STAC Input on Climate Science Needs

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Background

Chesapeake Bay Program

Climate Change Directive—Workplan

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5. **Refine and prioritize climate science needs and develop a resource plan.** Climate science needs for each outcome of the *2014 Chesapeake Bay Watershed Agreement* have been identified through the Strategic Science and Research Framework (SSRF). Completing and addressing the climate science needs for all the outcomes will require stronger engagement and collaboration from our partners to evolve their work to match CBP needs. The Management Board will host special sessions with support from STAR to 1) improve understanding of each outcome's climate science needs, 2) update the status of engaged resources addressing those needs, 3) identify priority climate science needs 4) quantify required additional resources for addressing remaining gaps, 5) and develop a plan for how partner programs, expertise and resources could be further leveraged to address priority climate science needs. The partnership will present their committed efforts to support implementation of the resource plan. The SSRF will be used to document and track future climate science needs identified for the outcomes and present, on an annual basis, to the Management Board to follow through with identifying opportunities to better engage science providers who can address these needs.

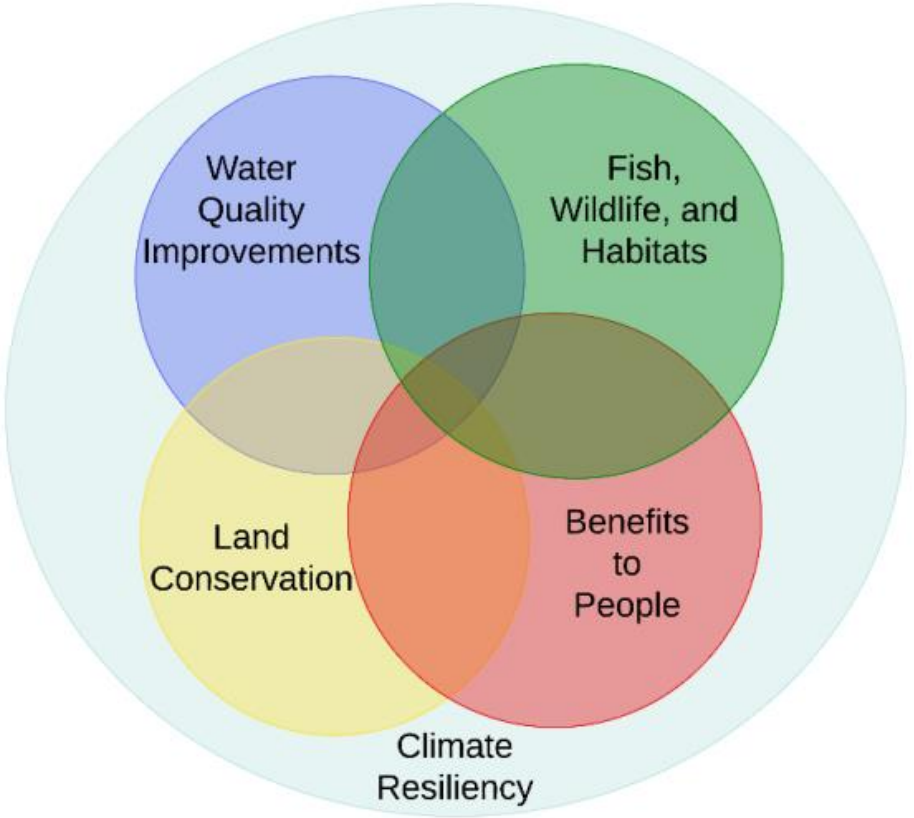
STAR Outreach to Outcomes

31 Outcomes -> 26* *Priority* Climate Science Needs

*Some Outcomes had the same climate science needs as another related Outcome, did not have a climate science need, or are still in the process of determining their priority climate science need

Priority Climate Science Needs

- Benefit to People
- Water Quality Improvements
- Habitat for Fish and Wildlife
- Land Conservation



Benefit to People

Synthesis

- Conduct a review of existing resources that prioritize and give guidance on high-impact actions that schools can take to mitigate against climate change.
- Use results from the stewardship index to help understand the relationship between human attitudes and behaviors towards restoration and conservation, in order to identify priorities and strategies for effective engagement, including actions that can contribute to climate solutions.
- Better articulation of green career/workforce pathways.

Monitoring & Analysis

- Identify the potential effects from climate change on public water access sites.

Water Quality Improvements

Modeling

- Develop and apply tools or methods that integrate various inputs to characterize healthy nontidal and healthy tidal waters vulnerability to future high-level risks including development and climate related stressors. (Also Synthesis.)

Water Quality Improvements

Monitoring

- Improve understanding of Chesapeake Bay tidal water quality trends in the context of climate change and changes in nutrient limitation over time.
- Conduct targeted research in small watersheds to measure the impacts of climate change on best management practices' effects on non-point source pollution such as nutrient, sediment and toxic contaminant loads and trends
- Evaluate and enhance consistent, coordinated monitoring of PFAS to assess status and change over time.

Water Quality Improvements

Research

- Research on climate change impacts, including sea level rise, storm surge, increased temperatures, extreme precipitation events and saltwater inundation, on the siting, design, and performance of BMPs to reduce nitrogen, phosphorus, and suspended sediment and enhance benefits to habitats and living resources. Research on the selection, placement, and tradeoffs of implementing current water quality best management practices (BMPs) in relation to minimizing the impacts of rising water temperatures to streams and nearshore tidal waters while maximizing the needed nutrient and suspended sediment load reductions to improve dissolved oxygen conditions, habitat for aquatic resources, and clean water for communities.
- Improved understanding of BMP effectiveness for removal of PCBs in a climate-impacted system. This has been expanded to include PFAS, and other prioritized toxic contaminants. (Also synthesis.)
- Conduct research on climate change impacts, including sea level rise, storm surge, increased temperatures, extreme precipitation events and saltwater inundation, on the siting, design, and performance of BMPs to reduce nitrogen, phosphorus, and suspended sediment and enhance benefits to habitats and living resources. (Also Modeling, Monitoring.)

Habitat for Fish and Wildlife

Research

- Conduct a robust assessment of which BMPs are heaters and coolers, to what extent, and to identify any landscape characteristics influencing the temperature impacts of BMPs. This could also include research into the efficacy of other cooling mitigation strategies, including wetland creation, dam/pond removal, floodplain restoration, beaver analogue projects, and improved roadside ditch management.
- Better understanding of the resilience effectiveness of natural infrastructure (e.g., living shorelines, marshes, forest buffers, oyster reefs) strategies to maintain/enhance ecosystem services to climate change impacts. Need better determination and quantification of associated benefits (e.g., habitat quality, shoreline protection) and potential unintended consequences to other restoration metrics (e.g, sediment dynamics), research on improving siting and design of natural infrastructure projects to maximize benefits, and cost-effectiveness analyses of these strategies under changing climate conditions. (Also Synthesis.)

Habitat for Fish and Wildlife

Analysis

- Determine how interactions between climate change (including rising water temperatures) and land use will affect brook trout, including cumulative impacts and adaptation potential.
- Risk assessment on wetland habitats forecasting vulnerability and resiliency to climate change. (Also Modeling.)
- Identify the potential mutualistic relationships between SAV restoration and bivalve restoration. Explore the potential of co-location of oyster/mussel restoration projects and SAV restoration projects; Identify the potential mutualistic relationships between SAV restoration and bivalve restoration. (Also Data Gathering, Literature Review, Modeling.)
- Evaluate the effects of environmental factors on blue crab growth, reproduction, mortality, abundance and distribution.

Habitat for Fish and Wildlife

Analysis (cont.)

- Evaluate climate related changes in fish growth, reproduction, abundance, distribution, habitat suitability, and predator prey interactions.

Synthesis

- Explore whether shallow-water oyster reefs can absorb a meaningful amount of wave energy as an element of shoreline protection.

Modeling

- A model to identify climate resilient streams and sub-watersheds would help prioritize fish passage restoration and increase resilience of targeted species/communities.
- Evaluate potential for additional forest buffers to cool streams and where these forest buffers could provide the greatest benefit for high-priority coldwater watersheds.

Land Conservation

Synthesis & Outreach

- Develop a Trees & Climate Resilience best practices technical guide with links to existing tools/analysis on which tree species are thriving or struggling in the face of climate change.
- Translate, format, package, and communicate LULC information and policy guidance to organizations and individuals trusted by local decisionmakers to inform a variety of policies and programs including land use and comprehensive plans, hazard mitigation and climate resiliency plans, as well as greenway, recreational and forestry management. Assess and communicate how observed land use changes are directly or indirectly due to climate change versus other factors.

Land Conservation

GIS

- Subject to change: Conduct opportunity assessment for climate related initiatives, both beneficial, such as forest-related carbon sequestration and co-benefits, and impactful, such as development pressures and negative climate impacts. (Also Analysis.)
- Change in land use needed for informing other Outcomes, particularly Healthy Watersheds, Stream Health, Climate Resilience, Tree Canopy, Forest Buffers, Wetlands, Fish Habitat, Oysters, Brook Trout, and Black Duck. (Also Synthesis.)

Questions for STAC

- Are the current themes logical? Are there additional themes we should pull out?
- Is there additional context you would add to the science needs so they may be of interest to management while also capturing what is needed from the research community?
- Can you share any research that may support justification for these science needs?