

Being Prepared for Climate Change: A Workbook for Developing Risk-Based Adaptation Plans

On behalf of the Maryland Coastal Bays Program

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Maryland Coastal Bays Program



Coastal Bays Watershed

National Estuary Program



One of only 28 National Estuary Programs nationwide, our goal since 1996 has been to protect and enhance the watershed, which includes Ocean City, Ocean Pines, Berlin, and Assateague Island National Seashore.

East of route 113, the 175-square mile watershed is home to the treasured resources of the St. Martin River, Newport Bay, Assawoman Bay, Isle of Wight Bay, Sinepuxent Bay, and Chincoteague Bay.

The watershed includes more than 189,000 acres of land, 71,000 acres of water, 248 miles of shoreline, and nearly 35,000 acres of wetlands.

Climate Change Planning - Background

- ▶ 2015: CCMP Revision included Coastal Resilience Focus
- ▶ 2016: Initiated EPA Climate Ready Estuaries Planning Process
- ▶ 2018: Completed Climate Change Vulnerability Assessment
- ▶ 2019-20 Developing Climate Change Action Plan
- ▶ Restoration/Resilience projects coincident with planning process
 - ▶ Assateague Shoreline
 - ▶ Tizzard Island



Vulnerability Assessment

- **Step 1—Communication and Consultation**
- **Step 2—Establishing the Context for the Vulnerability Assessment = 14 CCMP Goals**
- Step 3—Risk Identification
- Step 4—Risk Analysis
- Step 5—Risk Evaluation: Comparing Risks

Context

- Goal categories in the Comp. Conservation and Management Plan (CCMP)
 - Water Quality
 - Fish and Wildlife
 - Recreation and Navigation
 - Community and Economic Development

Step 3 – Risk Identification

Generating a broad list of reasonably foreseeable ways that climate stressors could keep your organization from achieving its goals

Stressors

- Warmer Summers
- Warmer Winters
- Warmer Water
- Increasing Drought
- Increasing Storminess
- Sea Level Rise
- Ocean Acidification

Step 4—Risk Analysis

- + One initial high level rating (low, medium, high) of:
 - + Consequence
 - + Likelihood
 - + Spatial scale
 - + Time horizon
 - + Habitat type

Step 5—Risk Evaluation: Comparing Risks

FIGURE 5-1. An example consequence/probability matrix.

- Develop a Consequences vs Probability Matrix
- Review it with Stakeholders
- Reach agreement on the overall assessment

Likelihood (probability) of occurrence	High	1. Warmer water may stress immobile biota 2. Warmer water may lead to changes in drinking water treatment processes n. _____	1. Warmer water may hold less dissolved oxygen 2. Sea level rise may cause bulkheads, sea walls and revetments to become more widely adopted n. _____	1. Shoreline erosion from sea level rise may lead to loss of beaches, wetlands and salt marshes 2. Combined sewer overflows may increase from more intense precipitation n. _____
	Medium	1. Increased wildfires from warmer summers may lead to soil erosion 2. Warmer winters may lead species that once migrated through to stop and stay n. _____	1. Parasites and bacteria may have greater abundance, survival or transmission due to warmer water 2. Warmer summers may drive greater water demand n. _____	1. More frequent drought may diminish freshwater flow in streams 2. More intense precipitation may cause more flooding n. _____
	Low	1. Warmer water may lead open seasons and fish to be misaligned 2. Warmer winters may lead to more freeze/thaw cycles that impact water infrastructure n. _____	1. Warmer water may lead jellyfish to be more common 2. Ocean acidification may cause the recreational shellfish harvest to be lost n. _____	1. Contaminated sites may flood from sea level rise 2. Warmer water may promote invasive species n. _____
		Low	Medium	High
		Consequence of impact		

CCVA Summary

Goals	Number of Risks		
	Red	Yellow	Green
WQ 1: Decrease nutrient loading throughout the watershed	17	7	2
WQ 2: Decrease inputs of toxic contaminants	2	3	15
WQ 3: Implement a strategy to meet TMDL reductions	4	0	2
FW 1: Characterize, monitor and manage fishery resources and habitats	21	9	6
FW 2: Characterize, monitor and manage estuarine resources and habitats	10	3	1
FW 3: Characterize, monitor and manage terrestrial resources and habitats	14	1	1
FW 4: Expand upon the coordinated effort to collect and report on Coastal Bays geomorphic and biometric info	1	0	0
RN 1: Improve recreational opportunities and access to the Coastal Bays and tributaries	0	2	2
RN 2: Balance resource protection with recreational use	5	0	2
RN 3: Continue to implement the Ocean City Water Resources Study recommendations	3	2	1
RN 4: Manage sediment alterations in a manner beneficial to the local economy and natural resources	2	0	1
CE 1: Manage the watershed to maximize economic benefits while minimizing negative resources impacts	5	7	3
CE 2: Enhance the level of sustainability in land use decision making	2	3	8
CE 3: Educate and inform the population so it can make knowledgeable decisions for the community and its future	0	1	0
Total	86	38	44



Action Plan

- + Step 6—Establishing the Context for the Action Plan
- + Step 7—Risk Evaluation: Deciding on a Course
- + Step 8a—Finding Adaptation Actions
- + Step 8b—Selecting Adaptation Actions
- + Step 9—Preparing and Implementing an Action Plan
- + Step 10—Monitoring and Review

Step 6: Establishing Context

- Affirm partnerships and possible leads
 - CCMP has leads for each goal already
 - Each partner should review CCMP goals for which they are the lead
 - Goal still necessary and/or relevant?
 - Is the partner still willing to be the lead?
- Organizational context
 - Anything MCBP should be aware of that will limit action?

Step 7: Risk Evaluation – Deciding on a course

Risk management approach	Description	How your organization would use this approach
Mitigate	Take action to lower the consequence or likelihood of the risk (or both).	Address the risk, or lead the effort to address the risk. Good for risks in Green happening now, and Yellow risks happening in 10-30 yrs.
Transfer	Another party has responsibility for mitigating the risk.	Allow or ask others to take the lead; assist as you can.
Accept	Run the risk. Accept that the consequences may occur.	Business as usual in spite of the risk. Monitor, and reassess options in the future. Good for risks in Green more than 10 yrs. away, and for Yellow risks with a long time horizon. Not recommended for Red risks.
Avoid	Take organizational or administrative action so that you will not be exposed to the risk.	Stop putting resources toward the goal that would be affected. Or delete/revise your goal and thus be out of the risk altogether.

Step 8A: Selection of Adaptation Actions

Table 8a-2. Selection of aDapTaTion acTions

Risk selected for mitigation	Potential adaptation action (one or more for each risk)	Could the <u>action</u> <u>reduce likelihood</u> (by itself or in combination with another action)? Yes/No	Could the action reduce consequence (by itself or in combination with another action)? Yes/No
1.			
2.			
3.			
n.			

Step 8B: Evaluation of Adaptation Actions

Adaptation actions	Risk reduction potential	Feasibility and effectiveness	Cost and cost-effectiveness	Ancillary costs and benefits	Equity and fairness	Robustness	Appropriate to proceed with this action? (yes/no)
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
n.							

Selecting Actions for Implementation

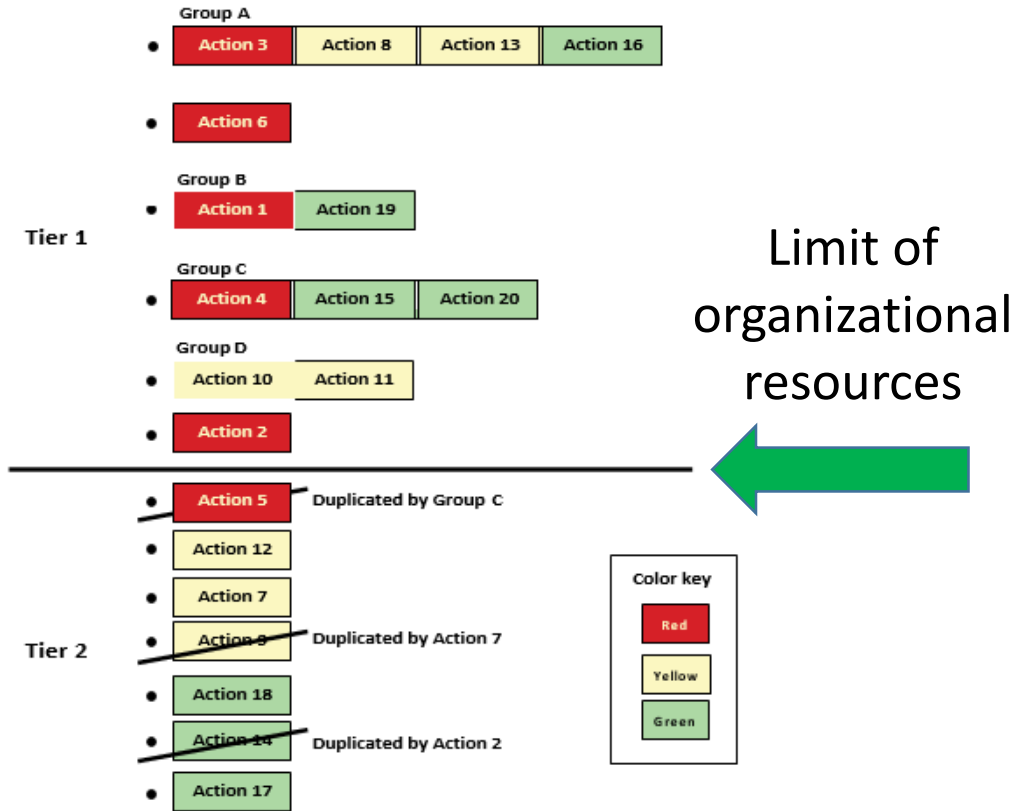


Figure 8b-2. Place a line as far down from the top of a list like Figure 8b-1 as your resources will allow. Tier 1 actions (above the line) will move forward for implementation, while Tier 2 actions (below the line) will not move forward right now. This is the plan that will get your organization the most risk reduction you can achieve using available resources.

Steps 9 and 10: Where we are now

- Prepare/Implement Action Plan

- Designate lead/project manager for each Tier 1 adaptation action
- Ensure organizational leaders have given concept approval of the work
- Charge the responsible parties with developing and implementing project plans
- Create 2 risk management tracking systems
- Actions (Table 9-1)
- Risks (Table 9-2)

- Monitor and Review

- Set routine meetings
- Monitor changes in science and context for the organization
- Review and revise plan based on regulatory, political, financial context