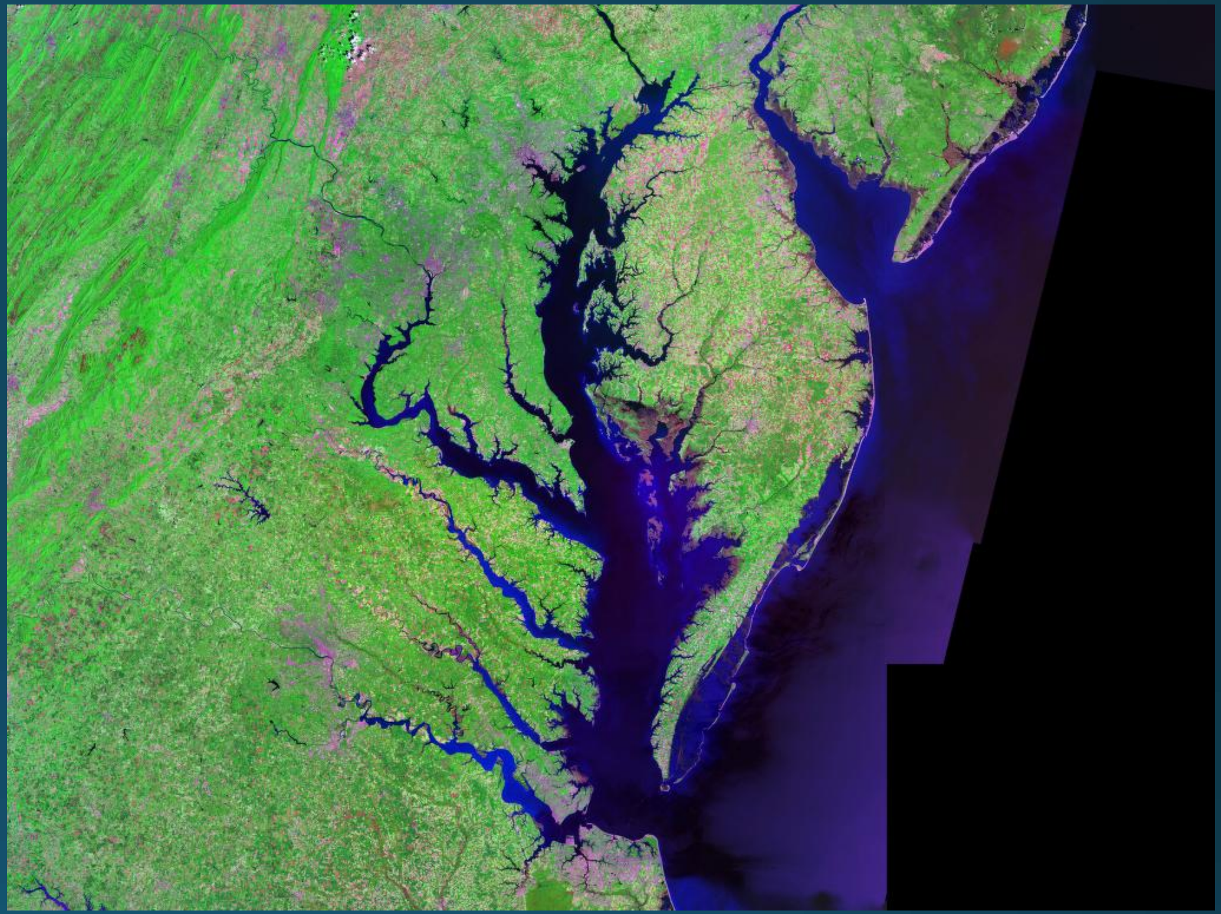
Climate Resiliency Decision-Making Matrix & Methodology

Climate Smart Restoration Workshop

Toxic Contaminants Workgroup

July 31-August 1, 2017



Overview

Agenda

- Project goals
- Climate smart approach
- Overview of climate adaptation matrices
  - Applicability at multiple levels
  - Tailoring to different GITs/workgroups
- Workshop process & exercise

What are we doing and Why?

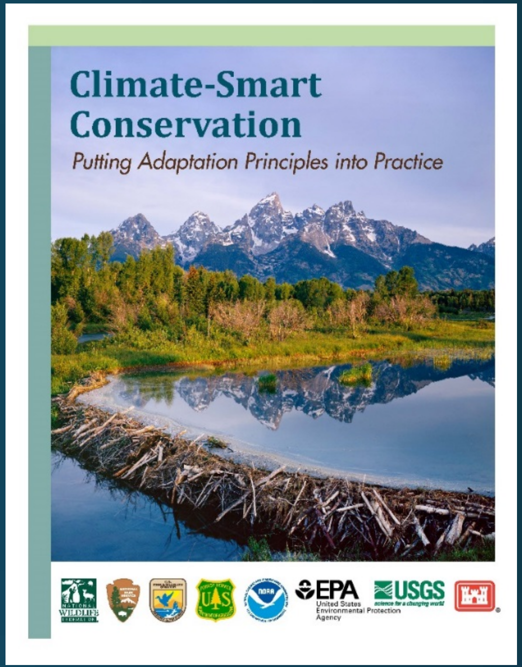
Climate Resiliency Goals

Increase the resiliency of the Chesapeake Bay watershed to adverse impacts from changing environmental & climate conditions

- Monitor:
  - Impacts of climate changes & sea level conditions
  - Effectiveness of restoration programs and projects
- Implement restoration &protection projects
  - Enhance resiliency
  - Address erosion, flooding, more intense & frequent storms & sea level rise

Project Goals

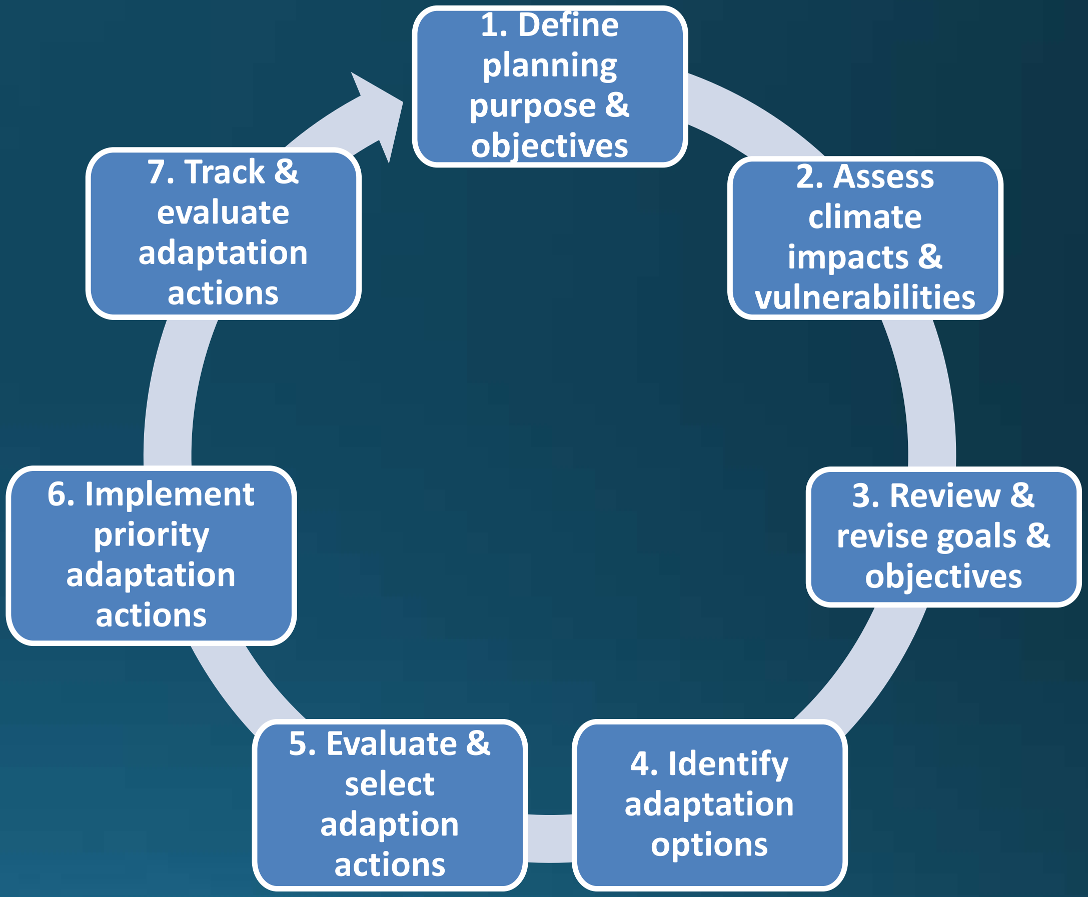
- Advance climate resilience objectives, including application of Climate-Smart conservation
- Develop a matrix methodology that will work across the GITs/workgroups
- Use a regionally developed framework/methods to integrate climate change into CBP management strategies and actions
- Engage with selected GITs/workgroups as case studies



Stein et al. (2014)
http://www.nwf.orgClimateSmartGuide

What is climate smart?

- Comprehensive review and synthesis of adaptation principles for ecosystem management
- Framework for integrating climate change information into every step of the management planning cycle
- General adaptation strategies to aid in brainstorming specific actions
- Rules for designing management actions to be “climate-smart”



Why 'Climate Smart' & This Process?

- Climate Smart planning– resiliency comes in at many points in the cycle
- Assessment & adaptation to climate change influences success ('effectiveness') of Chesapeake Bay restoration work
- Builds resiliency of living resources, habitats and communities
- Will require changes in policies, programs & projects → multiple scales of application

Climate adaptation matrices

Vulnerability Assessment as Input

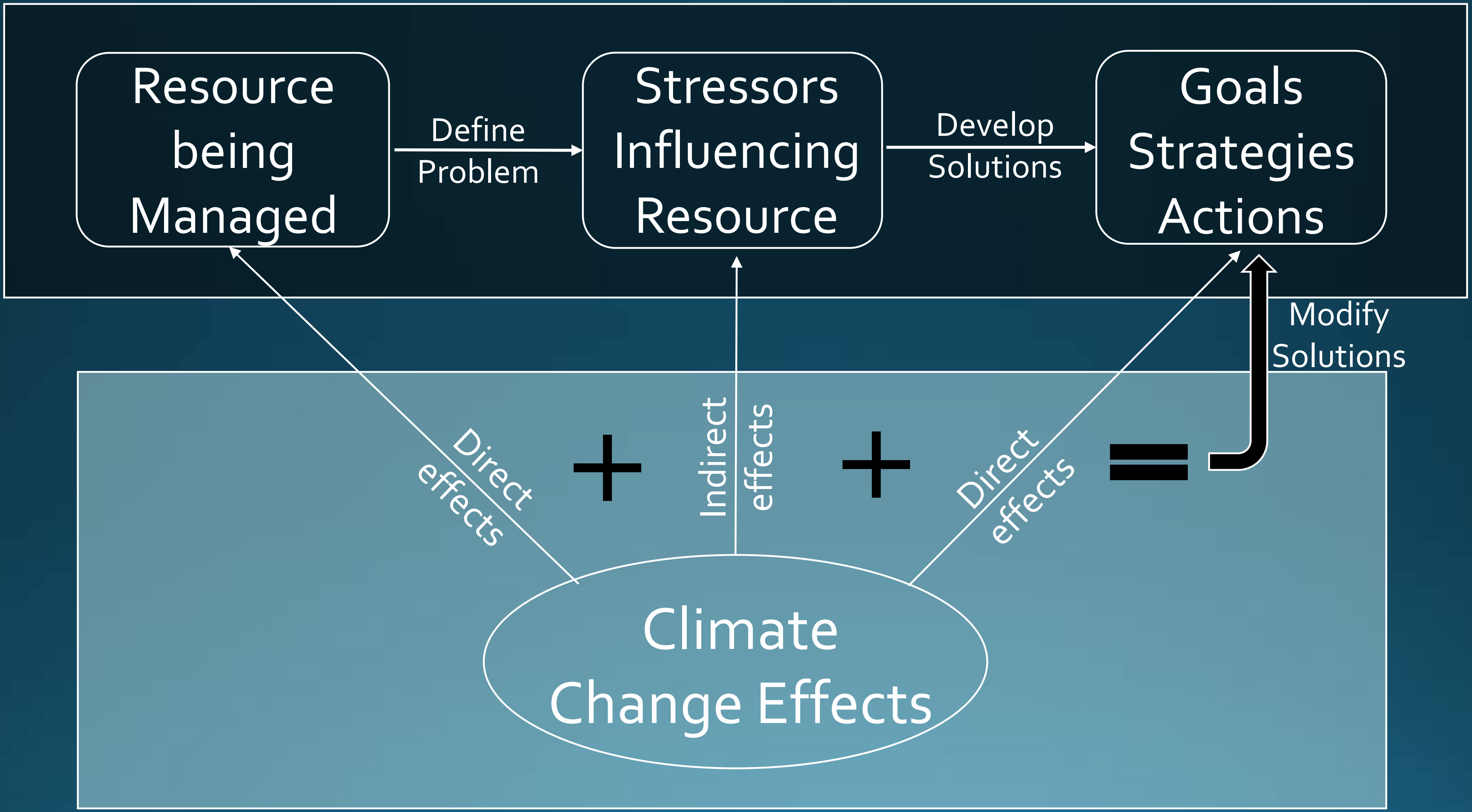
Step 2: Assess Climate Impacts & Vulnerabilities

COMMUNITY NAME: West Maui			
INDICATORS OF A CHANGING CLIMATE			
Climate Threat			Impacts
Indicator	Magnitude and direction of change over time based on community knowledge and latest climate science	Changes in environmental conditions (Climate Stressors)	Potential impacts to natural and social resources
• Air temperature	Air temperature has increased and is projected to continue to increase in the Main Hawaiian Islands. Historical: In the Main Hawaiian Islands, from 1919 to 2006, average temperature for all stations increased by 0.04°C (0.08°F) per decade with natural variability. The rate of warming accelerated to 0.16°C (0.30°F) per decade from 1975 to 2006. The rate of increasing temperature from 1975 to 2006 is greater at high-elevation stations (0.27°C or 0.48°F per decade at greater than 800 meters above sea level). The annual number of below-freezing days has decreased between 1958 and 2009. An increase in the frequency of occurrence of the Trade Wind Inversion over Hawaiʻi since the late 1970s (Cao et al., 2007) is consistent with continued warming and drying trends throughout Hawaiʻi, especially for high elevations. Projected: In the Central North Pacific region, under the B1 and A2 scenarios, mean annual air temperature will continue to increase compared to 1971 to 2000. For 2055, B1 values range from 1.5° to 2.5°F, and A2 values range from 3° to 3.5°F higher.	Warmer temperatures, higher rates of evapotranspiration, changes in rainfall patterns with potential increase in drought conditions	Shifts in composition and distribution of native and non-native species, leading to losses of soil-stabilizing vegetative cover that could result in increased soil erosion
• Sea-surface temperature	Water temperature has increased and is projected to continue to increase in the Main Hawaiian Islands. Historical: Pacific Ocean temperatures exhibit strong inter-annual and decadal fluctuations, and since the 1950s also exhibit a warming trend from surface to 200 m depth by as much as 3.6°F. Projected: In the Central North Pacific region, projected increases in SST range from 1.8° to 2.3°F by 2055 under B1 and A2 emission scenarios (compared to 1990 levels).	Warming seas, changes in ocean stratification	Coral bleaching and potential loss of reef structure and associated fish; shifts in marine species distribution and migration patterns; impacts to fishing sector
• Sea level	Sea level has risen and is projected to continue to rise in the Main Hawaiian Islands. Historical: Global average sea level has risen by about 8 inches since 1900. Since the early 1990s, the rate of globally averaged sea level rise has been estimated to be 0.134 ± 0.016 inches per year based on satellite altimeter measurements. This is twice the estimated rate for the 20th century as a whole based on tide gauge reconstructions. Regional sea level trends may differ significantly from the globally averaged rate over multi-year to multi-decadal time scales. Maui had a island-wide average shoreline change rate at – 0.13 ± 0.05 m/yr over the last century due to multiple factors. Projections: In the Central North Pacific region, sea level over this century is expected to rise at about the same rate as the projected increase in global mean sea level, with regional variations. Climate model predictions estimate approximately 6 to 24 inch rise in global sea level by 2100. Including potential contributions due to changes in the dynamics of ice-sheet discharge results in an additional 4 to 8 inches of rise. So-called "semi-empirical models" yield higher estimates of global sea level rise, ranging from approximately3 to 5 feet by 2100. Why semi-empirical models yield higher values than estimates based on climate models is not understood.	Increased storm surges and king tides, more frequent coastal inundation, larger areas of inundation, greater rates of coastal erosion	Damage to key infrastructure, homes, and culturally important areas; decreased near-coastal water quality, coastal flooding and drainage issues

Format of Decision Matrices

- Step 1 – Screening
- Step 2 – Category 1 Climate Smart Considerations
  - Climate change effects on the stressors and systems
- Step 3 – Category 2 Climate Smart Considerations
  - Climate change implications for functionality/effectiveness
- Step4 – Climate Smart Re-Design
- Other
  - Notes on needed interactions with other groups
  - Notes that inform climate questions at higher levels
  - Consideration of what is missing

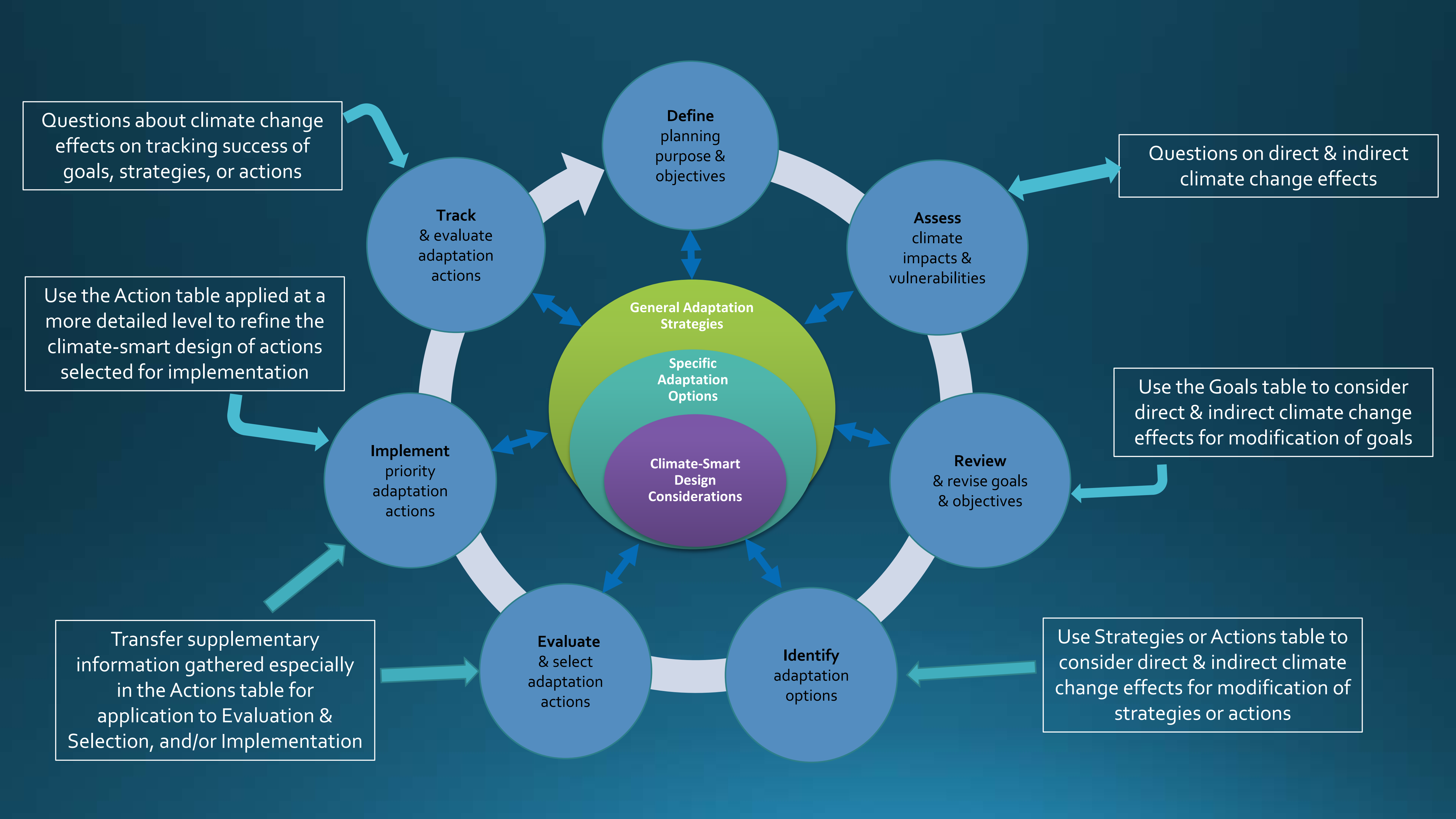
Original Management Approach



Climate Smart Considerations

Decision Matrices

- Need to make decisions 'climate smart' at multiple levels
  - Project design to realistic goals/outcomes
- Currently have 3 levels
  - Actions/work plans (most specific – the 'bottom' of bottom-up
  - Strategies/approaches
  - Goals/outcomes
- Pigeon-holing by level not important
- Questions become qualitatively different
  - Site- & method-specific at action level, applicability to design
  - Consider broader spatial & temporal scales at higher levels, applicability to planning
- Need inputs from the 'bottom' to assure higher levels incorporation meaningful climate vulnerabilities
  - **Bottom-up**


Questions about climate change effects on tracking success of goals, strategies, or actions
Define planning purpose & objectives
Questions on direct & indirect climate change effects
Track & evaluate adaptation actions
Assess climate impacts & vulnerabilities
Use the Action table applied at a more detailed level to refine the climate-smart design of actions selected for implementation
General Adaptation Strategies
Specific Adaptation Options
Climate-Smart Design Considerations
Use the Goals table to consider direct & indirect climate change effects for modification of goals
Implement priority adaptation actions
Review & revise goals & objectives
Evaluate & select adaptation actions
Identify adaptation options
Transfer supplementary information gathered especially in the Actions table for application to Evaluation & Selection, and/or Implementation
Use Strategies or Actions table to consider direct & indirect climate change effects for modification of strategies or actions

Tailor Applicability to all GITs/WGs

- Different decisions
  - Toxics focus different from habit or organism-based groups, etc.
- Mechanisms of implementation differ
  - Often ‘opportunistic’
  - Can apply to assess the value of opportunities

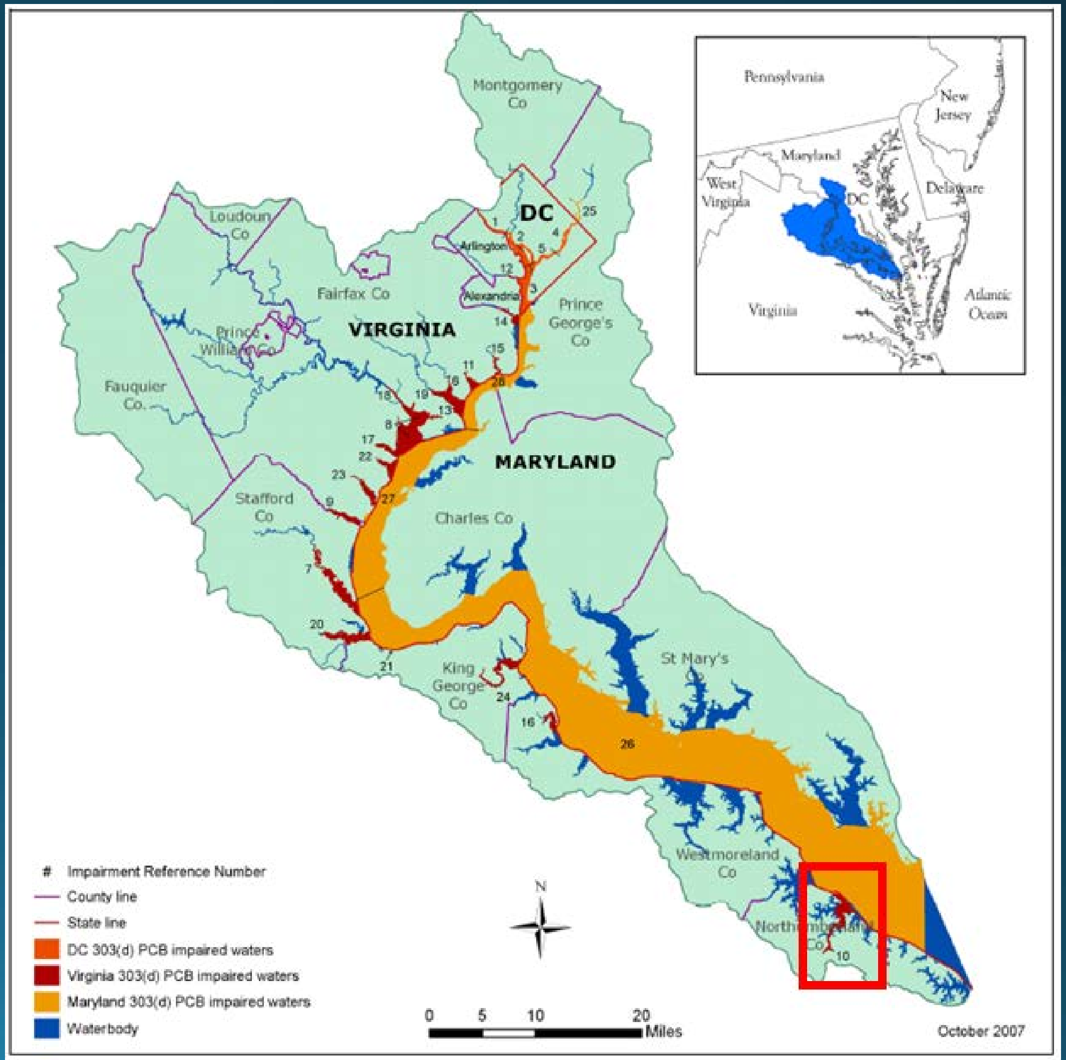
Workshop

Workshop Goals & Process

- Progress toward providing a structured but easily applied process to make Toxic Contaminant management decisions 'climate smart'
- Introductory information
- Work through 3 exercises to
  - Understand how the matrices work
  - Find strengths & weaknesses when applied to Toxics elements
  - Develop information specifically relevant to the Toxic Contaminants WG
- Breakouts
  - If enough participants, get multiple points of view on same questions

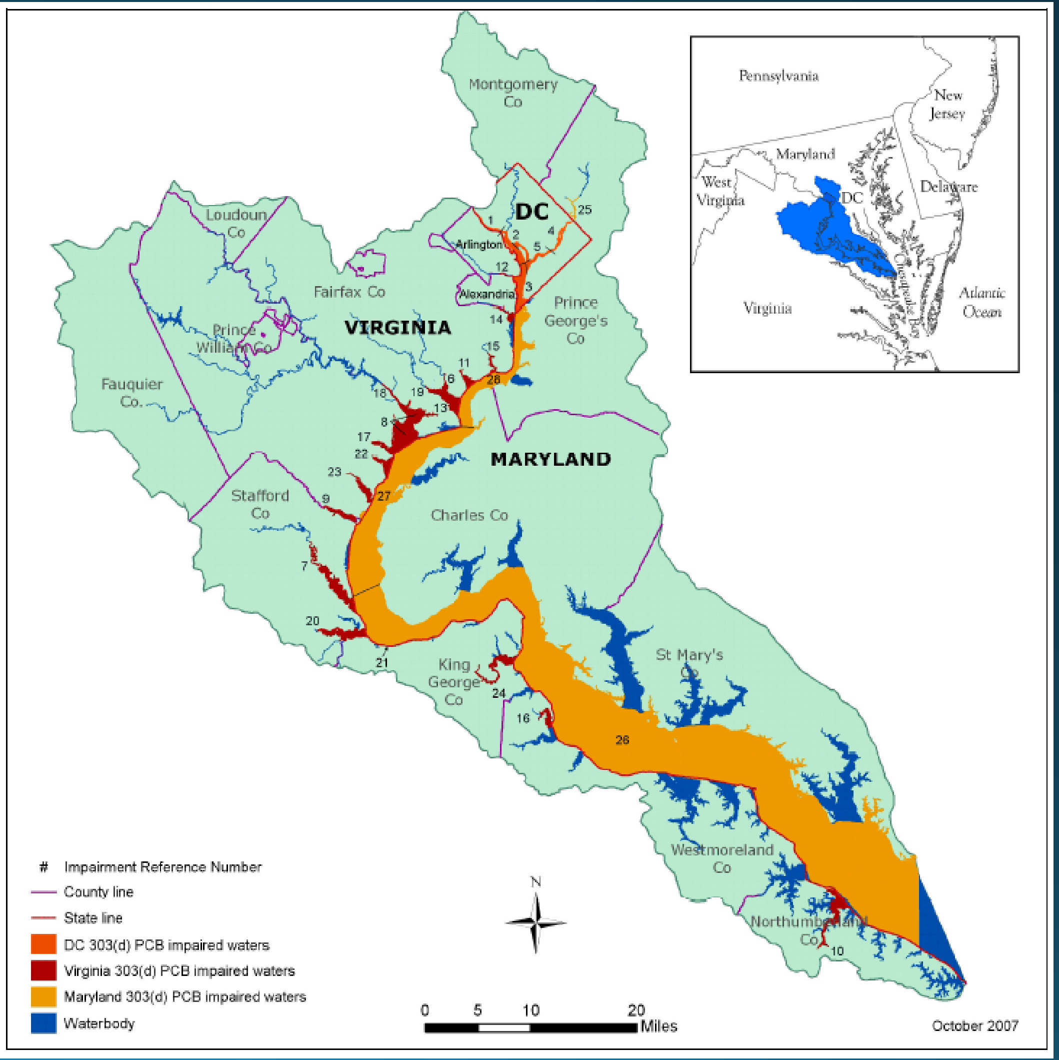
Exercise 1
Coan River PCB Remediation

- A hypothetical project, but grounded in the real TMDL
- Pilot most specific level (implementable actions)
- Inputs for work plan revisions
- Uses BMPs that might commonly be utilized to remediate PCB contamination



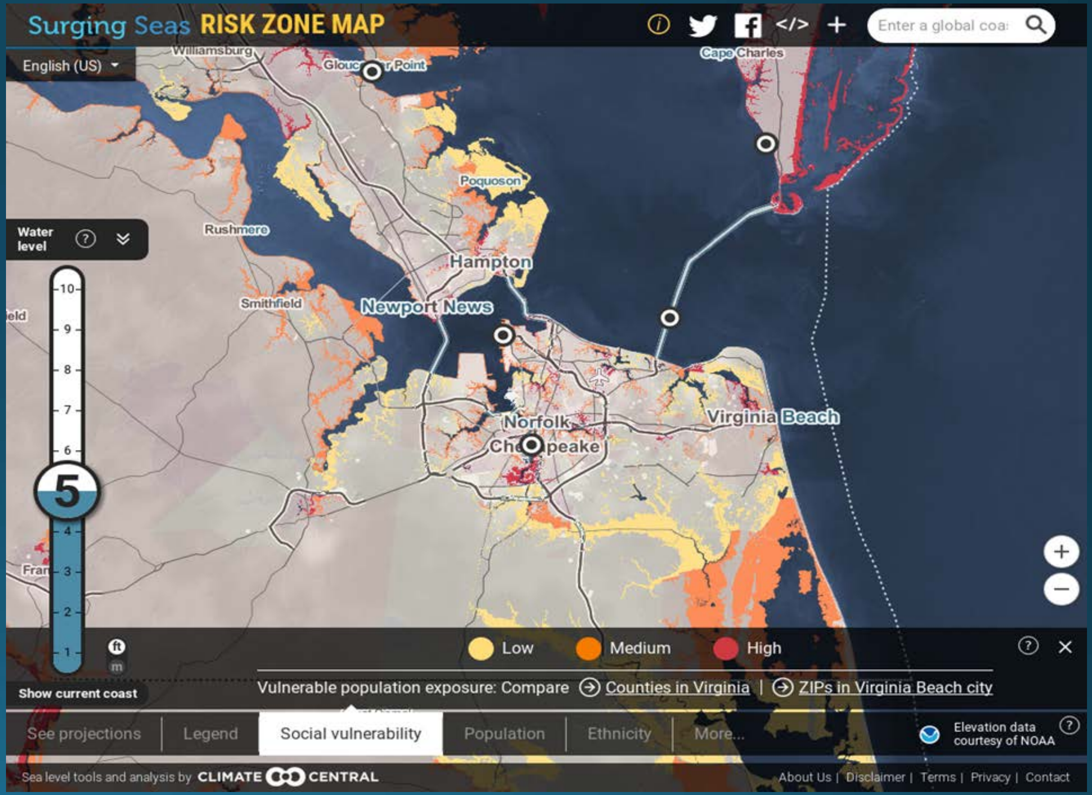
Exercise 2
Potomac River PCB TMDL

- TMDLs one approach that drives implementation of Toxic Workgroup goals
- Are critical components or assumptions of the TMDL vulnerable to climate change, and what could be done about it?
- Got background from Hope's presentation to help frame discussion



Exercise 3
Vulnerability of Virginia Waste Sites to SLR

- Over larger spatial scales, will climate changes, e.g., SLR & storm surge, change the picture of toxic inputs/ exposures in the Bay?
- How could such information affect strategy formulation?



Synthetic Questions

- Decision context
- Applying results to decisions
- Emerging insights
- Group comparisons, information gap, successes/issues
    - Will help revision of matrices
- Applicability to workgroup process
- Applicability across different workgroups

Expectations

- Work through first 2 exercises during first session (~1 ¾ hours)
- Work through 3rd exercise & issues in application at higher levels during second session (~1 hour)
- Lots of honest inputs!