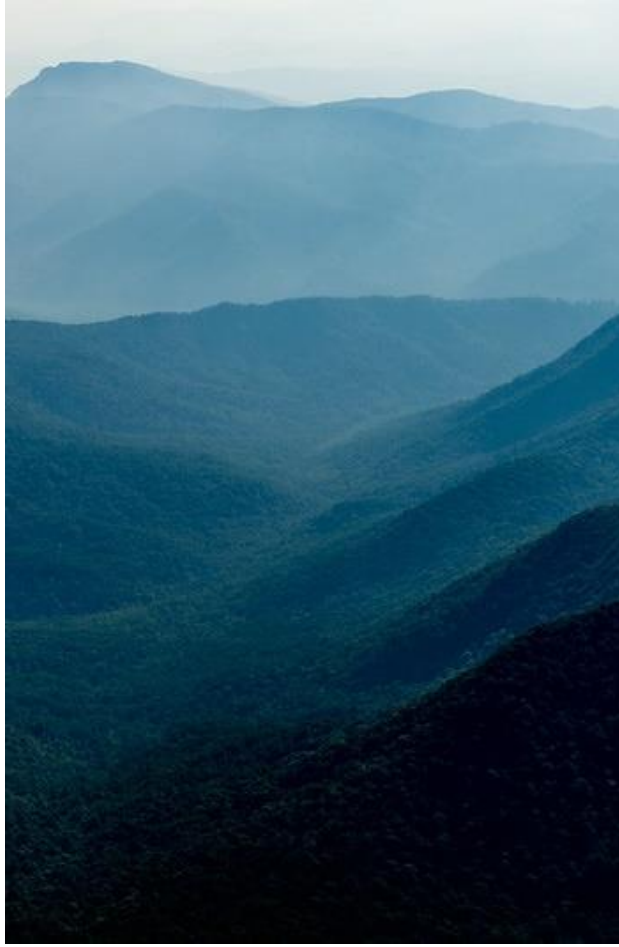


Climate Small Group

STAR Meeting

February 22, 2024

Chesapeake Bay Program

40 years of science, restoration and partnership

CLIMATE SMALL GROUP MEMBERS

- Breck Sullivan (Co-Chair), USGS
- Bo Williams (Co-Chair), EPA
- Lewis Linker, EPA
- Julie Reichert-Nguyen, NOAA
- Chris Guy, FWS
- Ashley Kelly, DOD
- Katie Brownson, USFS
- Jackie Specht, MD DNR
- Kathy Boomer, Foundation for Food & Agriculture
- Ruth Cassilly, UMCES Non-point Source Policy Analysist
- Rosa Hance, Choose Clean Water Coalition
- Sharon Baxter, VA DEQ
- Ben McFarlane, Hampton Roads Planning District
- Joseph Galarraga, TNC
- Jay Ford, CBF

OBJECTIVES

- Consider 3V questions
- Consider Executive Council Charge questions
- Consider other questions we deem fit within our topic
- Consider Cross-Cutting Questions
- 3-month timeframe
- Deliverable = 5 Recommendations for Steering Committees to consider for final product to the Executive Council

SCOPE AND PURPOSE

- Providing recommendations to transform Chesapeake Bay Program partnership policies, programs, and projects to address the significant ongoing and future impacts climate change will impose on the Bay and its watershed and people across generations. These recommendations should include strategies to better incorporate climate mitigation, adaptation and resiliency across the watershed and tidal Bay.

TOPICAL DISCUSSIONS

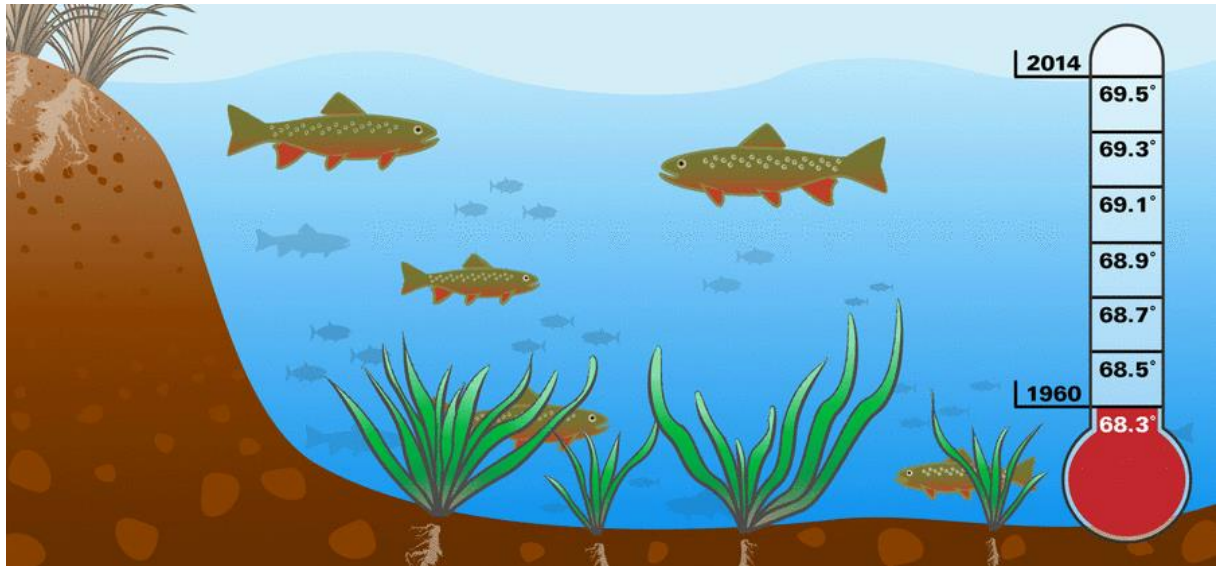
- Defining resilience, adaptation, and mitigation/carbon stewardship
  - Emily Trentacoste (EPA ORD), Elliott Campbell (MDDNR)
- Climate vulnerabilities
  - Dr. Weihsueh Chiu (Texas A&M)
- Food security and agriculture
  - Matthew Houser (TNC), Lisa Blazure (Stroud Water Research)
- Decision science
  - Mike Runge (USGS), David Martin (TNC)
- Adaptation Frameworks—RAD (Resist, Adapt, Direct) and Climate Change Response (Resistant, Resilience, Transition)
  - Danielle Shannon (NIACS), Andy Miller (EPA ORD), Joel Scheraga (EPA Office of Policy)
- Integrating climate factors into CBP work
  - David Wood (Chesapeake Stormwater Network), Nicole Carlozo (MDDNR)
- Ecosystem Services
  - Elliott Campbell (MDDNR)
- CBP Climate Capacity and Structure
  - Small Group Experts

RECOMMENDATIONS

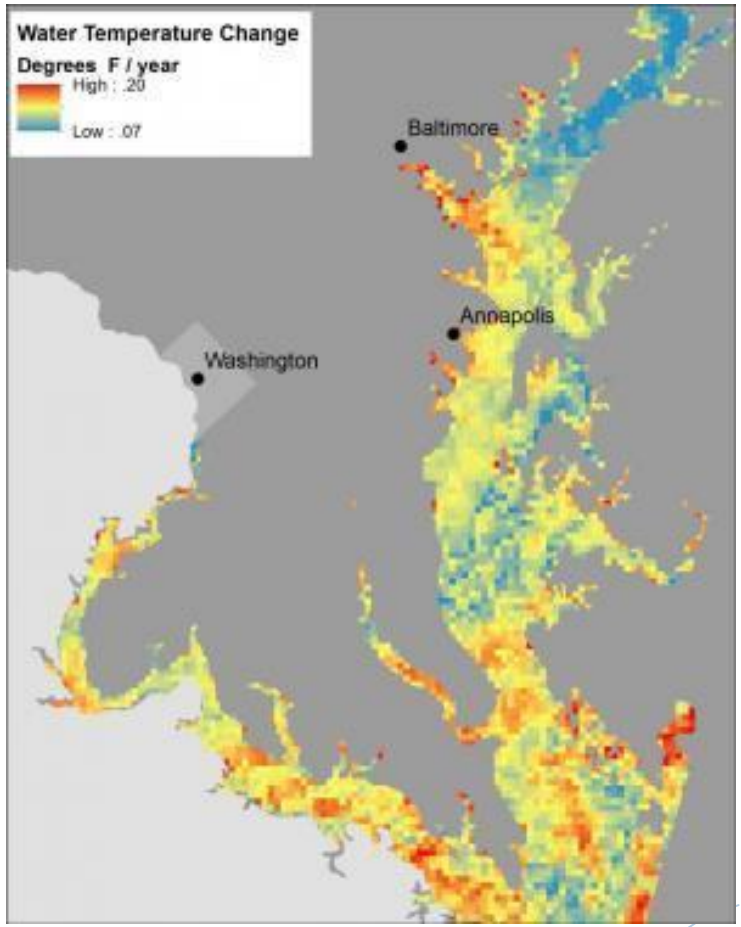
- These recommendations are being updated
- The order presented is not prioritized.
- The recommendations to the Steering Committee are to capture WHAT needs to change/adopted rather than HOW
- 5 Recommendations = Broad concepts
  - Details and justification will be provided to the Steering Committee to capture more specifics

A CHANGING CHESAPEAKE

Water temperatures are rising in the Bay and its watershed



Source: Chesapeakebay.net, EPA.

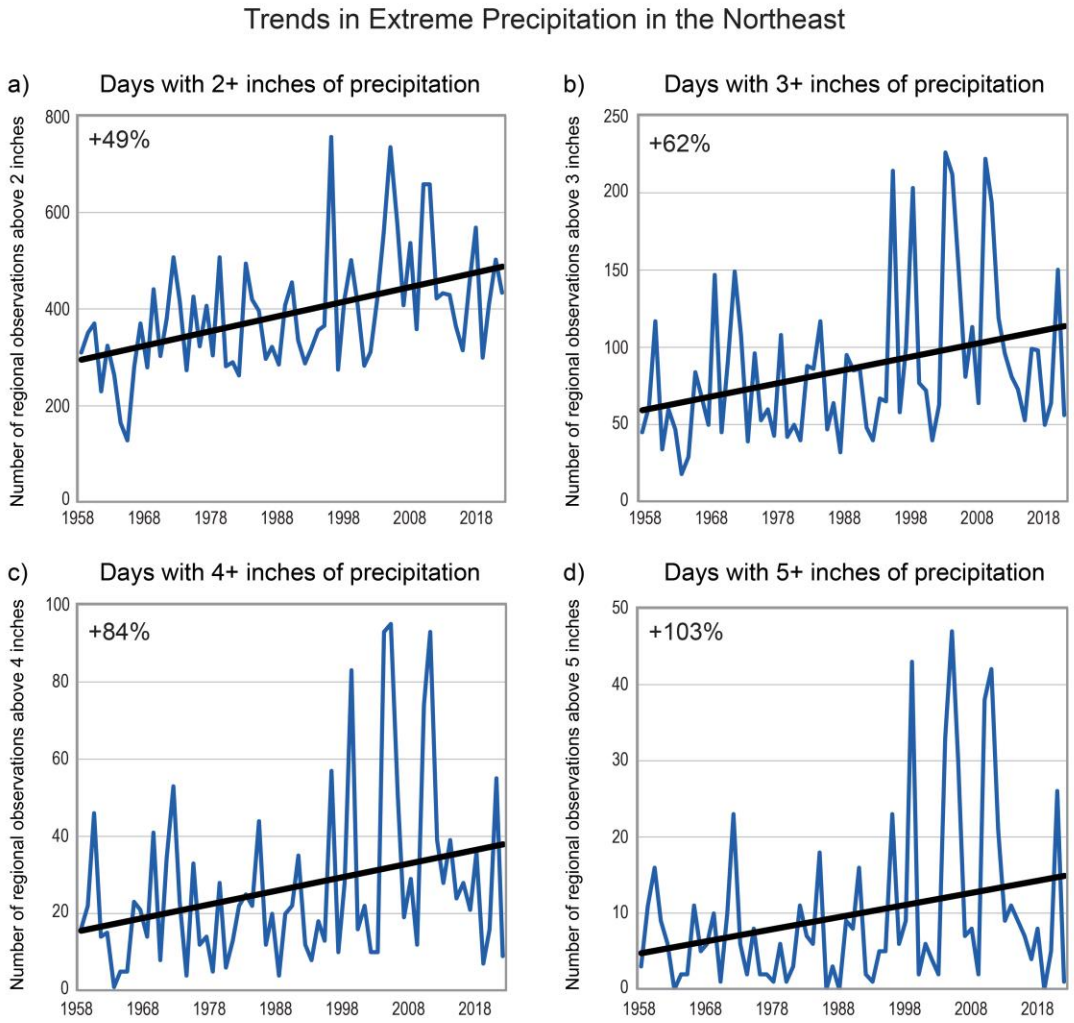


Source: Haiyong Ding, Andrew Elmore

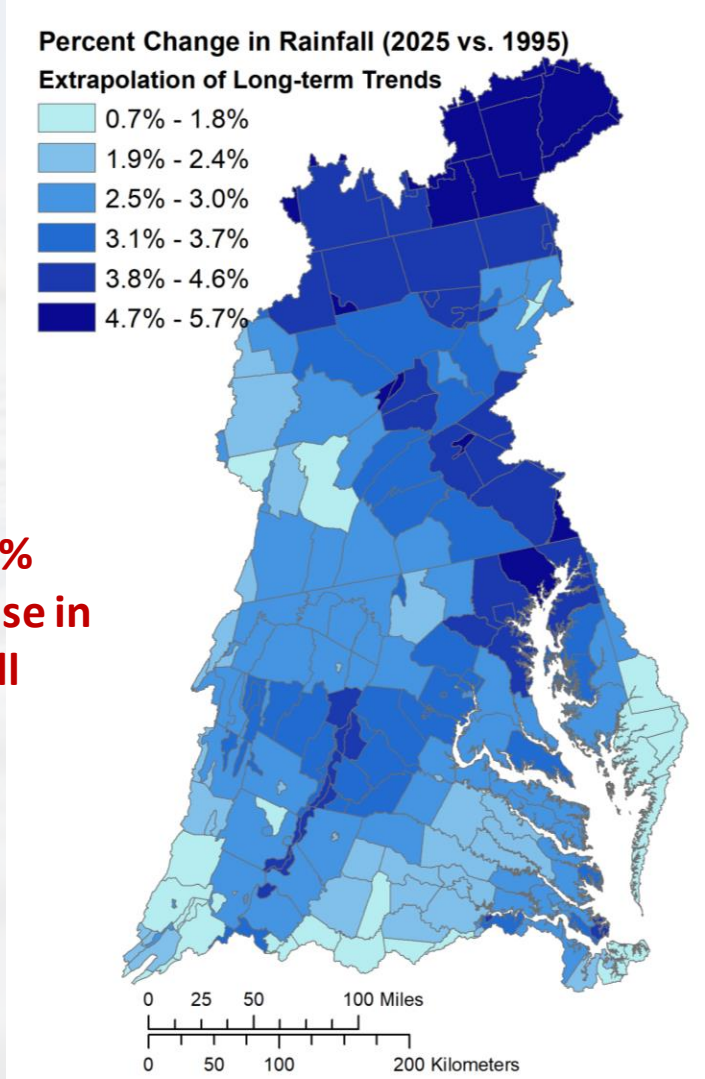
Chesapeake Bay Program
40 years of science, restoration and partnership

A CHANGING CHESAPEAKE

Precipitation and precipitation extremes are increasing



Elements of 2025 Climate Change (1995-2025)



+3.11 % Increase in rainfall

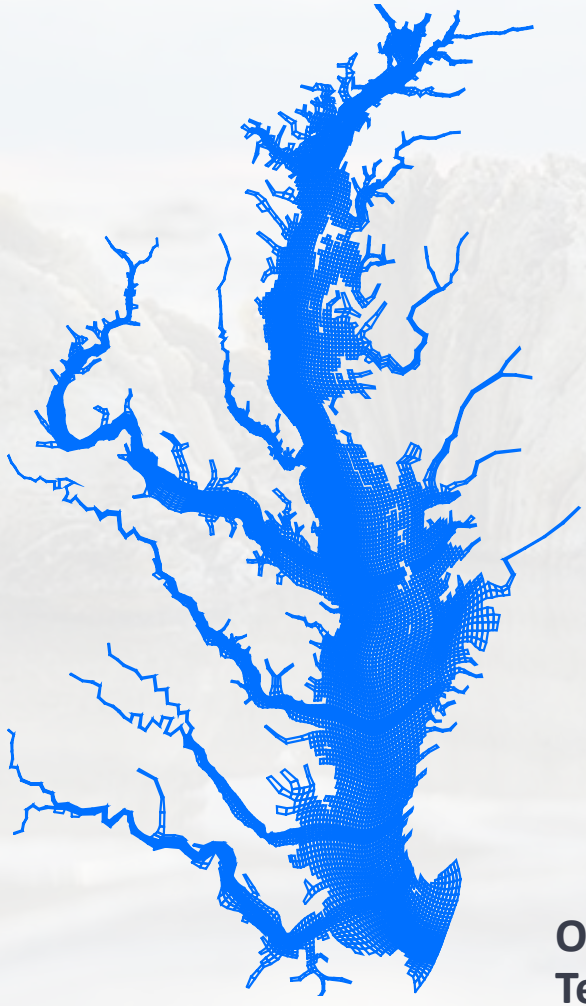
Phase 6 Watershed Model

Flow → 2.4% Increase

Nitrogen Load → 2.6% Increase

Phosphorus Load → 4.5% Increase

Sediment Load → 3.8% Increase



Model: CH3D-ICM 400m-1km Resolution

Air-temperature increase: 1.06 °C

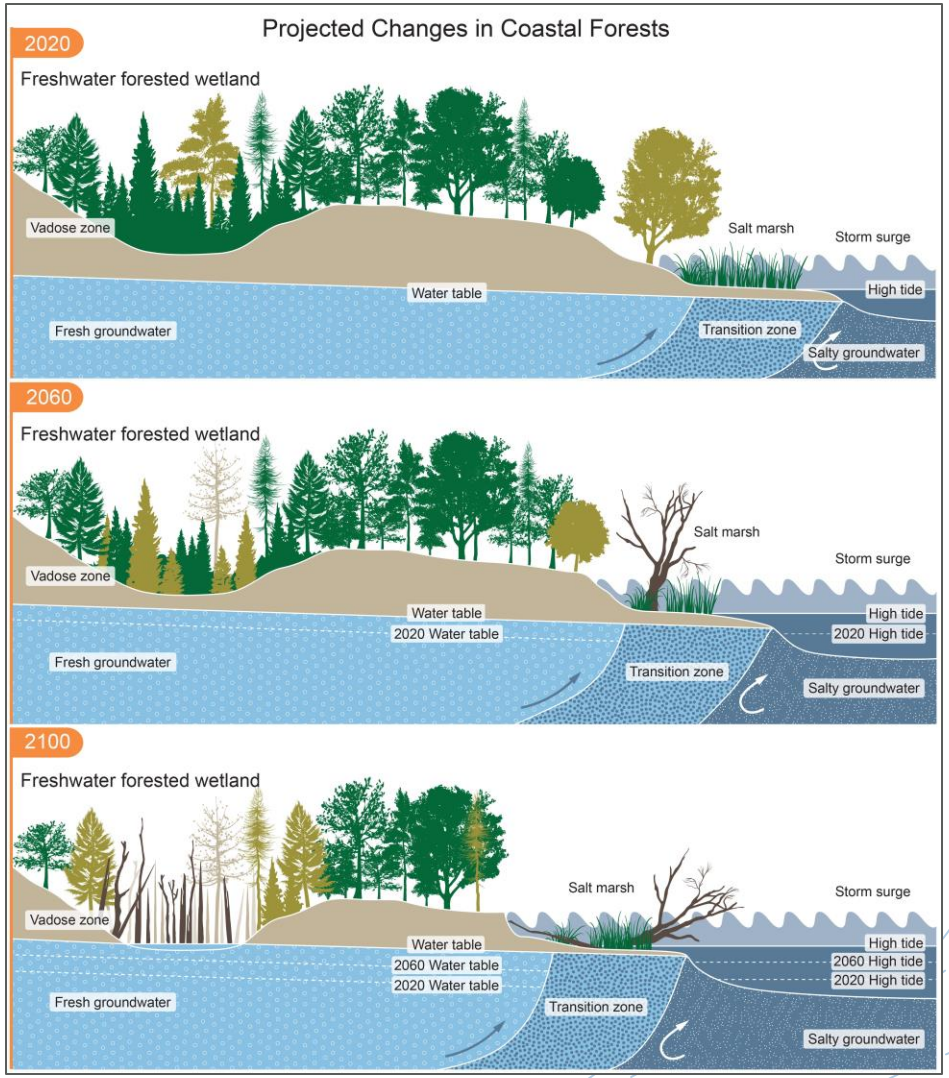
Sea Level Rise: 0.22m

Open boundary: Temperature: +0.95 °C; Salinity: +0.18 psu (Thomas et al., 2017)

A CHANGING CHESAPEAKE

Rising Seas

Source: Will Parsons

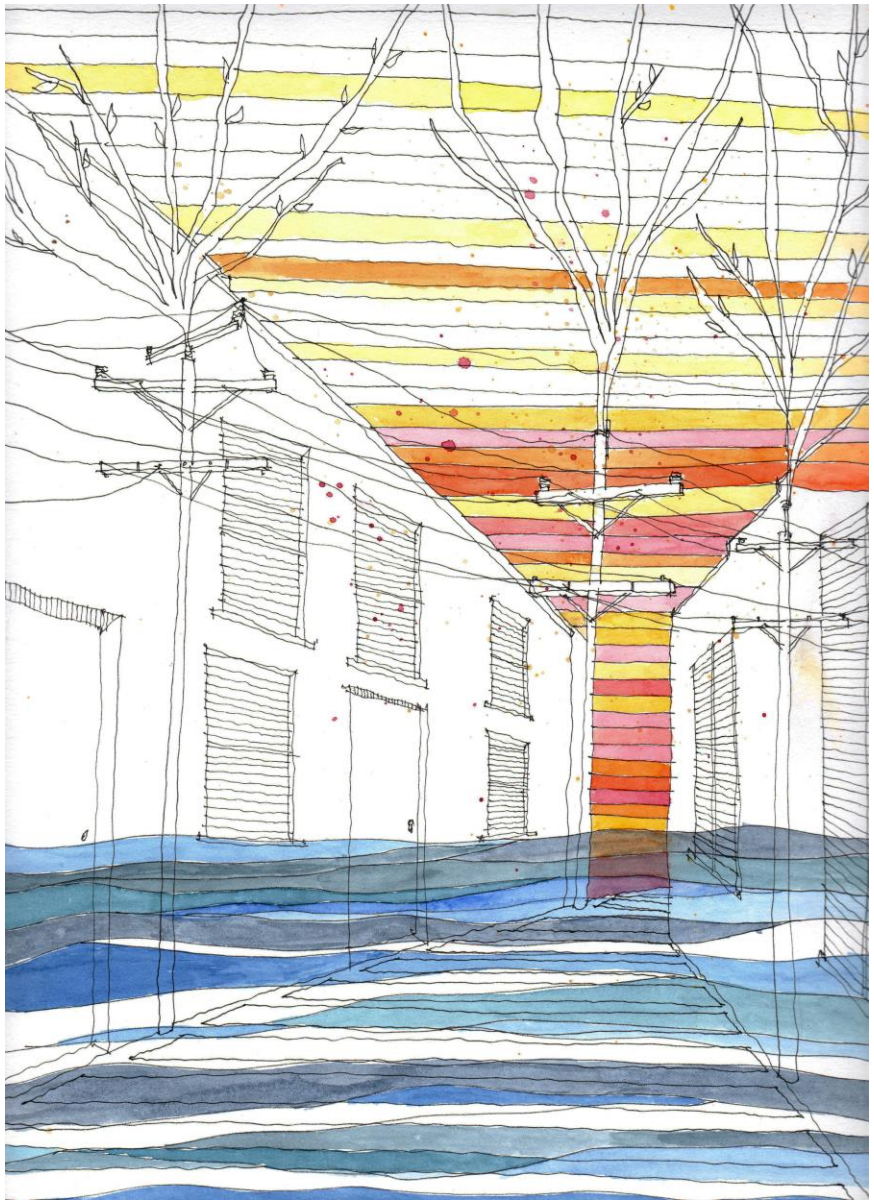


Source: National Climate Assessment

Develop a vision for the Bay of the future

- Align Chesapeake Bay Agreement goals with climate change
- Establish holistic climate *adaptation* goal(s)
- Invest in climate adaptation initiatives
  - Climate adaptation science
  - Integrate climate projections into strategies.
- Adapt partnership structure and increase capacity to advance integration of climate considerations
- Apply structured decision making at all levels

Replanting Resilience—Jillian Pelto



Under Pressure–Andrea Ruedy Trimble

Improve Resilience of Communities to Key Regional Climate Vulnerabilities

- Prioritize climate adaptation and resilience for most vulnerable communities
- Build community capacity to adapt to climate change
- Promote nature-based solutions to improve infrastructure
- Supporting cultural and historical continuity in a changing landscape
- Improve involvement by directly engaging communities and building networks of practice

Promote Carbon Stewardship as Holistic Approach to Climate Mitigation

Promote Carbon Stewardship as Holistic Approach to Climate Mitigation

- Advance understanding of carbon stewardship science
- Improve consideration of carbon in land use planning and decision-making
- Improve regional coordination around carbon stewardship using natural climate solutions

Promote Strategies that Enhance the Resilience of Natural Ecosystems to be Healthy and Productive Under Changing Climate Conditions

Promote Strategies that Enhance the Resilience of Natural Ecosystems to be Healthy and Productive Under Changing Climate Conditions

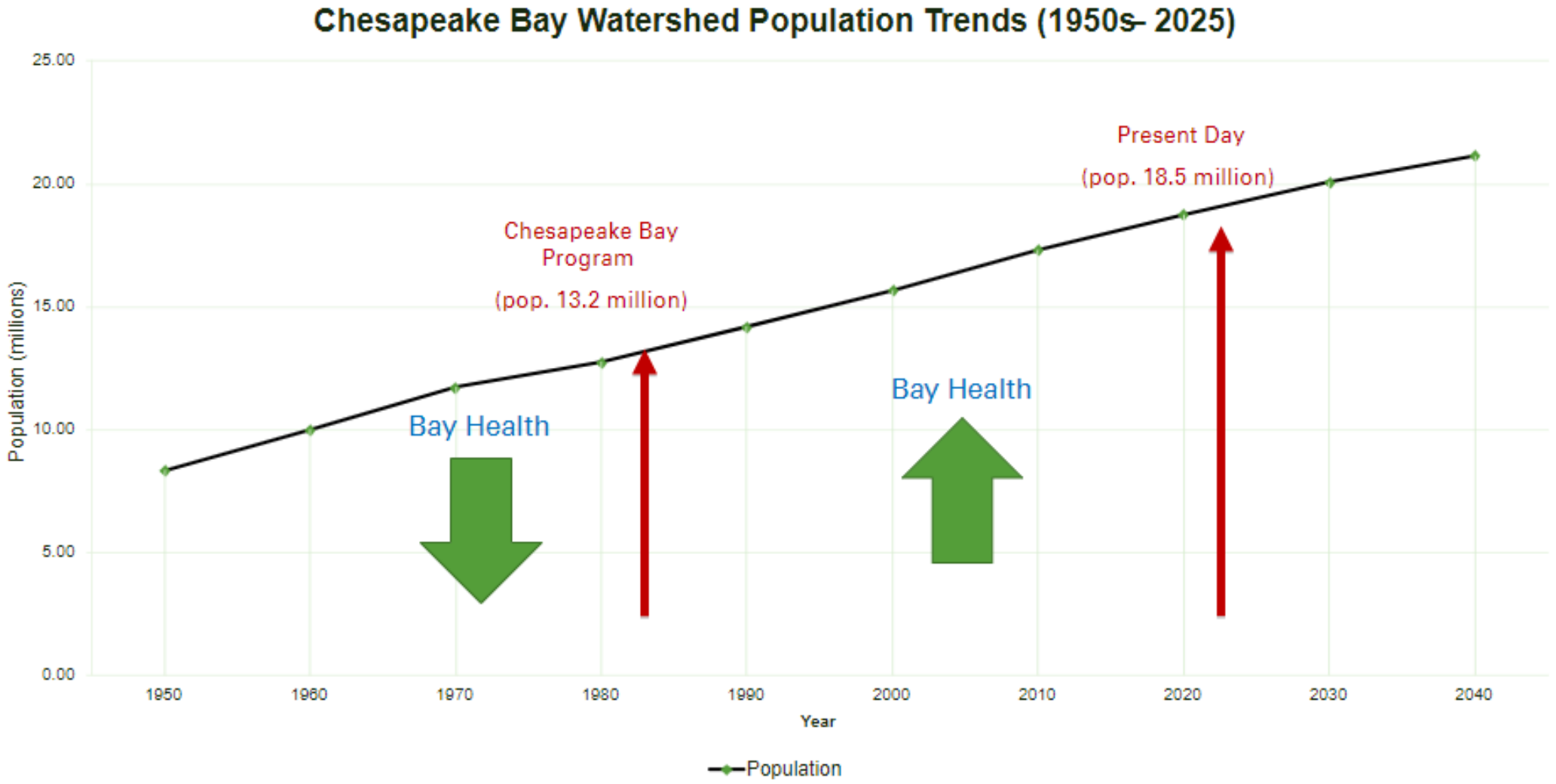
- Enhance the confidence and use of nature-based solutions

Wetlands, urban tree canopy, oyster reefs, etc., serve as an integral piece of response to climate change

Improve knowledge on design and implementation because nature-based solutions are vulnerable to climate change too

Promote Strategies that Enhance the Resilience of Natural Ecosystems to be Healthy and Productive Under Changing Climate Conditions

- Defining and evaluating multiple stressors on ecosystem health with emerging challenges
    - future climate, population growth, land use, and landscape changes.
- Additional research to estimate the future conditions under different future scenarios of management


Chesapeake Bay Watershed Population Trends (1950s- 2025)
Population (millions)
25.00
20.00
15.00
10.00
5.00
0.00
1950
1960
1970
1980
1990
2000
2010
2020
2030
2040
Year
Present Day
(pop. 18.5 million)
Chesapeake Bay
Program
(pop. 13.2 million)
Bay Health
Bay Health
Population

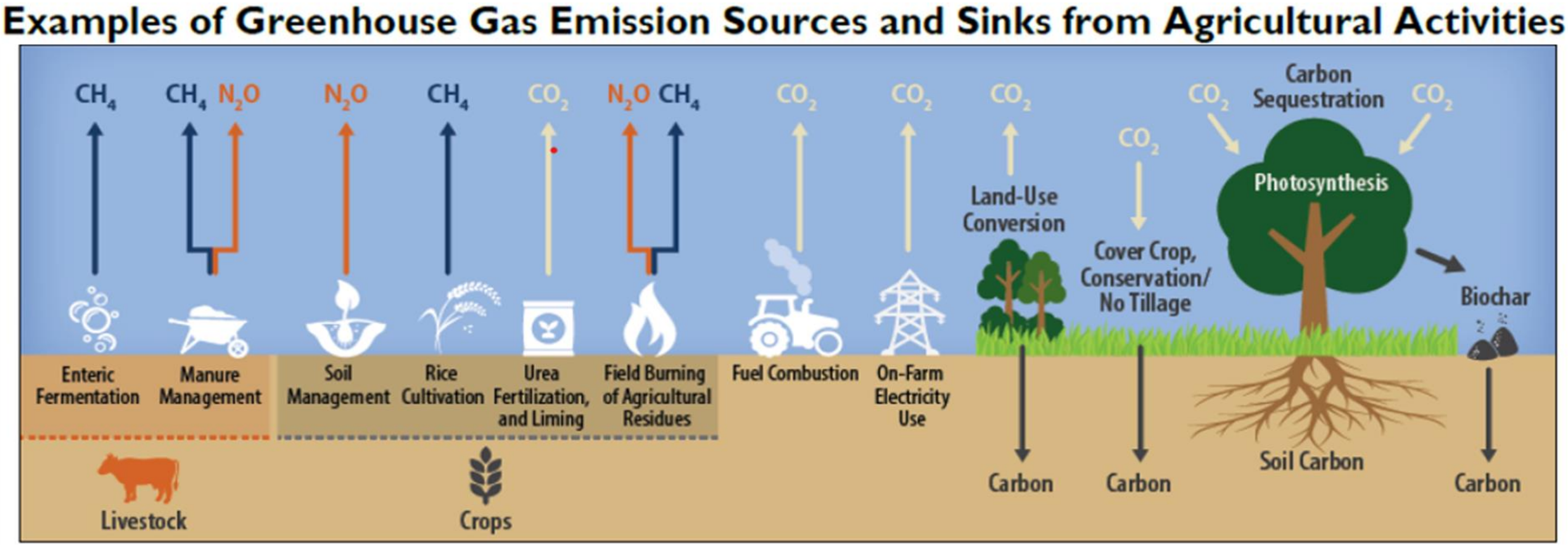
Promote Strategies that Enhance the Resilience of Natural Ecosystems to be Healthy and Productive Under Changing Climate Conditions

- Development and application of indicators for better understanding and tracking of ecosystem health status and change

- Need support for social science, communication strategies, and venues for partnership discussion to provide a proactive approach in preparing for ecosystem change

Promote Agro-Ecological Agriculture and Community-Based Food Systems

Promote Agro-Ecological Agriculture and Community-Based Food Systems



Promote Agro-Ecological Agriculture and Community-Based Food Systems

Global Warming Potential and Atmospheric Lifetime for Major Greenhouse Gases

Greenhouse gas	Chemical formula	Global Warming Potential, 100-year time horizon	Atmospheric Lifetime (years)
Carbon Dioxide	CO_2	1	100*
Methane	CH_4	25	12
Nitrous Oxide	N_2O	265	121
Chlorofluorocarbon-12 (CFC-12)	CCl_2F_2	10,200	100
Hydrofluorocarbon-23 (HFC-23)	CHF_3	12,400	222
Sulfur Hexafluoride	SF_6	23,500	3,200
Nitrogen Trifluoride	NF_3	16,100	500

SOURCE

Fifth Assessment Report (Intergovernmental Panel on Climate Change, 2014).

Greenhouse gas	Major sources
Carbon Dioxide	Fossil fuel combustion; Deforestation; Cement production
Methane	Fossil fuel production; Agriculture; Landfills
Nitrous Oxide	Fertilizer application; Fossil fuel and biomass combustion; Industrial processes

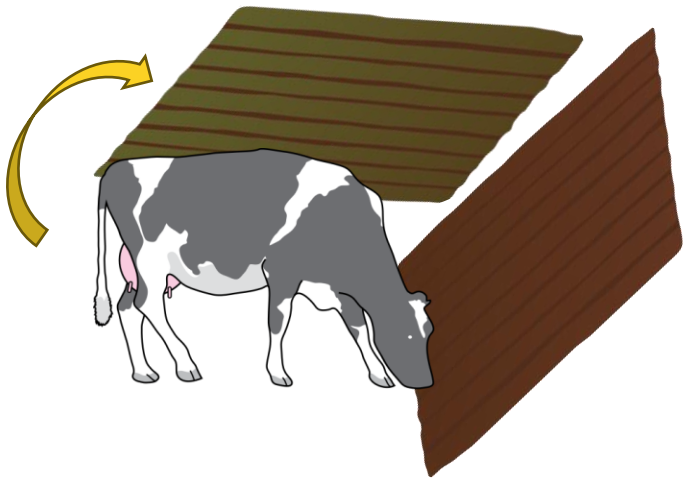
Promote Agro-Ecological Agriculture and Community-Based Food Systems

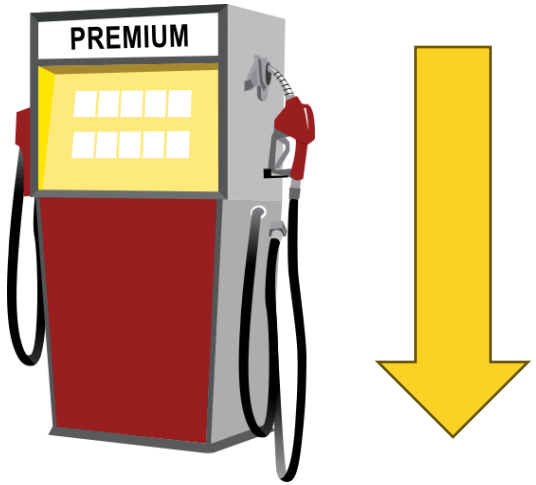
- Transform Agricultural production with a shift to Agro-ecological agriculture (regenerative production systems)
    - Pursue the development of a CBP soil health outcome

Soil Health = Continued and expanded capacity of soil to function as a vital living ecosystem that sequesters and stores carbon and sustains plants, animals, and humans.

Promote Agro-Ecological Agriculture and Community-Based Food Systems

- Promote Transformation of the Food Systems to Community Based
  - Community Based Food Systems = support local/regional production, sourcing and processing, sourcing and processing, regenerative and organic nutrient dense food, reduced meat consumption, reduced food waste





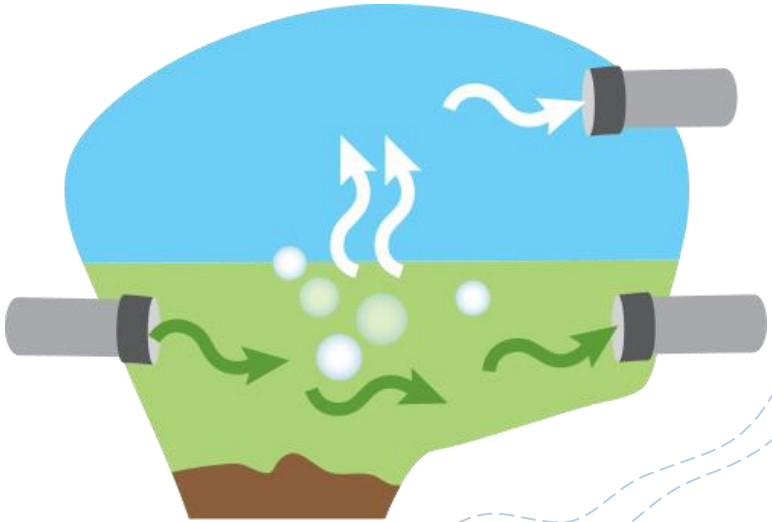


Photo Credit: Ian (ian.umces.edu/media-library)

Promote Agro-Ecological Agriculture and Community-Based Food Systems

- Promote Transformation of the Food Systems to Community Based
  - Community Based Food Systems = support local/regional production, sourcing and processing, sourcing and processing, regenerative and organic nutrient dense food, reduced meat consumption, reduced food waste
    - Use existing CBP framework to support research and workshops, local government outreach
    - Consider incentivizing existing and emerging technologies that promote carbon/soil health practices
    - Research, promote, and credit BMPs that provide results for multiple Bay outcomes
    - Improve modeling of manure transport, waste to energy, agri-solar production, land conservation and conservation scenarios

1. Develop a Vision for the Bay of the Future
2. Improve Resilience of Communities to Key Regional Climate Vulnerabilities
3. Promote Carbon Stewardship as Holistic Approach to Climate Mitigation
4. Promote Strategies that Enhance the Resilience of Natural Ecosystems to be Healthy and Productive Under Changing Climate Conditions
5. Promote Agro-Ecological Agriculture and Community-Based Food Systems