International Association for Hydro-Environment Engineering and Research

Supported by Spain Water and IWHR, China

IAHR World Water Day Forum on "Hydro-environment Engineering and Adaptation to Climate Change"

International Panel DIscussion

Climate Change and Adaptive Management Challenges and Issues

Global Trends and Issues: Ecosystem Services

Peter GOODWIN

** Keynote Lecture presented at the Croucher Advanced Study Institute on "Global Water Security: Integrated Modeling and Adaptive Management", HKUST, January 8-11, 2019*

Contemporary Existential Societal Threats

Acute Condition of the Planet – COVID-19

- Severe, Short-term and Immediate Action
- A demonstration of what is possible with International Collaboration

Chronic Condition of the Planet – Climate Change

IAHR Role in Mitigation, Adaptation and Resilience
Analysis, information and models to inform policy and action
Water supply,
Extreme events
Sea Level Rise
Ecosystem response

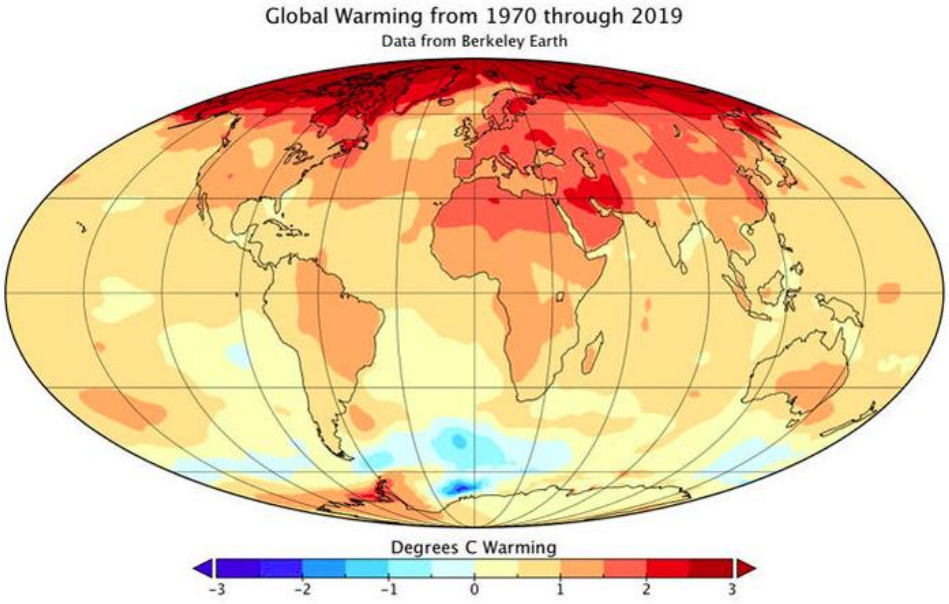
Nature Based Solutions, Adaptive Management and Smart Systems

Accuracy of Global Warming Predictions

10 of 17 forecasts from 1970-2001 showed no statistical difference between observations and predictions

5 of 7 – corrected for actual pollutants gave accurate predictions.

Retrospective analysis of assumptions explains discrepancies



Global temperatures have risen approximately 0.9°C since 1970, though some areas have warmed much more than others. BERKELEY EARTH

Even 50-year-old climate models correctly predicted global warming
By Warren Cornwall Science Dec. 4, 2019 , 12:00 PM

Sea Level Rise

PNAS | **July 23, 2019** | vol. 116 | no. 30 | **14887–14892**

Search ▾ The Guardian US edition ▾

Adam Morton *Environment editor*

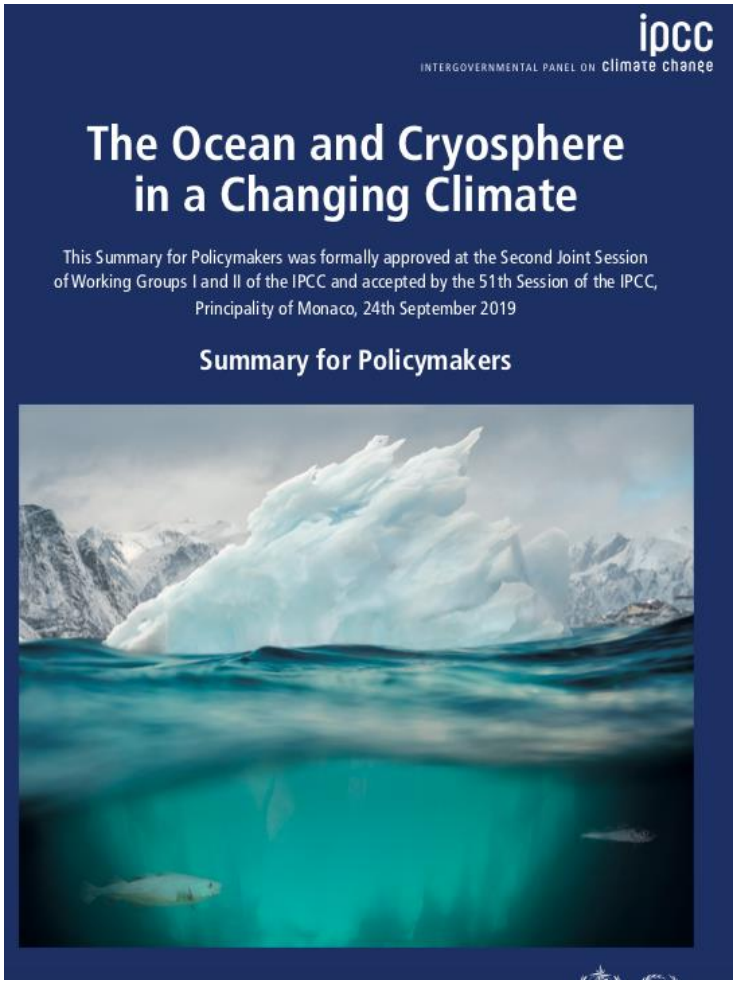
@adamlmorton

Tue 9 Jul 2019 06.50 EDT

Glacial melting in Antarctica may become irreversible

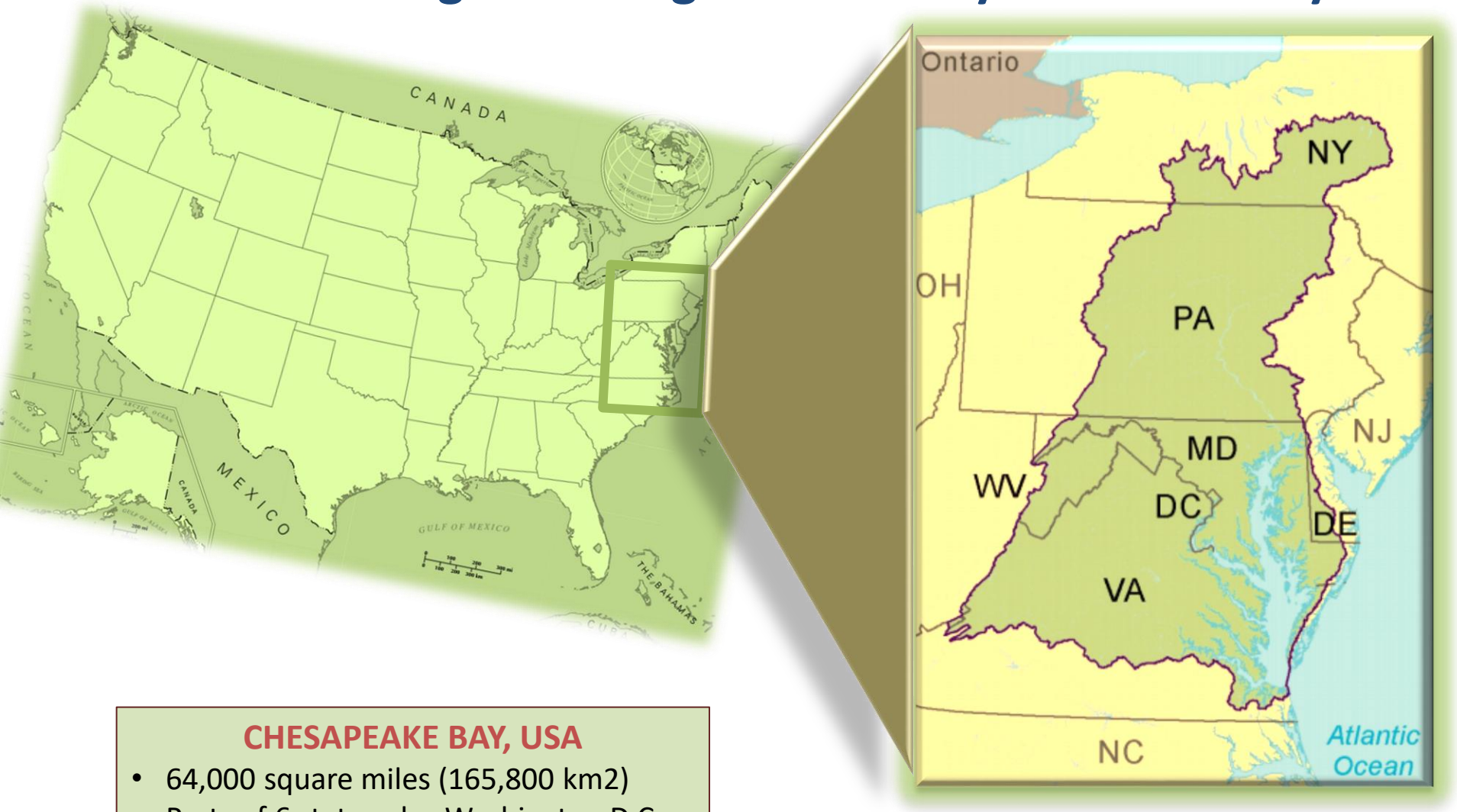
Thwaites glacier is likely to thaw and trigger 50cm sea level rise, US study suggests

▲ An aerial view of Thwaites glacier, which shows growth of gaps between the ice and bedrock. Photograph: Nasa/OIB/Jeremy Harbeck/Handout/EPA



https://hightidedorchester.org – Impact in Chesapeake Bay

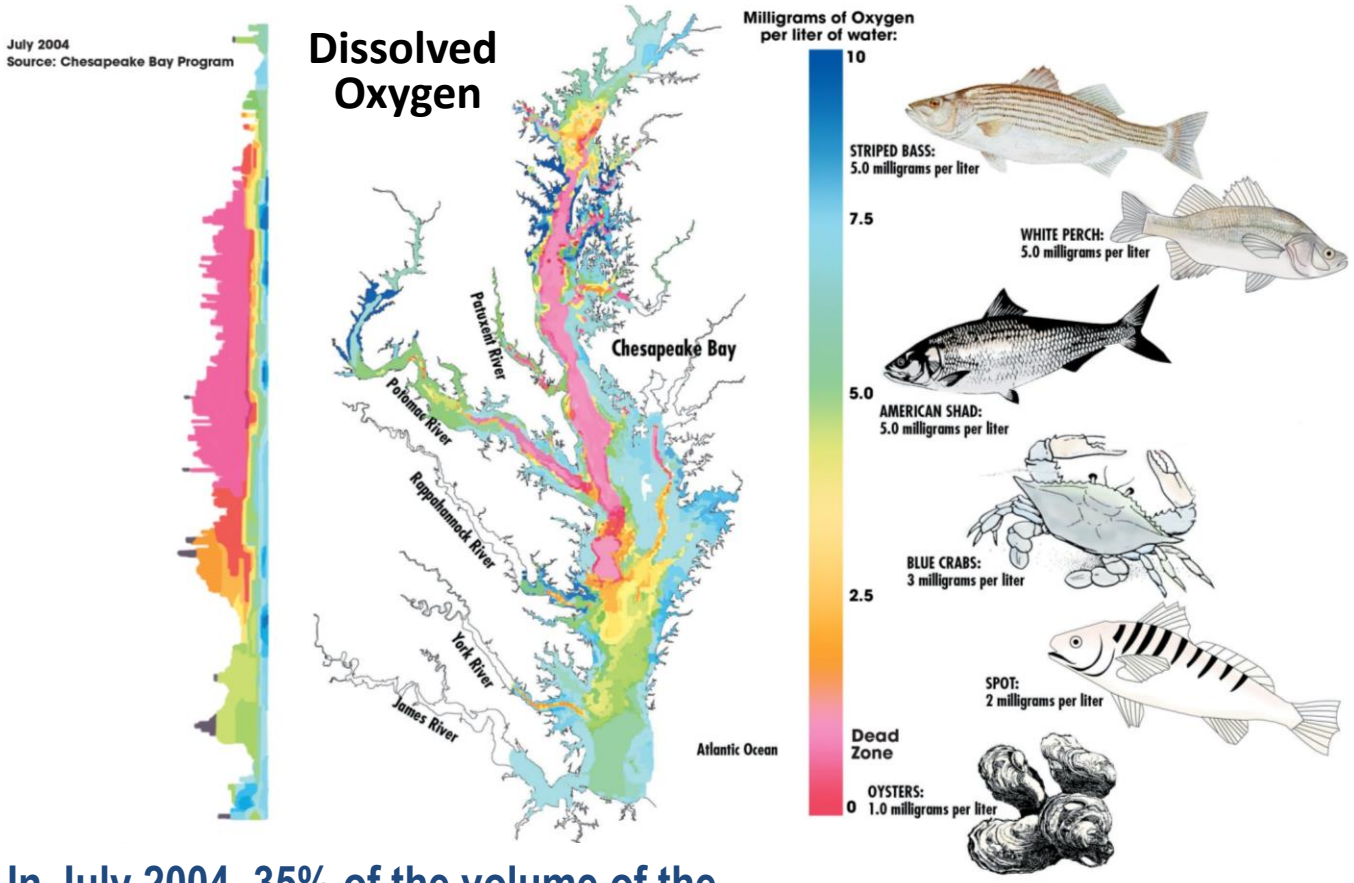
Climate Change and Large-Scale Ecosystem Recovery



CHESAPEAKE BAY, USA

- 64,000 square miles (165,800 km2)
- Parts of 6 states plus Washington D.C.
- Largest Estuary in North America

Chesapeake Bay: Large-Scale Ecosystem Recovery



In July 2004, 35% of the volume of the Chesapeake Bay was considered a Dead Zone.

BAY RESTORATION GOAL:

Improve Water Quality & Health of the Living Resources

Focus:

- Dissolved Oxygen
- Clarity
- Chlorophyll a

Reducing Pollution: 1985-2019

Nitrogen

1985 2009 2019

Phosphorus

1985 2009 2019

2019-25

Sediment

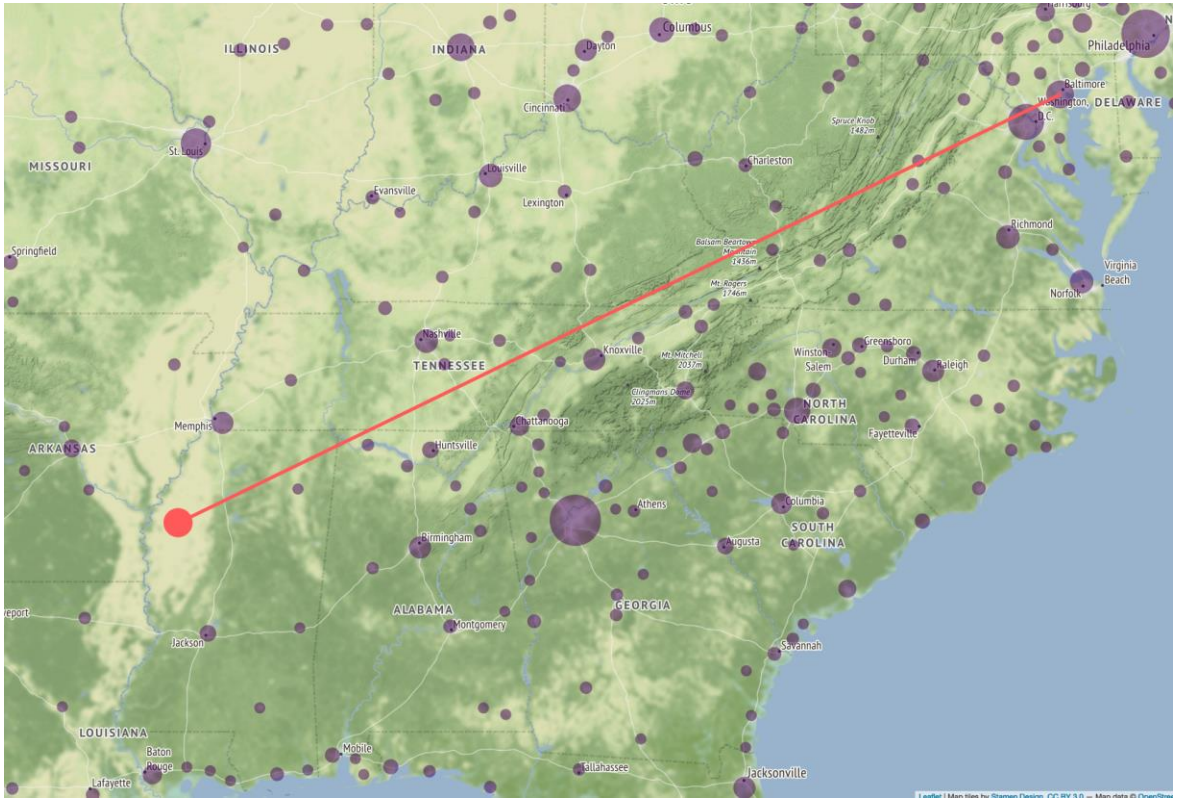
1985 2009 2019

A Landscape Responding

- ☑ Water Clarity Sea Grasses
- ☑ Atmospheric Deposition
- ☑ Waste Treatment Plants
- ☑ Rivers and Streams
- ☑ Blue Crab
- ☑ Oysters
- ☑ Dissolved Oxygen

Climate Change and Chesapeake Bay Recovery

By 2080, Baltimore will experience weather currently in Mississippi



Summer:
6ºF warmer, 8% drier

Winter:
9ºF warmer, 58% wetter

Storms will be more intense

Dr. Matt Fitzpatrick
https://www.umces.edu/futureurbanclimates

Climate Resiliency Outcomes

Management Strategy

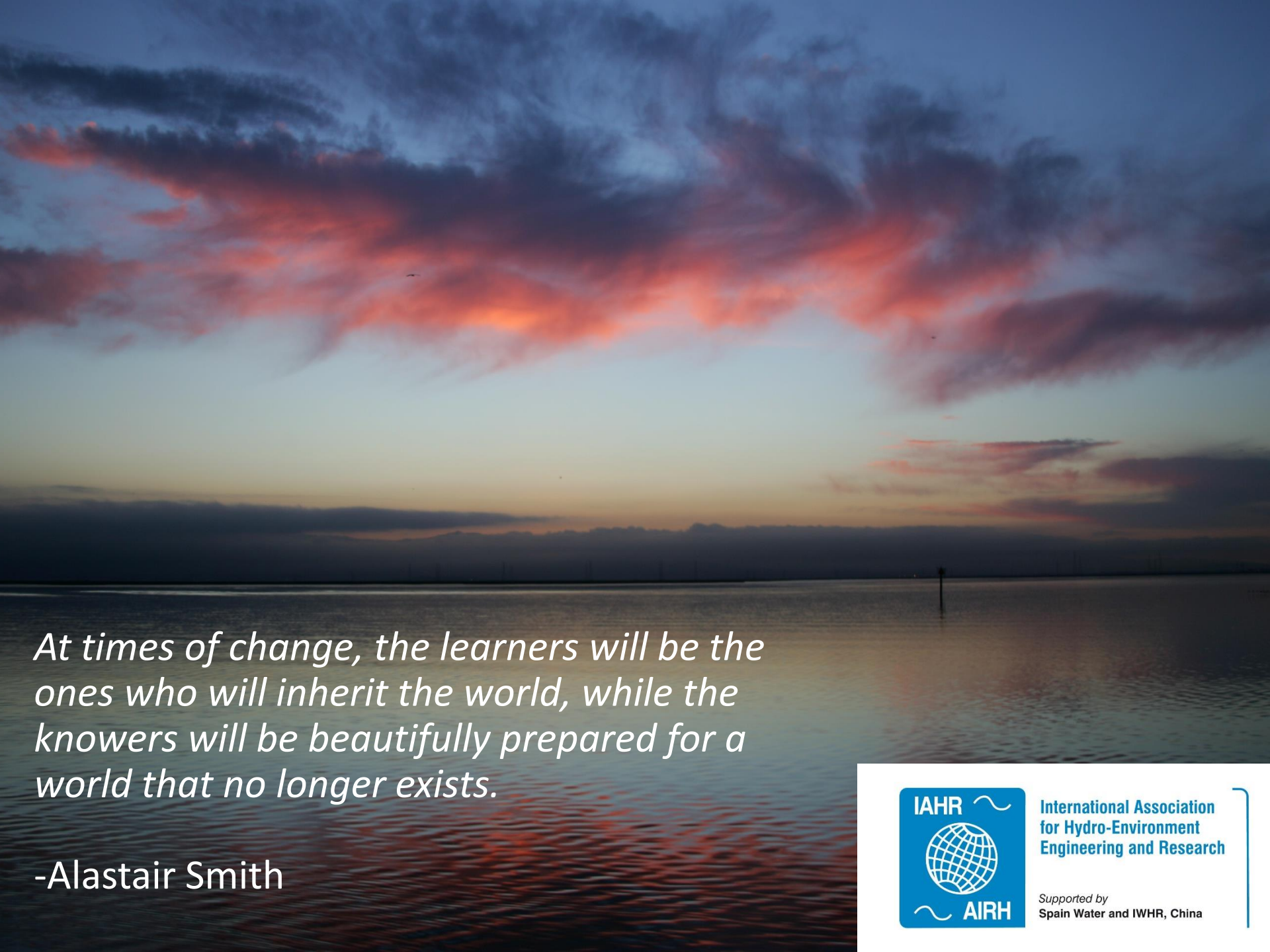
2015–2025, v.2

Chesapeake Bay Program
Science. Restoration. Partnership.

http://www.chesbay.us

https://www.chesapeakebay.net

Ann Pesiri Swanson. aswanson@chesbay.us



At times of change, the learners will be the ones who will inherit the world, while the knowers will be beautifully prepared for a world that no longer exists.

-Alastair Smith

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