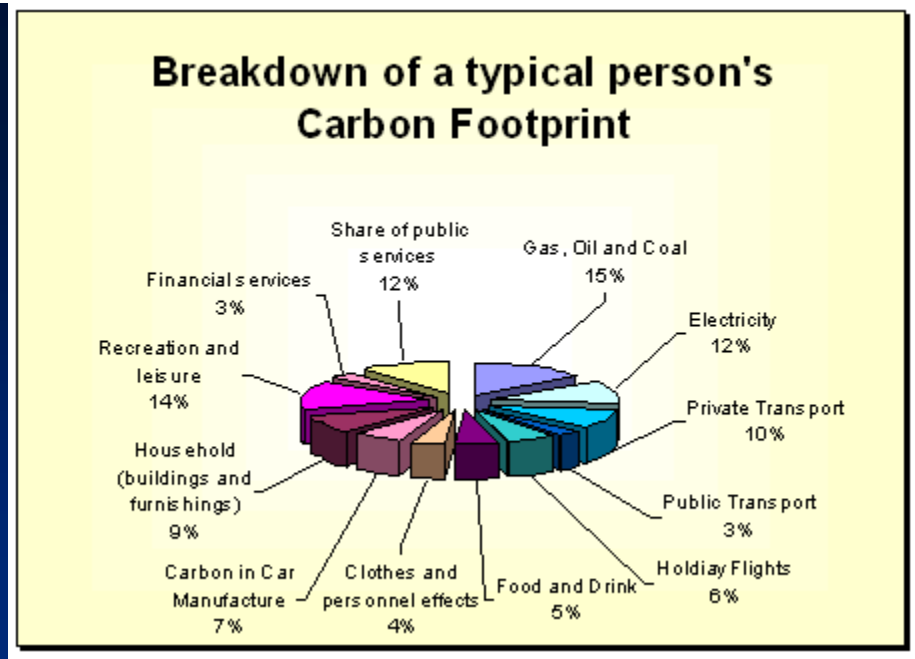
Carbon sequestration associated with wetland restoration

Brian Needelman

Department of Environmental Science & Technology
Univ. of Maryland

Carbon footprints

http://www.zerocarbonfootprint.co.uk/



http://www.carbonfootprint.com/carbon1.gif

- My personal emissions (EPA): 19,500 lbs CO_2 per year
  - 9.75 English tons = 8.8 metric tons (Mg)
- United States: ~1580 million metric tons C per year

~1580 million metric tons CO_2 per year

So how much do we need to reduce emissions?

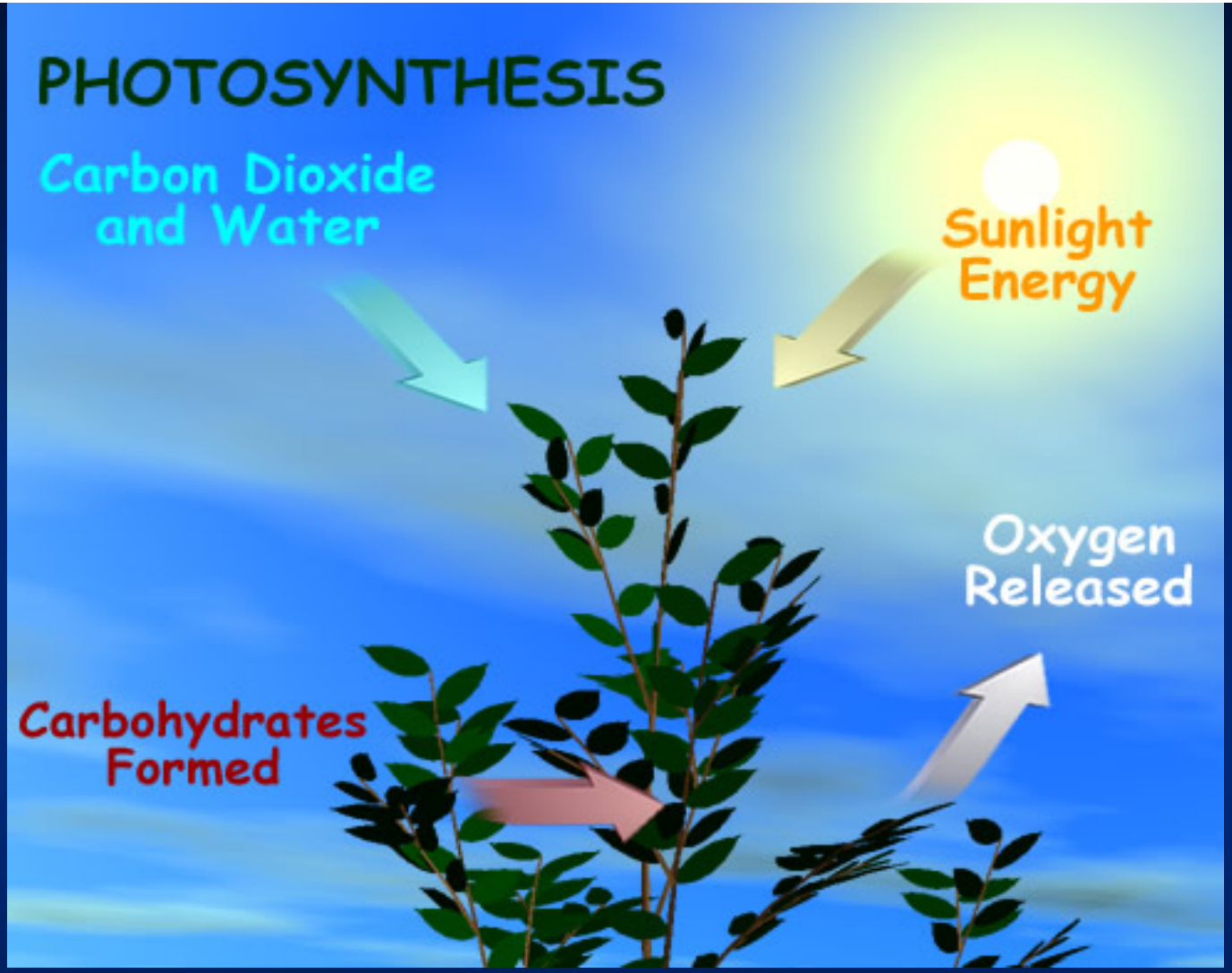
- Kyoto Protocol: 7% below 1990 emissions, 20% total
- Germany, Britain, Japan proposal: 50% reduction

Cap-and-trade programs

- Set a cap on emissions
- Each source must stay under the cap by:
  - Reducing emissions
  - Capturing and storing carbon dioxide ($$)
  - Buying credits from other sources under cap
  - Buying credits from emission offset projects

Regional Greenhouse Gas Initiative (RGGI or "ReGGIe")

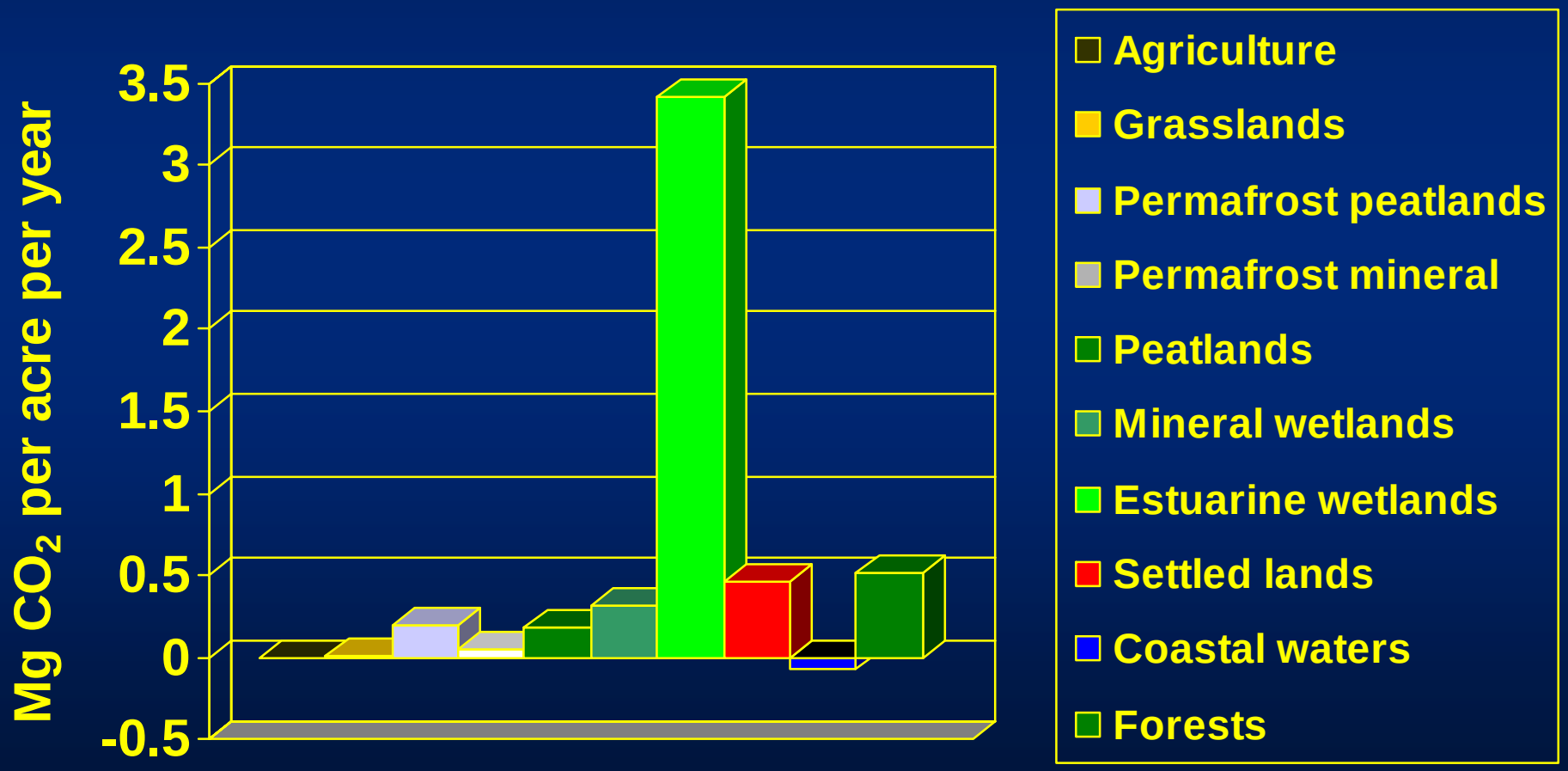
- Nine Northeast and Mid-Atlantic states
- Cap-and-trade program to reduce carbon dioxide emissions from power plants in the region
  - Compliance begins 2009
  - Regional emissions capped at ~1990 emissions
  - Cap reduced 10% in 2018
- MD RGGI offsets goal: ~1 million metric tons CO_2 per year



http://techalive.mtu.edu/meec/module19/images/Photosynthesis.jpg

Already offsets 20-30% of emissions in U.S.

Mean carbon sequestration in North American ecosystems



Tidal marshes: Maximizing terrestrial carbon sequestration

- High net primary productivity and low decomposition rates
- Accretion --> more carbon
- As sea-level rise increases, so does carbon sequestration potential
- Minimal methane production (salinity dependent)

Carbon sequestration for 20,000 acres of restored marshes

- 3.7 to 8.5 metric tons CO_2 per acre per year
- ~75,000 to 170,000 metric tons CO_2 per year
  - Up to ~17% of Maryland RGGI offsets goal

Annual subsidy value of carbon sequestration for 20,000 acres of restored marshes

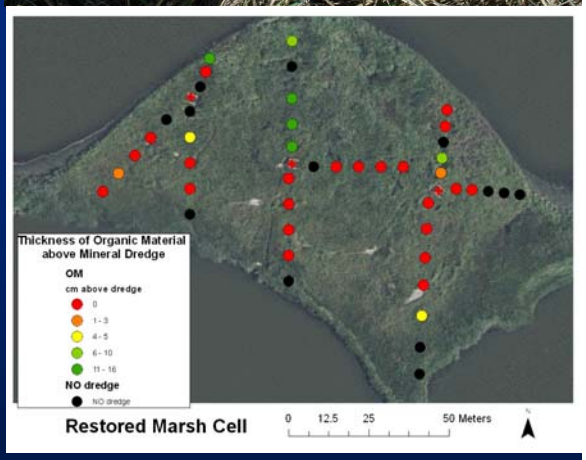
Price per Mg CO_2	75,000 Mg CO_2 yr^{-1}	170,000 Mg CO_2 yr^{-1}
$5.00	$375,000	$850,000
$10.00	$750,000	$1,700,000
$20.00	$1,500,000	$3,400,000
$50.00	$3,750,000	$8,500,000

Coastal wetland restoration objective:

<u>Maximize organic matter accumulation</u>

- Factor controlling long-term marsh sustainability
- Responsive to management

Brian Needelman
bneed@umd.edu
301-405-8227



Funding:
Maryland Department of Natural Resources Power Plant Research Program
Maryland Energy Administration
Department of Energy: Midwest Regional Carbon Sequestration Partnership