Understanding the Role of Nutrient Reduction Activities in Improving Water Quality: Lessons Learned from Chesapeake Bay Restoration Efforts

Chesapeake Bay Program
A Watershed Partnership

Scientific, Technical Assessment and Reporting (STAR) Team Meeting
March 28, 2013

Liza Hernandez and Christina Lyerly
University of Maryland Center for Environmental Science at the Chesapeake Bay Program

Project Evolution

- 20-page brochure published by UMCES
- Lessons have been revised since January STAR update
  - 7 lessons

New Direction

- Introduction
- 2-pg spread for each lesson:
  - Short 150-word summary
  - Highlight case studies
  - Conceptual diagrams
  - Data graphics
  - Photographs
- Recommendation
- References

Process

CURRENT

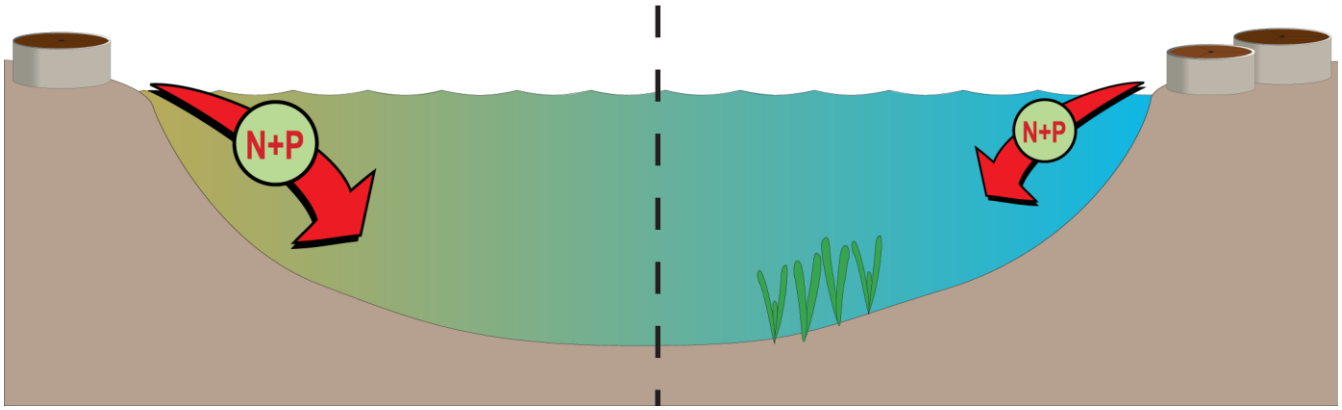
- Writing phase
- Obtaining raw data
- Drafting conceptual diagrams

UPCOMING

- Review
  - Internal review → Incorporate revisions → External review → Incorporate revisions
- Final product May 31st
  - June: Publication

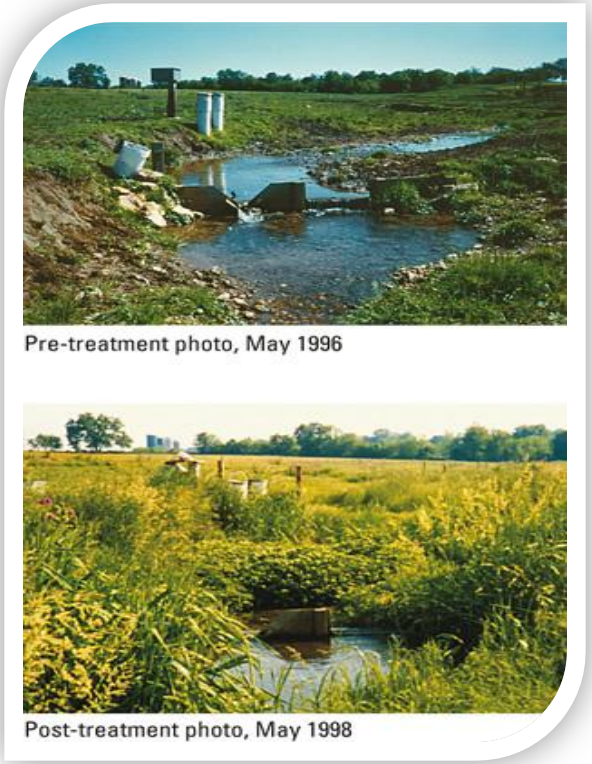
Lesson 1

- Upgrades in both nitrogen and phosphorus wastewater treatment will provide rapid local water quality improvements



Lesson 2

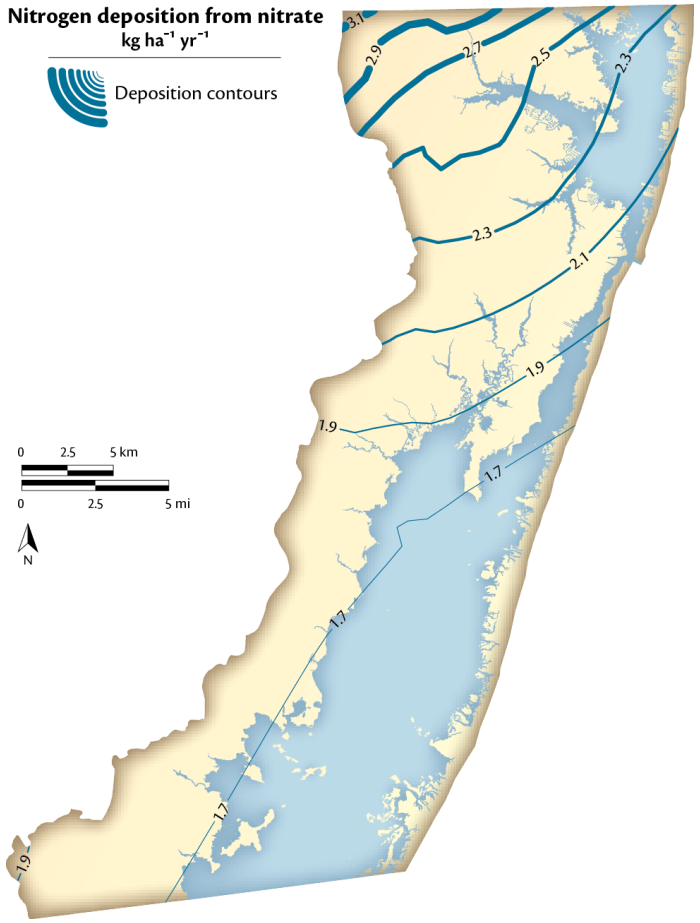
- Reductions of agricultural nutrient sources result in improved stream quality



Big Spring Run : Riparian areas pre- and post-cattle stream exclusion and riparian replanting (Galeone et al. 2006).

Lesson 3

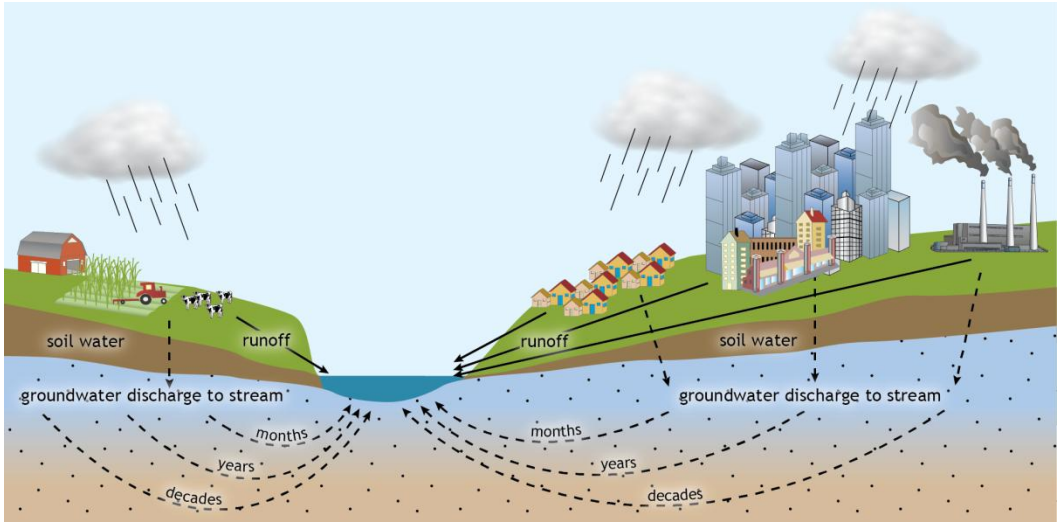
- Improvements in air quality have led to reductions in atmospheric deposition



Shifting Sands, p 282

Lesson 4

- Many practices provide initial water quality improvements in runoff; however, full benefits to stream conditions can be delayed

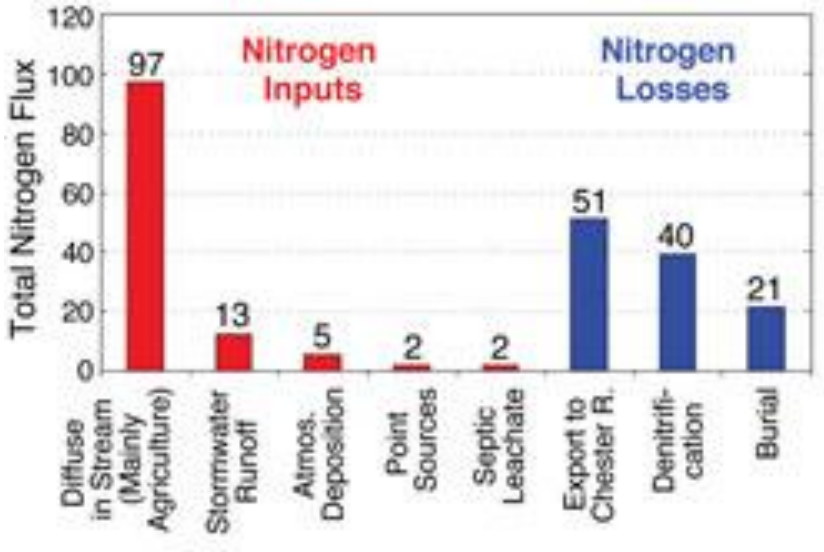


Lesson 5

- Improvements in water quality can be counteracted by other nutrient sources and changes in land-use practices

Lesson 6

- You are more likely to produce observable water quality responses if you A) **identify** location specific sources of pollution, and B) implement **targeted** practices



Lesson 7

- Innovative technologies and approaches can be employed to achieve nutrient reduction

Floating wetlands by BlueWing Environmental Solutions and Technologies

Lesson Refinement

- An array of practices to promote stormwater infiltration and retention are needed in urban and suburban areas
- Combine agriculture into one comprehensive lesson

Figure 1. Examples of the many types of urban and suburban stormwater management facilities, commonly called Best Management Practices (BMPs): *(A)* above-ground retention pond, *(B)* rain garden, *(C)* rain barrel, *(D)* sand filter, and *(E)* sand filter and detention pond in series. BMPs help to slow the flow of stormwater from the landscape to streams to mitigate streambank erosion, prevent degradation of stream habitat, and reduce the load of contaminants, including nutrients and sediment, tranported in stormwater runoff to local streams and then downstream to Chesapeake Bay.

Water Quality Improvements Resulting from Suburban Stormwater Management Practices in the Chesapeake Bay Watershed