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"Eutrophication/Anoxia & Hypoxia"

D. EGGLESTON
North Carolina State University
MEAS
Raleigh, NC
USA

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Lecture notes from Dr. David Eggleston, North Carolina State University, eggleston@ncsu.edu

Eutrophication/Anoxia & Hypoxia

- Nutrients are moving across the land/sea margins at such high rates that coastal waters and estuaries are some of the most fertilized ecosystems on earth.

I. Sources

-non-point sources of stormwater runoff; wastewater discharge; air pollution; reservoirs

II. Ecological consequences

- leads to drastic changes in water quality and food webs; increased propensity for toxic algal blooms and hypoxia/anoxia.

A. First order effects – increased algal production (toxic and non-toxic)
B. Second order effects – increased turbidity, loss of benthic primary production (e.g., seagrasses, microalgae), frequent anoxia
C. Third order effects – changes in the structure and function of food webs (e.g., fish kills, toxic algal blooms

Hypoxia/Anoxia

I. Definitions

A. Hypoxia = low DO (O_2 < 1-4 mg DO/l)
B. Anoxia = no DO (O_2 < 1 mg DO/l)

II. Causes

Organic enrichment leads to increased oxygen demand to match increased remineralization. Typically associated with water column stratification.

III. Ecological consequences

A. Sessile species are killed (suffocate or eaten)
B. Mobile species forced to smaller areas (increased predation, cannibalism, fishing impacts)
C. Restricts settlement habitat
D. Changes in food web structure
   - shift from diatoms ("good food") to dinoflagellates ("poor food")
   - shift from larval fish predators on zooplankton, to jellyfish predators on larval fish

David Eggleston, NC State University

Eutrophication and Harmful Algal Blooms

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