Connecting Monitoring to Policy: Potential for OA water quality criteria

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MAINE

Outline

- **Water Quality Standards**
- **Potential Approaches for OA**

Clean Water Act

To restore and maintain the chemical, physical and biological integrity of the Nation's waters.

- **EPA:** Guidance on water quality standards
- **States: -** Water quality standards (designated uses and criteria)
  - Assessment of impairment
- **EPA:** Approve criteria and impairment designations
- **States:** Develop implement TMDL/plans to address causes of impairment

Water Quality Criteria Options

- **Narrative Criteria** (Often Linked to Biological Uses)

- **Numeric Criteria** (Specific threshold values for impairment)

Impairment requires development of permit requirements or BMPs

Current pH Standard from EPA

- pH is a recognized pollutant under the Clean Water Act

- Section 304 National Water Quality Standard for marine waters pH was first published in 1976 (and renewed in 1986.)

  - Marine waters pH should be between 6.5 and 8.5

  - Marine waters pH should not change > than ±0.2 pH units from "normal"

Conundrum: We know it's a problem…

• We know that acidification is a water quality problem for our Nation's coastal waters, including use of their natural resources.

• We know that acidification is caused by a suite of drivers, most notably anthropogenic $CO_{2,}$ but also local sources of runoff, nutrient loading, and low-alkalinity water..

• We know that pH is considered a pollutant and that the loss of uses of these waters is generally an impairment.

• But we aren't using Clean Water Act to manage acidification with current criteria.

So...can Clean Water Act implementation be modified to include acidification?

Lawsuits Forcing Issue

Two Central Arguments Advanced by Center for Biological Diversity (lead environmental group on cases):

1. Current Numeric AND Narrative/Biological Criteria Require Listing Waters As Impaired
2. EPA Should Update Its National Standards To Reflect Latest Science

CENTER for BIOLOGICAL DIVERSITY

Because life is good.

Where Things Basically Stand

Why the EPA Doesn't Regulate Ocean Acidification

In part, it's because no one knows how best to do it yet.

-The Atlantic Magazine

Approach 1: Biological Narrative Criteria

Approach: Use the "propagation of shellfish" designated use and/or other general narrative criteria associated with shellfish impacts found in most states.

Advantages: Nothing new is required; most states have such a criterion, usually associated with population-level effects of a contaminant.

Challenges:

(1) Many states have different versions of what can trigger such criteria and how to assess biological indicators.

(2). : Must (a) show population impacts, and (b) show linked to OA related stressor

(3). Potentially limits OA management to shellfish impacts.

Approach 2: Update pH Criteria

Approach: Move beyond ±0.2 unit and 6.5-8.5 pH range. Proposed Form from CBD: **"For marine waters, pH should not deviate measurably from naturally occurring pH levels as a result of absorption of anthropogenic CO_2 pollution."**

- **Advantages:** pH is already a recognized pollutant.

- **Challenges:**

  (1) The "natural range" requires intensive monitoring of baseline in water body segments.

  (2) Estuaries have highly variable pH

  (3). Even if we recognize sources of pH variability other than CO_2, we don't have the science to build an "OA" budget yet for full suite of drivers of pH variability.

Approach 3: Alternative Numeric Criteria

Approach: Rather than pH, use Ω (or another carbonate chemistry parameter such as pCO_2) as basis for numeric criteria.

Advantage: Aragonite saturation state of 1.0 is frequently used and biologically relevant (mostly).

Challenges: (1) Sources of variability aren't strictly anthropogenic. (2). Almost no monitoring/mapping currently done, so no baseline.

Approach 4: Something New

Approach: Develop ecological narrative criteria that are specific to the circumstance of acidification (rather than an amalgamation of aquatic life criteria).

Advantage: Allows tailoring to problem. State of the science (and its uncertainty) can be adequately addressed.

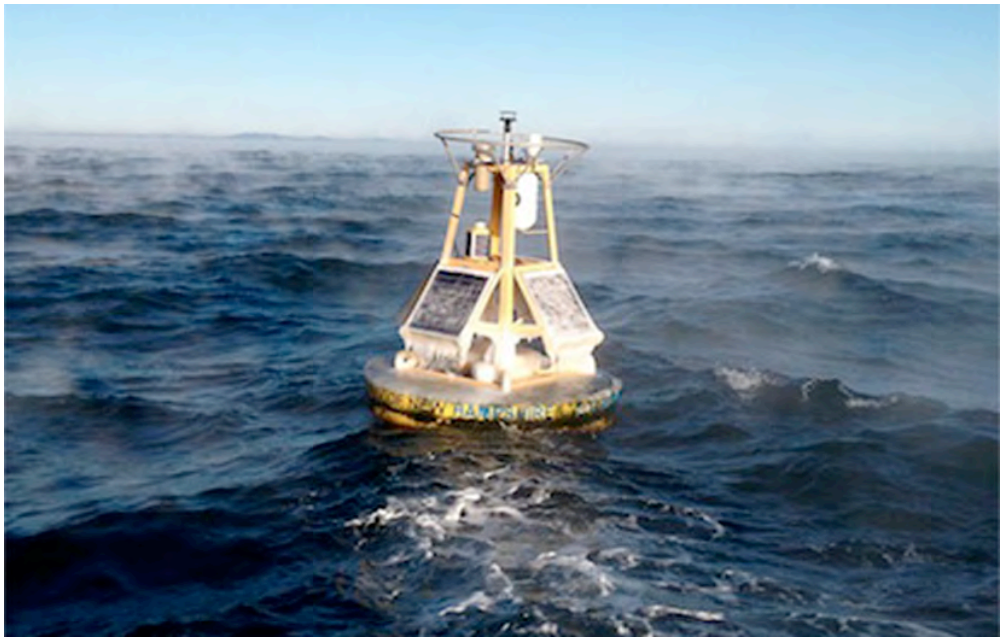
Challenges:

(1) New and therefore challenging. (What would it look like?).

(2) Potentially slow...requires states to develop whole new set of standards in each state.

What Becomes Key: Monitoring Data

- Baseline data on natural variability of pH, Ω, and biological communities is required.
- Targeted studies in peer-reviewed literature on individual water bodies go a long way to inducing impairment determinations.
- Data in state waters is required!
- Linked biological and biogeochemical data are required!



NERACOOS Buoy

Nearshore monitoring data (FOCB)

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What's Next? Keep Talking

- **Spring 2017:** Tentative plans for workshop to discuss OA-specific standards in NECAN region

Nutrients and Coastal Acidification

- Nutrient Criteria and Nutrient Management Are Also Part of the WQ Story