# Missing Benefits, Missing Values: A retrospective analysis of Clean Water Act economic analyses

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A large cyanobacteria bloom on Lake Monona in Madison on June 29, 2019. Cyanobacteria has been present in Lake Monona almost all of June. *Photo courtesy of Finn Ryan of yaharaproject.org*

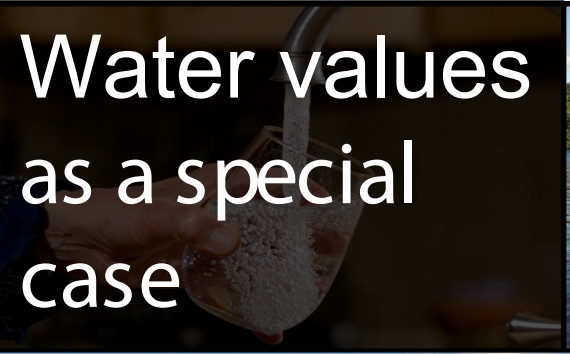
Wisconsin DNR Identifies 92 New Waters As 'Impaired'

*E.P.A.'s Proposed Rules on Water Worry Farmers* (2014)

*Trump Removes Pollution Controls on Streams and Wetlands* (2020)

*Biden Administration to Restore Clean-Water Protections Ended by Trump* (2021)

# Water values as a special case












# Research Questions:

1. What is the extent of missing benefits in EA of the CWA?

1. What values, and whose values are underrepresented or under -counted?

1. What are the implications of these missing benefits for clean water policy?

# Past research

THE PROBLEM OF UNQUANTIFIED BENEFITSAuthor(s): Amy Sinden

Source: *Environmental Law*, Vol. 49, No. 1 (2019), pp. 73-129

*with major final rules issued between 2002 and 2015. In 80% of the CBAs analyzed, EPA excluded categories of benefits that the agency itself described as either actually or potentially "important," "significant," or "substantial" because they were unquantifiable due to data limitations.*

# Dataset: OIRA reports to Congress back to 1995

Coded in ATLAS.ti for:

- Benefit type
  - Cultural, Ecological, Economic, Human Health, Recreation
- CWA Policy
  - Effluent Standards, NPDES, WOTUS…
- EJ Considerations
  - Equity, Environmental Justice
- Missing Benefits Verbiage
  - Unquantified, Unmonetized, Quantified but unmonetized?
- Contaminant/Concern
  - Cooling water intake structures,  oil, a milieu of pollutants, CAFO's…
- Year
  - 1993-2015

# Insight #1: Lots of missing benefits

## Economic and Benefits Analysis of the Final 2008 Vessel General Permit (VGP)

The ballast water provisions of EPA's final Vessel General Permit are expected to reduce the number of introductions of aquatic non-indigenous species (ANS) and thus may prevent significant future damages to fisheries, tourism, recreation, infrastructure, and human health, as well as further stresses on native biodiversity and ecosystems. Although estimating the monetary value of benefits from preventing future invasions with a reasonable degree of certainty would not be possible due to the lack of data on rates of invasive species introduction associated with ballast water releases, the type of species introduced in the future and the range of potential economic impacts associated with each species type is very large. The potential benefits of preventing the introduction of even one harmful ANS could be substantial.

**Table III-55: Scenarios 1 & 2 — Potential impacts, cost savings, and forgone benefits in the Case Study areas excluding the potential impact from states that may continue their baseline dredged/fill and surface water permitting practices**

| | Annual Avoided Costs (2018$ millions) | | Annual Forgone Benefits (2018$ millions) | |
|---|---|---|---|---|
| | Low | High | Low | High |
| **Lower Missouri River Basin** | | | | |
| CWA 402 | *not monetized* | *not monetized* | *not monetized* | *not monetized* |
| CWA 404 Permit Application | $0.27 | $0.27 | N/A | N/A |
| CWA 404 Mitigation – Wetlands & Ephemeral Streams | $1.41 | $5.51 | $0.13[3] | $0.84 |
| CWA 404 Mitigation -Water Quality | N/A | N/A | *not quantified* | *not quantified* |
| CWA 404 Mitigation-Reservoir Dredging | N/A | N/A | *not quantified* | *not quantified* |
| CWA 311 – FRP Requirements | *not monetized* | *not monetized* | *not monetized* | *not monetized* |
| CWA 311 – SPCC Requirements | *not monetized* | *not monetized* | *not monetized* | *not monetized* |
| **SUBTOTAL** | **$1.68** | **$5.78** | **$0.13** | **$0.84** |
| **Rio Grande River Basin** | | | | |
| CWA 402 | *not monetized* | *not monetized* | *not monetized* | *not monetized* |
| CWA 404 Permit Application | $0.11 | $0.11 | N/A | N/A |
| CWA 404 Mitigation – Wetlands & Ephemeral Streams | negligible[4] | negligible | *not monetized* | *not monetized* |
| CWA 404 Mitigation -Water Quality | N/A | N/A | *not quantified* | *not quantified* |
| CWA 404 Mitigation-Reservoir Dredging | N/A | N/A | *not quantified* | *not quantified* |
| CWA 311 – FRP Requirements | *not monetized* | *not monetized* | *not monetized* | *not monetized* |
| CWA 311 – SPCC Requirements | *not monetized* | *not monetized* | *not monetized* | *not monetized* |
| **SUBTOTAL** | **$0.11** | **$0.11** | | |
| **Total 3 Case Studies** | | | | |
| **TOTAL (Monetized Categories)** | **$8.75** | **$22.69** | **$0.51** | **$3.35** |

## 2019 Regulatory Impact Analysis, Clean Water Act Hazardous Substances Spill Prevention Final Action

In addition, as discussed above, this analysis does not estimate benefits for a prevention program (Proposal Option 2) or targeted prevention requirements (Proposal Option 3). The reason is that EPA is unable to quantify the extent to which risks of a discharge would be reduced or damages would be avoided because of new requirements.

## Economic Analysis for the Navigable Waters Protection Rule: Definition of "Waters of the United States" (2020)

The agencies did not model the potential impacts of the final rule on reservoir sedimentation. As described above, higher sediment loads due to reduced wetlands could increase sedimentation in downstream reservoirs, but these potential effects are expected to be small given the minimal predicted 404 program impacts.

# Insight #2: But getting better over time?



TABLE 21.—BENEFIT CATEGORIES ASSOCIATED WITH WATER QUALITY IMPROVEMENTS RESULTING FROM THE METAL PRODUCTS AND MACHINERY EFFLUENT GUIDELINE

| Benefit category | Quantified and monetized | Quantified and nonmonetized | Nonquantified and nonmonetized |
|---|---|---|---|
| Human Health Benefits: | | | |
| Reduced cancer risk due to consumption of chemically-contaminated fish | X | | |
| Reduced cancer risk due to ingestion of chemically-contaminated drinking water | | X | |
| Reduced systemic health hazards (e.g. reproductive, immunological, neurological, circulatory, or respiratory toxicity) from consumption of chemically-contaminated fish. | | X | |
| Reduced systemic health hazards (e.g. reproductive, immunological, neurological, circulatory, or respiratory toxicity) due to ingestion of chemically-contaminated drinking water. | | X | |
| Reduced cancer risk from exposure to unregulated contaminants in chemically-contaminated sewage sludge. | | | X |
| Reduced systemic health hazards from exposure to unregulated contaminants in chemically-contaminated sewage sludge. | | | X |
| Reduced health hazards from exposure to contaminants in waters used recreationally (e.g., swimming and boating). | | | |
| Ecological Benefits: | | | |
| Enhanced recreational fishing | X | | |
| Reduced risk to aquatic life | | X | |
| Enhanced in-stream recreation such as swimming, boating, hunting, rafting, subsistence fishing. | | | X |
| Improved water enhanced recreation such as hiking, picnicking, birdwatching, photography. | | | X |
| Increased aesthetic benefits such as enhancement of adjoining site amenities (e.g. residing, working, traveling, and owning property near the water). | | | X |
| Existence value | | | X |
| Option value | | | X |
| Reduced risk to terrestrial wildlife including endangered species | | | X |
| Protection of biodiversity | | | X |
| Protection of cultural valuation | | | X |
| Reduced non-point source nitrogen contamination of water if sewage sludge is used as a substitute for chemical fertilizer on agricultural land. | | | X |
| Satisfaction of a public preference for beneficial use of sewage sludge* | | | X |
| Economic Productivity Benefits: | | | |
| Reduced sewage sludge disposal costs | X | | |
| Enhanced tourism | | | X |
| Improved commercial fisheries yields | | | X |
| Addition of fertilizer to crops (nitrogen content of sewage sludge is available as a fertilizer when sludge is land applied)*. | | | X |
| Improved crop yield (the organic matter in land-applied sewage sludge increases soil's water retention)*. | | | X |
| Reduced management practice and recordkeeping costs for appliers of sewage sludge meeting exceptional quality criteria. | | | X |
| Reduced management and disposal costs for "cleaner" sewage sludge that does not meet land application criteria. | | | X |
| Avoidance of costly siting processes for more controversial sewage sludge disposal methods (e.g., incinerators) because of greater use of land application. | | | X |
| Reduced water treatment costs for municipal drinking water, irrigation water, and industrial process and cooling water. | | | X |

*Some double counting between this benefit category and "reduced sewage sludge disposal costs" is present.

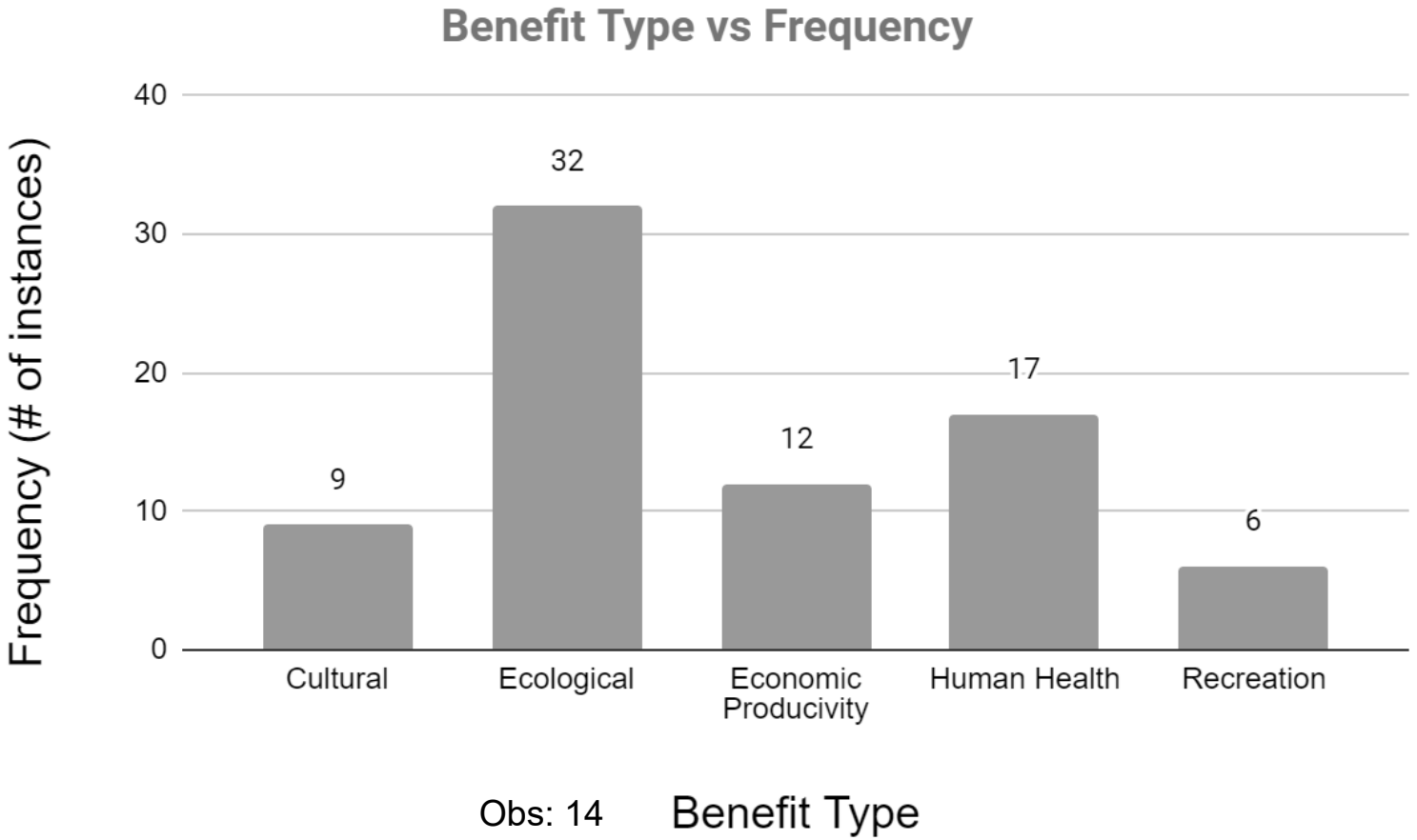


TABLE IX–1.—BENEFIT CATEGORIES ASSOCIATED WITH WATER QUALITY IMPROVEMENTS RESULTING FROM THE METAL PRODUCTS AND MACHINERY EFFLUENT GUIDELINE

| Benefit Category | Quantified and monetized | Quantified and nonmonetized | Nonquantified and nonmonetized |
|---|---|---|---|
| Human Health Benefits: | | | |
| Reduced cancer risk due to ingestion of chemically-contaminated fish and unregulated pollutants in drinking water | X | | |
| Reduced non-cancer adverse health effects (*e.g.*, reproductive, immunological, neurological, circulatory, or respiratory toxicity) due to ingestion of chemically-contaminated fish and unregulated pollutants in drinking water | | X | |
| Reduced non-cancer adverse health effects from exposure to lead from consumption of chemically-contaminated fish | X | | |
| Reduced health hazards from exposure to contaminants in waters used recreationally (*e.g.*, swimming) | | | X |
| Ecological Benefits: | | | |
| Reduced risk to aquatic life | | X | |
| Enhanced water-based recreation, including fishing, boating, and near-water (wildlife viewing) activities | X | | |
| Other enhanced water-based recreation, such as swimming, waterskiing, and white water rafting | | | X |
| Increased aesthetic benefits, such as enhancement of adjoining site amenities (*e.g.*, residing, working, traveling, and owning property near the water) | | | X |
| Non-user value (*i.e.*, existence, option, and bequest value) | X | | |
| Reduced contamination of sediments | | | X |
| Economic Productivity Benefits:[a] | | | |
| Benefits to tourism industries from increased participation in water-based recreation | | | X |
| Improved commercial fisheries yields | | | X |
| Reduced water treatment costs for municipal drinking water, irrigation water, and industrial process and cooling water | | | X |

[a] The final rule regulates direct dischargers only. Therefore the selected option does not affect POTW operation. EPA, however, includes this benefit category when analyzing alternative options which considered the regulation of indirect dischargers (See Chapter 19 of the EEBA for the benefits analysis of alternative options).

# Insight #3: Most common missing benefits were…



# Insight #4: Not much on equity/distribution

location. The final regulation will reduce the negative effects of meat and poultry products industry waste in our nation's waters to benefit all of society, including minority and low-income communities. The cost impacts of the rule should likewise not disproportionately affect low-income communities given the relatively low economic impacts of the rule.

(2004)

*Excerpts from section on E.O. 12898*

consume fish at higher levels. EPA expects the final rule to reduce substantially the cancer risks to these tribal populations, as discussed in Chapter 8 of the Economic Analysis (DCN 14649).

(1998)

Because this rule will increase abundance of all fish species in the areas affected by cooling water intakes, it might provide a benefit to subsistence fishermen. To the extent that minority and low-income populations are over-represented in this group, they might especially benefit from this rule.

(2014)

# Policy implications

## Circular A-4

In the case of missing benefits agencies should…. “exercise professional judgment in determining how important the non-quantified benefits or costs may be[,]” and, to carry out a breakeven analysis if they are determined to be “important.”

But also notes that CBA “is less useful,” and “can even be misleading because the calculation of net benefits in such cases does not provide a full evaluation of all relevant benefits and costs.”

# Policy implications

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BRIEFING ROOM

## Modernizing Regulatory Review

JANUARY 20, 2021 • PRESIDENTIAL ACTIONS

"fully accounts for regulatory benefits that are difficult or impossible to quantify"

"propose procedures that take into account the distributional consequences of regulations, including as part of any quantitative or qualitative analysis of the costs and benefits of regulations, to ensure that regulatory initiatives appropriately benefit and do not inappropriately burden disadvantaged, vulnerable, or marginalized communities"

BRIEFING ROOM

## The Path to Achieving Justice40

JULY 20, 2021 • BLOGS

"Justice40 is a whole-of-government effort to ensure that Federal agencies work with states and local communities to make good on President Biden's promise to deliver at least 40 percent of the overall benefits from Federal investments in climate and clean energy to disadvantaged communities."

# Policy implications

THE PROBLEM OF UNQUANTIFIED BENEFITSAuthor(s): Amy Sinden

Source: *Environmental Law*, Vol. 49, No. 1 (2019), pp. 73-129

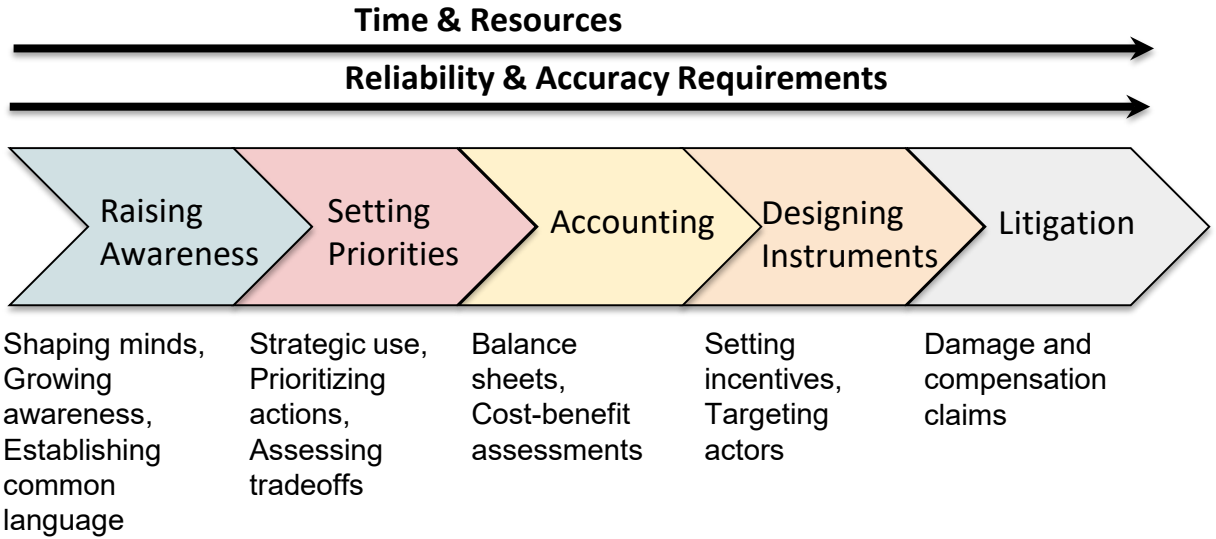
On one hand…. *"There is some sense, after all, in setting standards based on the information you have, rather than the information you wish you had."*

On the other hand…

*"typically leads to the optimistic suggestion that the problem can be solved simply by a renewed commitment to research aimed at quantifying unquantified benefits."*

# Policy implications

> *"The price you pay for precision is an inability to deal with real-world issues"*
> - Douglass C. North




Adapted from Gómez-Baggethun et al. Ecol Econ 2013

# Feedback on next steps

1. How to ensure we've captured the full set of RIAs/EAs?

1. Additional coding prompts?

1. Other insights to search for?

1. Compare with EAs for CAA?

1. Have existing studies already done this?

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# Assumptions of economic analysis:


1. Values for clean water can be expressed through a consumer choice model, preferences observed at level of individual, at the margin
2. People are rational, have full information, well formed preferences
3. Goal: maximize net social welfare, assuming those who gain could compensate losers and still be better off

1. Not all benefits are valued
2. Preferences of the rich receive more weight than poor
3. Historical and social context not considered
4. Missing other policy criteria