The Missing Benefits of Clean Water: A Retrospective Analysis of Clean Water Act Economic Analyses

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Extended Abstract

Since the passage of the Clean Water Act in 1972, US Environmental Protection Agency (EPA) economists have been tasked with conducting economic analyses of proposed rules or regulations designed to protect water quality. In theory, these economic analyses aim to comprehensively describe the potential costs and benefits of clean water policies. In practice, many changes in recreation, human health, ecosystem services, and non-use values are difficult if not impossible to monetize with existing economic tools. In this paper, we characterize the extent of missing benefits in federal economic analysis in order to understand the policy implications of gaps in economic valuation of water quality. We further explore how these missing benefits are likely distributed along socioeconomic dimensions.

Our analysis proceeds in two steps. First, we describe the extent of missing benefits in US EPA analyses and how these gaps have changed over time. To conduct this assessment, we searched government databases for economic analyses associated with the Clean Water Act. This review yielded dozens of economic analyses completed since 1972. We further supplemented this review through conversations with US EPA staff economists. Using qualitative methods software, we coded each analysis based on the type of water quality benefit, degree of quantification, valuation methodology, assumptions about extent of market for water benefits, and other descriptors, including characterization of distributional or equity implications. In every economic analysis, we found benefits which were not fully monetized or quantified. The most common missing benefits were associated with ecological impacts, cultural benefits, and human health concerns. We observed that the frequency of missing benefits declined over time, suggesting that tools for quantifying benefits, especially related to human health, have improved since the passage of the Clean Water Act.

Further, our review of prior economic analyses demonstrates that cultural values for clean water and issues of equity and distribution in water quality benefits remain a notable gap. Prior analyses lack robust assessments related to the socioeconomic distribution of potential benefits. The second step in our analysis aims to fill this void. We proceed by assessing two main areas of the Clean Water Act: 1) industrial and municipal point source pollution and 2) wetlands. Most economic analyses of the Clean Water Act have focused on these two broad categories. Effluent standards for point source polluters are a cornerstone of the Act, and the extent to which the Clean Water Act protects wetlands has been a controversial aspect of the Act for decades.

To explore how the potential distribution of water quality benefits vary with point sources and wetlands, we compile five main categories of data: 1) the location and operation status of approximately 100K point source polluters from 1990 to 2019, 2) monthly effluent levels from these point sources, 3) violations of effluent standards, 4) the location of wetlands, and 5) socioeconomic information of residents living within close proximity to point sources and wetlands. The first three data sources help us assess the extent to which potential benefits vary based on industrial classification. Most point source regulations, and corresponding economic analyses, are delineated by the industrial sector. The fourth dataset provides information on the location of wetlands and contentious waterbodies. While we do not have information on the full range of benefits related to point sources and wetlands, we use information on the location of facilities, the level of pollution from these facilities, the location of wetlands, and upstream/downstream relationships with population to proxy for potential benefits. The fifth dataset allows us to link socioeconomic characteristics to the first four.

Preliminary analyses show that facilities and their corresponding pollution levels are most highly correlated with residents that are below the poverty threshold and have a below college education. Surprisingly, many facilities discharge water pollution in areas that are predominantly white. However, the extent to which exposure varies across the US is highly heterogeneous and dependent on the industrial sector. Industrial sectors such as mining, manufacturing, and wholesale trade demonstrate strong correlations with high poverty and lower levels of education. We plan to assess whether similar patterns hold for wetlands.

By combining information on the extent of missing benefits, both in terms of use categories and sub-populations, we illuminate important gaps in regulatory impact assessments. We conclude with recommendations to guide future assessments.