Understanding The Ecological Risks, Costs, and Benefits of Use Attainment

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Background and Rationale

Under the Clean Water Act (CWA), states and tribes adopt *designated uses* (e.g., aquatic life support, drinking or agricultural supply, contact recreation) that specify the protection goals for each body of water. When natural, man-made, or socioeconomic factors preclude the attainment of a given use, states and tribes may consider removing or modifying the use. Before changing a designated use, a *use attainability analysis* (UAA) is required.

In addition, whenever a new development is contemplated that, while still meeting designated uses, may lower water quality, the state or tribe must conduct an *antidegradation review* (AR) to demonstrate that such a reduction is necessary to accommodate important economic or social development.

UAAs and ARs that include economic analysis evaluate the societal costs of achieving high water quality but may ignore the societal benefits of ecosystem protection. Thus, a broader evaluation of ecological and socioeconomic objectives may better inform the setting of water quality goals. States have requested additional information on economics and use attainment.

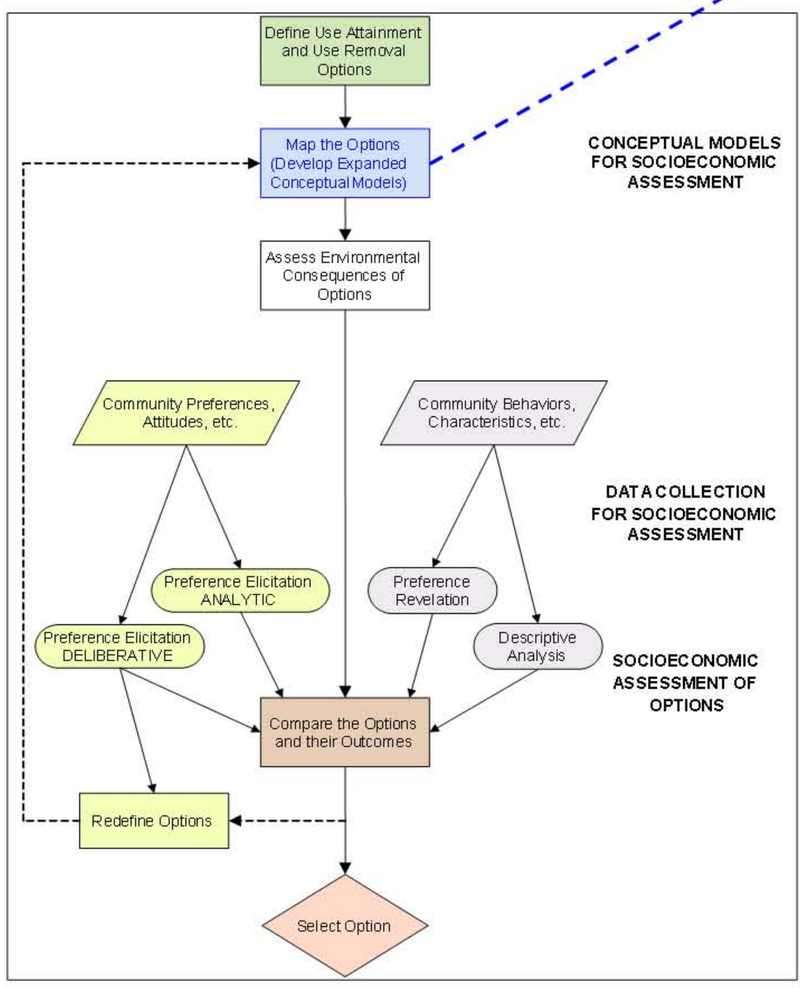
Project Goals

Enable states, tribes, and communities to make choices that enhance their quality of life while complying with the provisions of the CWA. Provide framework to enable water quality managers to better understand the trade-offs (i.e., gains and losses) of attaining high water quality, and to incorporate community preferences in decision-making. This approach does not change or affect existing regulations.

Specific Objectives:

- Summarize EPA regulations concerning the use of economics in setting/changing designated uses.
- Illustrate trade-offs from use attainment decisions (see Expanded Conceptual Models)
- Introduce an array of economic and decision-making tools that can be used to evaluate preferences, and
- Present a stepwise process for users.

Decision Framework



Expanded Conceptual Models Illustrate Ecological and Economic Outcomes

Standard conceptual model describes relationships among the source, stressor, exposure, and assessment endpoint response. Expanded model depicts impact of management options on stressors, track changes through ecosystem processes/components and assess ecosystem services and regulatory compliance.

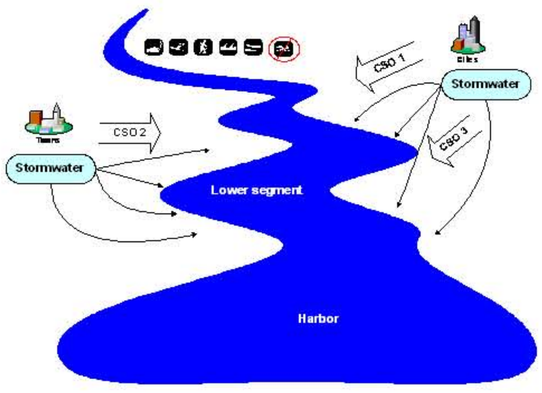
We develop expanded models using five, hypothetical issues:

- **Case 1**: UAA addressing agricultural impacts on an intermittent stream
- **Case 2**: AR of a proposed mall complex
- **Case 3: UAA addressing combined sewer overflow and stormwater impacts on river**
- **Case 4**: UAA addressing discharges to an effluent dominated stream
- **Case 5**: UAA for the Lower Salmon Falls River in Maine

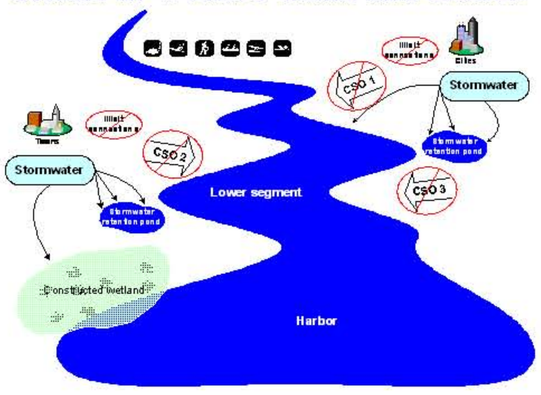
Example: Mitigating Combined Sewer Overflow

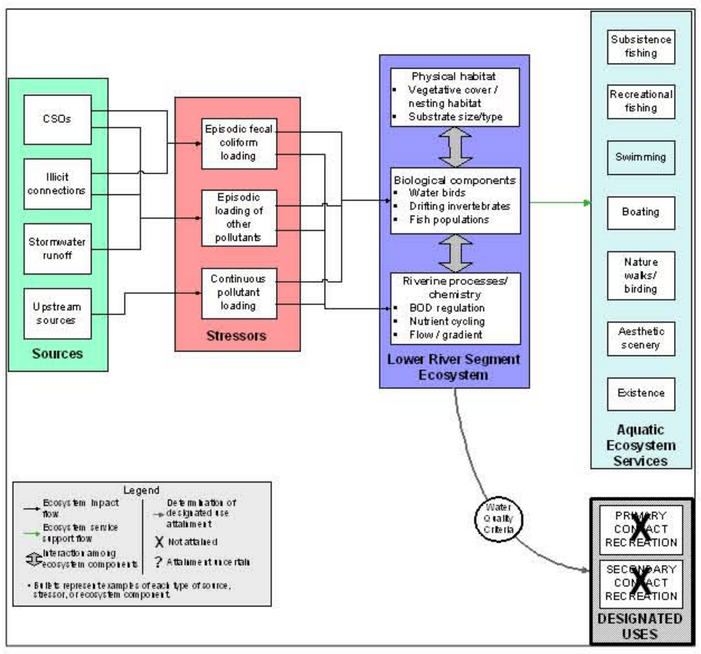
A river, designated fishable/swimmable, does not meet uses. Popular recreation, like boating and hiking, in and around the river. Fishing for both food and recreation. Birds use river for nesting and feeding. Lower segment is affected by stormwater runoff, combined sewer overflow (CSO), and pollutants from upriver. Fecal coliform exceeds swimming standard in lower segment. Three CSOs lead to discharges approximately three times a year. To meet uses, eliminate the CSOs while controlling stormwater runoff with retention ponds, street sweeping, etc.

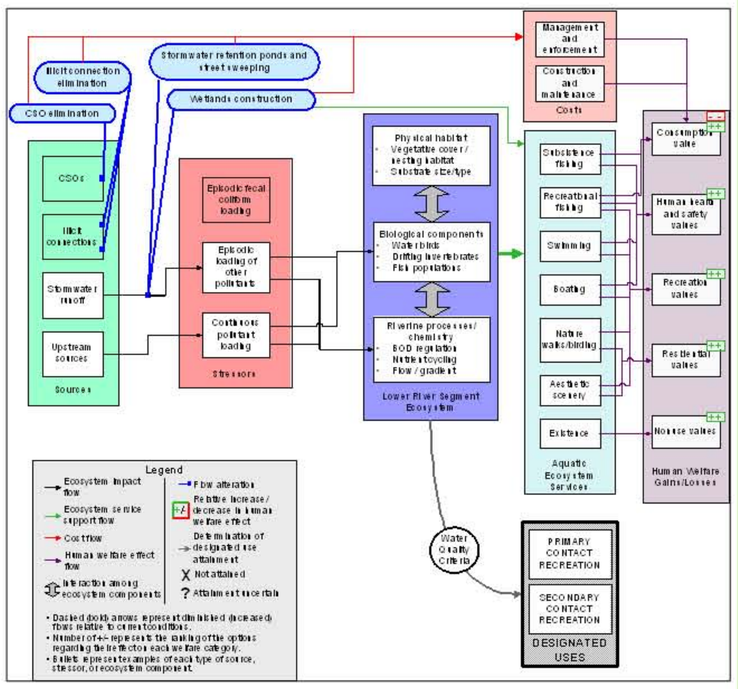
Baseline: CSOs and Runoff Prevent Use Attainment



Management Option: Controls Result in Welfare Gains and Losses







An interdisciplinary framework for analyzing the trade-offs and assessing the impacts of management options

Socioeconomic assessment methods use information about affected communities to evaluate the gains/losses from different management options. Preferences, attitudes, opinions, and perceptions can be directly elicited from community members using *preference elicitation* methods, or they can be inferred from their behaviors and characteristics using *preference revelation* methods. *Descriptive analyses* provide additional context and background for socioeconomic assessments, without specifically evaluating preferences.

Preference elicitation methods can be categorized as deliberative and/or analytic. *Deliberative methods* involve stakeholders in participatory processes designed to collectively assess options. *Analytic methods* differ in that data regarding community preferences are structured and analyzed without dialogue. Analytic methods reduce data into answers to factual questions.

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We would like to acknowledge the following individuals:
Co-authors of Report
RTI: Steve Beaulieu, William Cooter, David Driscoll, Katherine Heller, Wanda Throneburg; **Decision Research:** Robin Gregory

Comments and Suggestions
EPA/OW: G. Ali, Tim Connor, Joel Corona, George Denning, Tom Gardner, Jim Keating, Mark Morris, John Powers
EPA/ORD: Tara Maddock, Glenn Suter, Hale Thurston, Mike Wright

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