



EXECUTIVE SUMMARY

Moving Toward a Multi-Benefit Approach for Water Management

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THERE IS BROAD RECOGNITION THAT adapting to climate change, coupled with the need to address aging infrastructure, population growth, and degraded ecosystems, will require rethinking programs and policies and investing in our natural and built water systems. There are a variety of strategies for addressing water challenges, from watershed restoration and efficiency improvements to vegetated swales and green roofs. Because water is deeply linked with economic, environmental, and community well-being, many of these strategies can also provide other benefits, such as reducing energy use and greenhouse gas emissions, providing wildlife habitat, and enhancing community livability.

Advancing Multiple Benefits: Opportunities and Challenges

Government agencies, businesses, and others have acknowledged the importance of multiple benefits and the potential for multi-benefit approaches to help build partnerships, leverage resources, optimize the value of investments, and garner public support. Communities throughout the United States are examining and advancing water management strategies that achieve multiple benefits, from complete street projects that create safe transportation options for all users and reduce pollutant runoff to water efficiency programs that reduce water and energy demand while increasing in-stream flows. For example, the City of Philadelphia is implementing low-impact development and green stormwater infrastructure options throughout the city based on the assessment of multiple benefits. Their analysis compared traditional grey infrastructure for combined sewer overflow controls (e.g., storage tunnels) with alternative low-impact development options (e.g., tree planting, permeable pavement,



Source: Heather Cooley

Green infrastructure projects, such as the Transbay Transit Center rooftop garden in San Francisco, California pictured above, can provide multiple benefits, including reducing stormwater runoff, improving water quality, providing habitat, and providing public green space.

green roofs) and examined the effectiveness of each option as well as associated co-benefits (reducing urban heat island effect, wetlands creation, air quality, electricity use, and more). When additional benefits were included, low-impact development increased the economic value of the investment by a factor of 20 compared to traditional grey infrastructure alone: from \$122 million to \$2.8 billion.¹ The benefits from low-

1 Stratus Consulting, Inc. 2009. *A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philadelphia's Watersheds*. Philadelphia: City of Philadelphia Water Department. https://www.epa.gov/sites/production/files/2015-10/documents/gi_philadelphia_bottomline.pdf.

impact development included more than \$520 million in additional recreational activities, \$1.1 billion in reduction of heat stress mortality, and \$130 million in green jobs. Implementing either option would require a significant investment from the City of Philadelphia, but examining a broader suite of benefits allowed the city to select the option that would maximize the value of its investment.

There are examples from around the country of efforts to advance integrated projects that achieve multiple benefits. Yet, these efforts are not universal. One challenge is that the term multiple benefits is often loosely defined and thus associated benefits and costs are examined inconsistently. Multi-benefit projects are typically defined as projects that provide more than one benefit or serve more than one purpose.² Yet, flood management, water quality, and water supply are so interconnected that nearly every water-related project will touch on at least two of these categories. In addition, by emphasizing only two or three benefits, decision makers may ignore others that could ultimately affect the project selected. Finally, the focus on multiple benefits often ignores potential costs or trade-offs, leading to an overly simplistic analysis of the project costs and benefits.

Various groups have developed tools and resources to assist in identifying and quantifying benefits of water management strategies; however, the tools often focus on a single strategy (e.g., stormwater management or watershed restoration) or a specific geographic region. For this reason, it is

difficult to apply insights from the tools to a new project without significant investment of time and resources. As a result, the broad benefits and costs of water management are not routinely or systematically included in decision making, and water managers and decision makers cannot effectively compare alternative options.

A Framework for Incorporating Multiple Benefits into Decision Making

To address these challenges, researchers at the Pacific Institute and Professor Bob Wilkinson of the University of California, Santa Barbara launched an initiative to develop, build consensus around, and promote the uptake of a framework to embed the multiple benefits of water projects into decision-making processes. The framework seeks to outline a strategy for systematically identifying and incorporating the costs and benefits of water management strategies into decision making. The framework could be used by the public sector, for example, when evaluating which water supply/supplies or water quality interventions to pursue. Or, it could be used by the private sector, when assessing which projects to invest in within their value chains or as part of their philanthropic activities. By promoting a broader and more complete consideration of the wide range of benefits and costs associated with water management decisions, this work can help to:

- Broaden support for a policy or project;
- Identify opportunities to share costs among project beneficiaries;
- Minimize adverse and unintended consequences;
- Optimize the investment of time, money, and other resources; and
- Increase transparency associated with decisions.

2 California State Water Resources Control Board. 2015. *Storm Water Resource Plan Guidelines*. Sacramento, Calif.: State Water Resources Control Board. https://www.waterboards.ca.gov/water_issues/programs/grants_loans/swgp/docs/draft_guidelines_120315.pdf.

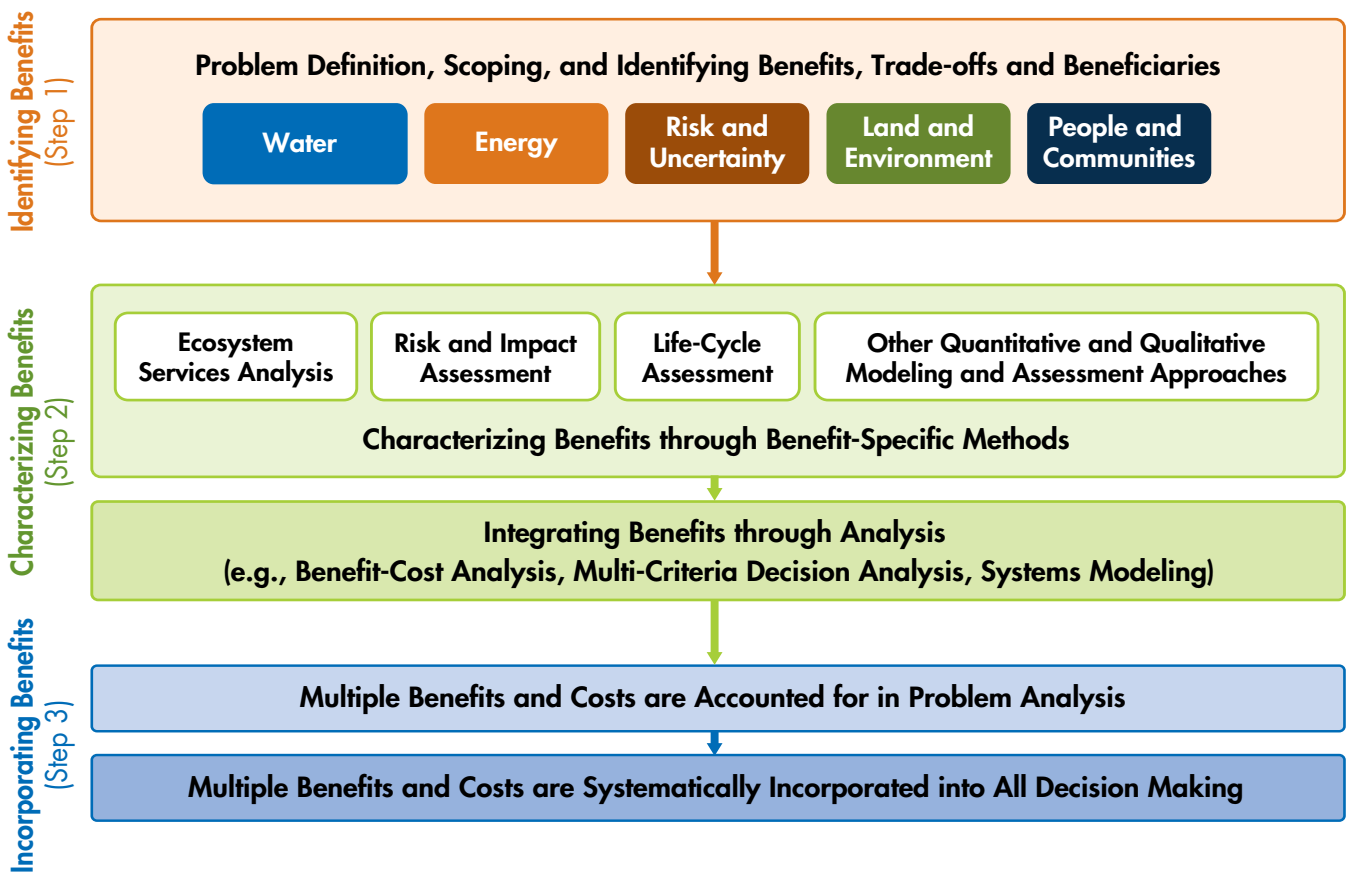
This initiative has three distinct phases. The goal of Phase 1 was to develop a draft framework and process for evaluating water projects by engaging a diverse set of stakeholders representing government, businesses, non-governmental organizations, investors, and decision makers. During Phase 2, we will be working with stakeholders to apply the framework to specific water management decisions, such as optimizing green infrastructure locations, evaluating the return on investment for water reuse, or developing an integrated water strategy. Phase 2 will allow us to refine the framework and develop resources to assist users in implementing the framework. Finally, in Phase 3, we will focus on embedding

the framework into policy and planning. This report represents the culmination of Phase 1 of this work and includes a proposed framework for examining multiple benefits and trade-offs of water management.

Throughout Phase 1 of this work, we engaged with a diverse set of stakeholders (government, non-governmental organizations, businesses, water utilities, and community members) to develop a draft framework for evaluating multiple benefits of water projects. We identified a three-step, theoretical framework to expand the analysis of multiple benefits and better account for them in decision making (Figure ES1).

Figure ES-1.

Outline of the Multi-Benefit Framework, Including Three Steps Toward Systematically Incorporating Multiple Benefits into Decision Making



The **first step** of the framework is to define the problem, determine an appropriate scope, and identify the potential benefits and costs. This process is iterative and requires engagement with stakeholders to expand the framing of the project, especially related to potential positive and negative impacts of water management strategies. In order to assist with identifying potential benefits and trade-offs, we conducted an extensive literature review and focused interviews with experts and practitioners. Through this process, we categorized over 100 potential benefits or trade-offs of water management strategies into five broad themes: (1) Water; (2) Energy; (3) Risk

and Uncertainty; (4) Land and Environment; and (5) People and Community (Figure ES2). These themes provide a starting point for identifying and organizing benefits and costs more methodically and transparently.

The **second step** of the framework is to characterize benefits and costs. While there are many potential benefits, finding context-relevant, good-quality data to adequately assess each benefit is a common challenge. However, there are methods and tools available for conducting both quantitative and qualitative analyses of specific benefits and costs (e.g., an ecosystems services analysis) and for

Figure ES-2.

Benefit Themes for Identification of Relevant Benefits of Water Management Strategies 🔍



integrating these results into a comprehensive assessment of benefits (e.g., a benefit cost analysis).

The **third step** of the framework is to incorporate the benefits and costs characterized in step two into policy and decision making. The multi-benefit framework is designed to assist decision makers from government, corporations, non-governmental organizations, and other entities in developing the tools they need to consider the broad benefits and costs of water management strategies during decision making. This could include, for example, guidance for funding proposals on evaluation methods for multiple benefits or developing co-funding agreements and guidelines among agencies. In addition, we will explore how this framework can be integrated into existing decision-making and planning frameworks, such as Integrated Water Resources Management or One Water frameworks. Our research on improving decision-making processes to account for multiple benefits is in its early stages; however, we will continue to outline and expand this final step through continuing work.

KEY FINDINGS

We have developed several key conclusions and recommendations for integrating multiple benefits into water management decisions.

1. Expanding the types of benefits and trade-offs considered in water management decisions can help broaden support for a policy or project; leverage resources from partners; minimize adverse and unintended consequences; increase transparency; and optimize the investment of time, money, and other resources.

While many government agencies, businesses, and non-profit organizations acknowledge the importance of multiple benefits, the full

range of benefits are not routinely considered in analysis because we lack a consistent definition of multiple benefits and the tools and resources to adequately identify them. To address these challenges, we have developed a three-step process to support more deliberate consideration of benefits and trade-offs in water management decisions: (1) identifying benefits and trade-offs across five broad themes; (2) characterizing benefits using quantitative and qualitative metrics; and (3) incorporating that information into decision-making processes.

2. Stakeholder engagement is essential for identifying and prioritizing benefits and trade-offs.

Throughout our research and discussions, water managers in the public and private sector stressed the importance of engaging with stakeholders to successfully identify and implement projects with multiple benefits. This process is not without challenges, such as the potential to delay projects. However, when effectively involved in the decision-making process, community members and agency stakeholders can drive projects that incorporate multiple benefits and reflect their needs and values. The multi-benefit framework may be able to assist water managers with stakeholder engagement by providing a platform for transparent and open discussions on project goals, broad benefits and beneficiaries, and trade-offs. In addition, the overall decision-making process is likely to benefit from stakeholder engagement through, for example, better communication with the public and support for the outcomes; financial support and improved relationships with partner organizations; and a smoother regulatory process.

3. Equity should serve as an essential lens for evaluating water management strategies.

Water management projects are not intrinsically equitable or inequitable. Instead, equity is defined as the just distribution of benefits and trade-offs among stakeholders. For this reason, equity is not considered a “benefit” within the multi-benefit framework. Rather, it is a lens that should be applied to all benefits. In most decisions, benefits and costs cannot be distributed equally among stakeholders, and there will be communities, agencies, or ecosystems that benefit more or are harmed more than others. In order to advance equity, water managers and decision makers must identify stakeholders that are impacted by a decision, both positively and negatively, and work toward ensuring that the same stakeholders are not consistently receiving all the benefits or incurring all the costs. Examining the distribution of the proposed benefits and costs to a range of stakeholders through an equity lens in the initial project scoping can help promote a more transparent discussion about impacts to various stakeholders.

4. Multi-benefit projects can advance collaboration among stakeholders and facilitate innovative funding opportunities.

Water management and infrastructure will require significant investment in order to address climate change, aging infrastructure, population growth, and environmental degradation. Funding for investments in water management remains a major challenge across the country. An explicit focus on multiple benefits provides an opportunity to more efficiently plan, implement, and fund projects that simultaneously meet multiple objectives. The prospect of incorporating

new financial partners (i.e., co-financing) into water management projects is one of the strongest motivations for examining co-benefits. Significant effort is needed to support partnerships and co-fund projects that meet multiple objectives.

5. Expanding the definition of the problem and the scope of the analysis will help to better integrate multiple benefits and trade-offs into water management decisions.

One of the keys to examining multiple benefits is carefully defining the water management challenges that are being addressed, and expanding the analysis to include a broader range of potential benefits and beneficiaries. The boundary or scope of the decision-making process determines the relevant stakeholders, geography, and benefits and costs considered within an analysis – what’s in and what’s out. Setting a scope that is too narrow runs the risk of ignoring important impacts that could alter the type of project pursued. On the other hand, expanding the scope of the analysis can increase the complexity of the project, resulting in a decision-making process that is too time and/or resource intensive. For example, a water supply agency may conclude that a stormwater capture project is not cost effective if it distributes the entire cost of the project over the amount of water that project yields and ignores other benefits, such as flood management and water quality, provided by the project. If these additional benefits are included, stormwater capture becomes significantly more cost-effective. If the scope is expanded to include multiple benefits, the water manager can more fairly compare projects and provide decision makers with adequate information to maximize investments in water management.

NEXT STEPS

The framework currently provides a theoretical approach to identifying and quantifying multiple benefits and costs of water management strategies. In Phase 2, we will conduct several test cases in order to refine and advance the framework. During Phase 3, we will identify pathways to embed multi-benefit analyses and resultant information in policy and investment decision making, such as promoting uptake of the framework in funding proposal requirements and in integrated water management planning at the local, state, and federal levels. Ultimately, we believe that having a systematic framework will increase the usefulness and uptake of available data and allow for wider development of multi-benefit tools.

For the full report, *Moving Toward a Multi-Benefit Approach for Water Management*, please visit:

<https://pacinst.org/wp-content/uploads/2019/04/moving-toward-multi-benefit-approach.pdf>



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