

The Role of Distributed Approaches in Sustainable Water Resource Management

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Distributed resource management describes an approach for managing resources (water, nutrients, energy, etc.) holistically and at various scales (from decentralized to centralized) based on an equitable, situation-specific consideration of their appropriateness and sustainability. Distributed stormwater systems are perhaps best embodied in the context of sustainable design as “low-impact development,” in which management practices are designed to infiltrate, intercept, and/or treat stormwater near where it originates. Likewise, distributed wastewater management is an approach to wastewater collection, treatment, and disposition (discharge, reuse, dispersal) that utilizes scalable systems—which can vary from onsite to cluster to centralized—as appropriate across a service area, watershed, or other political or natural boundary. This presentation will focus on environmental, technical, legal, economic, social, and other factors which inform the appropriateness and successful implementation of distributed water management within a range of community-specific situations. The primary author is the Principal Investigator for a Water Environment Research Foundation (WERF) project entitled, “When to Consider Distributed Systems in an Urban and Suburban Context.” The objectives of this WERF project are to identify and analyze appropriate examples of distributed water management systems, define their key attributes, and develop decision support instruments that help planners, utility managers, engineers and other decision-makers and stakeholders better determine whether or not distributed systems would be a viable solution in their community. Although distributed wastewater/stormwater systems are not particularly well understood or accepted by the water resource industry at large, they have been utilized in many innovative applications in urban and suburban situations. Through the green building movement, water reuse, integrated wastewater and stormwater management systems, and water conservation programs have demonstrated the flexibility of distributed systems. These recent project examples highlight potential innovative solutions that may suggest a new direction for the future of water resource management. On a broader level, this project supports integrated resource management efforts whereby multiple community goals and values can be addressed to advance the classic triple bottom line of sustainability: social, economic and environmental performance. Integrated resource management can and should address multiple, varied issues including water conservation and reuse, closed-loop nutrient management, energy recovery and carbon neutrality, food production and sustainable local agriculture, ecosystem protection, restoration and enhancement, and sound and equitable socio-economic opportunities for all community members. A conceptual framework for considering integrated resource management—particularly at the watershed, regional and community scales—will be presented, along with recommendations for advancing state policy and sustainable design practices among professionals.