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Protecting the City's Water: Designing a Payment for Ecosystem Services Program

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Studies of water utilities across the United States show that every dollar invested in watershed protection saves tens to hundreds of dollars in water treatment costs. The threats that watersheds face are numerous: pollution, development, fire, soil erosion, drought, flooding, and others. Payment for Ecosystem Service (PES) programs mitigate the risks posed to watersheds by linking the payment for hydrological services to consumers and using the resulting funds for conservation, restoration, and land acquisition projects. This article examines several examples of municipalities in the United States that have defined and valued their ecosystem services, developed agreements to guarantee these services, and established a payment mechanism. With an exception of one case, a common characteristic among the examples is that the need for a PES program was identified only after a catastrophic event in the watershed. These examples offer insightful lessons in implementing a PES program that provides a cost-effective means of protecting ecosystem services supplied by watersheds.

Ecosystem services are the conditions and processes of a natural ecosystem that provide benefits to people and communities. Typically, these benefits are not included in conventional markets and are thus unpaid for by recipients. Over the past few decades, research has demonstrated that healthy, forested watersheds provide numerous, economically important services to society. Municipalities, water districts, and other agencies are now aligning their economic and conservation objectives in ways that explicitly link the well-being of humans and the environment. Gretchen Daily & Pamela Matson, *Ecosystem Services: From Theory to Implementation*, 105 PROC. NAT'L ACAD. OF SCI. 28 (2008). PES programs have gained importance worldwide and provide clear economic incentives for environmental stewardship by landowners and promote greater awareness among consumers of the valuable services ecosystems provide. By allowing landowners to internalize societal watershed benefits, PES systems also promote landowner communication and collaboration with downstream stakeholders. As such, PES programs are often a more efficient and cost-effective method of achieving watershed protection compared to regulations alone.

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The concept of investing in watershed protection to maintain a water supply is not new. In 1889 the Great Seattle Fire destroyed the entire downtown business district and exposed many inadequacies in the City of Seattle's water-supply system. Shortly after the fire, voters approved bonds to finance construction of the Cedar River system, which continues to be Seattle's primary water source today. At the time, city leaders also formulated a plan to eventually acquire all land surrounding the entire 100,000-acre watershed and thus control all activities on those lands. One hundred years later, in the late 1990s, the city realized this plan for the Cedar River watershed, thereby securing Seattle's drinking water supply. Similarly, by investing \$1.5 billion over ten years to protect the Catskill and Delaware watersheds, New York City has avoided spending \$6 billion in capital and \$300 million in annual costs associated with constructing and operating a new filtration plant. S. L. Postel & B. H. Thompson, Jr., *Watershed Protection: Capturing the Benefits of Nature's Water Supply Services*, 29 NAT. RESOURCES F. 98–108 (2005). Thus, as shown by the City of Seattle and New York City, investments in watershed protection have eliminated the need to construct expensive treatment facilities.

The production of surface water for municipal use is an ecosystem service that is generally neither paid for by cities nor individual water consumers. Water consumers usually pay water companies or municipalities for the services of capturing, treating, and delivering water but not for producing the water. Therefore, the goods and services provided by healthy forested watersheds are of critical importance to water consumers. Among them, flow regulation; filtration; flood control; and protection against runoff, erosion, and sedimentation are critically important, especially in areas where precipitation comes in the form of heavy rainfall or snowmelt during the spring and summer seasons as in the Mountain West and Southwestern regions of the United States.

Unfortunately, watershed-protection efforts are often only undertaken in response to watershed degradation. One hundred years of fire suppression have rendered most western forests overcrowded, vulnerable to pests, and highly prone to stand replacement fires that strip steep slopes of soil protecting vegetation. The loss of forest cover decreases a watershed's capacity to regulate flow and control soil erosion. Research of the Los Alamos reservoir in New Mexico showed a dramatic spike in the sedimentation rate due to soil erosion following the Cerro Grande fire. A. Levine et al., *A Five-Year Record of*

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