Assessment of Goods And Valuation of Ecosystem Services (AGAVES)

San Pedro River Basin, United States and Mexico

A consortium of federal, academic, and nongovernment organization (NGO) partners have established a collaborative research enterprise in the San Pedro River Basin to develop methods, standards, and tools to assess and value ecosystem goods and services. The central premise of ecosystem services research is that human condition is intrinsically linked to the environment. Human health and well-being (including economic prosperity) depend on important supporting, regulating, provisioning, and cultural services that we derive from our surrounding ecosystems. The AGAVES project is intended as a demonstration study for incorporating ecosystem services information into resource management policy and decisionmaking. Accordingly, a nested, multiscale project design has been adopted to address a range of stakeholder information requirements. This design will further facilitate an evaluation of how well methods developed in this project can be transferred to other areas.

The San Pedro River originates in Sonora, Mexico, and flows north into southeastern Arizona (fig. 1). In 1988, the U.S. Congress designated portions of the San Pedro River Valley as the San Pedro Riparian National Conservation Area (SPRNCA), the first designation of its kind in the Nation (Government Printing Office, 1988). The legislation directed the Secretary of the Interior to conserve, protect, and enhance the riparian, wildlife, archaeological, paleontological, scientific, cultural, educational, and recreational resources of the conservation area. The SPRNCA, managed by the Bureau of Land Management (BLM), hosts a rich riparian community with vital habitat for resident and migrant species.

Figure 1. Location of San Pedro River Basin.

Decades of groundwater overdraft have reduced base flows in the San Pedro River. Rapid urbanization and forecasted climate change both serve to exacerbate this problem. The Upper San Pedro Partnership (USPP) was formed in 1998 as a consortium of 21 federal, state and local agencies and organizations that were to assist in meeting the long-term water needs of the SPRNCA and of the area residents. In November 2003, the U.S. Congress passed legislation requiring the Secretary of the Interior, in consultation with the Secretaries of Defense and Agriculture, and in cooperation with the USPP, to restore and maintain sustainable yield of the regional aquifer by and after September 30, 2011 (U.S. Congress, 2004).

The San Pedro River Basin's unique combination of existing data, previous research, established partnerships, and stakeholder commitment, together with a serious management challenge, creates the perfect test bed for ecosystem services research, as well as an evaluation of the efficacy of the approach for facilitating decisions by resource managers.

Ecosystem Services Derived from the San Pedro River Basin

Ecosystems provide society with a range of natural services and functions, collectively known as **ecosystem services**. Some of the services provided by the urban, riparian, riverine, agricultural, and rangeland ecosystems in the San Pedro River Basin are illustrated in figure 2. They include providing clean drinking water; shelter and food for wildlife, birds, and humans; clean air; recreation opportunities; stable soils; and regulating the climate by removing greenhouse gases from the atmosphere. Several of these services or processes produce benefits that have utility or satisfy want and can be translated into goods that can be accounted for by society through market trading (for example, carbon offsets or reforestation subsidies). Often, however, the means to values and market trade have not been determined (for example, conserving rare species and open spaces). In addition, we often have a poor understanding of the tradeoffs and synergies among bundles of ecosystem services. AGAVES seeks to determine how to quantify, value, and account for goods, some of which may be amenable to trading directly in markets. By understanding the value of ecosystem services, decisionmakers (for example, city managers) will be better prepared to accurately weigh the benefits of policies and management actions designed to meet stakeholder objectives. The aim of AGAVES is to develop computer-based tools to explore the effects of management decisions. Realizing that water is fundamental for the generation of most ecosystem services, AGAVES will concentrate initially on the benefits and tradeoffs associated with protecting, restoring, and managing ecosystems under the stress of drought which could result from changes in our climate brought on by the build up of greenhouse gases (for example, carbon dioxide and methane) in our atmosphere.

A prolonged drought in the San Pedro could force decisionmakers to choose how to allocate precious groundwater and surface water among urban, agricultural, ranching, cultural, and ecological interests. AGAVES will develop a computer-based, decision-support tool that enables the consideration of alternative versions of the future based on different approaches for allocating waters, managing ecosystems under a changed climate and growing human demands.

References Cited:

U.S. Congress, 2004, Defense Authorization Act of 2004, Restore and maintain sustainable yield of the regional aquifer by and after September 30, 2011: Public Law 108-136, Section 321.

Government Printing Office, 1988, San Pedro Riparian National Conservation Area: U.S. Code, title 16, chap. 1, subchap. CIX, p. 711–713.

Figure 2. San Pedro River with Huachuca Mountains in the background. Photograph courtesy of Jerry Jacka

For Further Information Contact

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David Goodrich
U.S. Department of Agriculture –
Agricultural Research Service
Southwest Watershed Research Center
Tucson, AZ
Dave.Goodrich@ars.usda.gov

EPA/600/
F-10/015

William Kepner
U.S. Environmental Protection Agency
Office of Research and Development
Las Vegas, NV
Kepner.William@epa.gov

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Darius Semmens
U.S. Geological Survey
Rocky Mountain
Geographic Science Center
Denver, CO
dsemmens@usgs.gov

Or visit us on the Web at: *http://rmgsc.cr.usgs.gov/agaves/*