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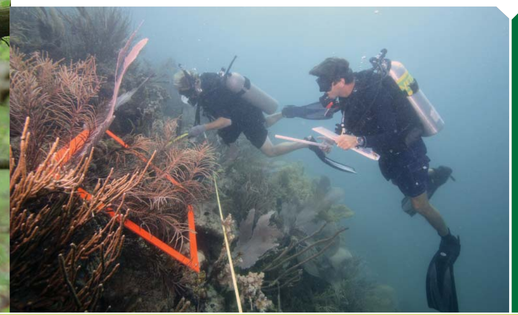
ECOSYSTEM SERVICES RESEARCH PROGRAM

EPA/600/F-08/009 I January 2009 I www.epa.gov/ecology

Research to Sustain **Ecosystem Services**



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Transforming the way we account for the type, quality, and magnitude of nature's goods and services.

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ECOSYSTEM SERVICES RESEARCH PROGRAM

EPA's **Ecosystem Services Research Program** in the Office of Research and Development is at the forefront of science to protect, enhance, and restore the many vital services provided by ecosystems. Discoveries are providing the tools and information needed to effectively conserve nature's limited resources and guide policy decisions that impact ecosystems.

What are Ecosystem Services?

Ecosystem services are the benefits people obtain from natural systems. Our health, well-being, and livelihoods depend on these benefits. For example, forests purify the air we breathe and the water we drink; wetlands protect us from floods; and grassland soils allow us to grow food. Ecosystems also enhance our well-being by offering recreational and cultural benefits.

Modern societies are altering ecosystem services. Expanding populations are changing our rivers, coastal areas, forests, wetlands, and other ecosystems. These changes impact the ability of ecosystems to provide the goods and services essential to our health and well-being. Using science, EPA is analyzing how nature produces ecosystem services, estimating their value, and developing tools to support good stewardship of our natural resources.

Providing Tools for Decision Making

EPA's Ecosystem Services Research Program is developing user-friendly information and hands-on tools for policymakers, urban planners, environmental managers, and others to help them incorporate the value of ecosystem services into environmental and land use decisions.

The research will provide opportunities to forecast and predict impacts on ecosystem services from proposed uses of natural resources and enable decision-makers to understand more fully the trade-offs involved in alternative management choices.

The Ecosystem Services Research Program delivers the science necessary to identify and evaluate the complex interactions of ecosystems and how the services from nature may be impacted by man-made changes to the environment.

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Ecosystem Services Research Activities

- Providing the data, methods, and models needed to understand the response of ecosystem services to human activities
- Developing maps, measures, and models of ecosystem services to show where, when, and how much they will change under alternative management choices
- Exploring the monetary, cultural, and health implications of conserving, enhancing, consuming, impairing, and destroying ecosystem services

Three Research Approaches:

- Chemical-Specific Approach: Study the impact of nitrogen, a widely-used and discharged element, on ecosystem services
- Ecosystem-Specific Approach: Study the ecosystem services in wetlands and coral reefs, which provide vitally important services
- Place-Based Approach: Study the interconnection of ecosystem services within a particular place

Nitrogen Research:

EPA conducts research to understand how nitrogen, a regulated pollutant, affects ecosystem services that benefit human health. Excess nitrogen from fertilizer, septic tanks, power plants, urban runoff and other sources can impact water quality, fisheries, and other ecosystem services. Nitrogen research will assist national air and water policy-makers in evaluating the most cost-effective means of improving human health and ecosystem services through more effective nitrogen management.

Wetlands Research:

Research is needed to clearly understand the ecosystem services provided by wetlands such as safe water supply, fish and fiber, wildlife habitat, and flood regulation. Scientists are studying wetland ecosystem services to provide the decision-support tools needed to target, prioritize, and evaluate policy and management actions that protect, enhance, and restore the ecosystem goods and services provided by wetlands.

Coral Reef Research:

Coral reefs provide valuable ecosystem services to society such as food, coastal protection, and fishing, yet they are in serious decline partly from global factors, such as high seawater temperatures, and partly from pollutants and sediments in watershed runoff. Pollution from population growth and land-use change in coastal zones further threatens coral reef systems. Research is providing tools to understand the costs and benefits of land use decisions on coral reef systems.

Place-Based Studies:

- **Tampa Bay area in Florida:** Tampa Bay, located on the Gulf Coast, is Florida's largest open-water estuary. It supports one of the world's most productive natural systems and is home to a large and growing urban center. Decision-makers need scientific tools and information to help them balance rapid urban growth with preservation of unique estuarine habitats and economically important recreation and tourism industries.
- **Willamette River Basin in Oregon:** The river basin, located in Oregon between the Coast Range and the Cascade Range, is largely agricultural but with a rapidly growing population. EPA is quantifying the area's ecosystem services and assessing the effects of land development and other man-made stressors on those services.
- **Future Midwestern Landscapes:** "Bread-basket states" in the Upper Midwest are critically important in supplying national and global demand for food and fiber. Rising demand for fuel crops offers an opportunity to study the impacts of expanding agricultural land use and the rapid development of the biofuels industry on existing ecosystem services.
- **Coastal Carolinas:** The North and South Carolina coastal counties represent an important area to study ecosystem services. Extensive natural landscapes are facing unprecedented pressures from population growth, landscape alteration, and climate change.
- **Southwest Ecosystem Services:** Fresh water is a limited ecosystem service in California, Nevada, and Arizona. There are many demands on its use, ranging from agriculture to urban development. Scientific tools and information can help resource managers make decisions on the use of fresh water and other ecosystem services. Three study areas are: California's Central Valley, Nevada's Humbolt River basin, and Arizona's San Pedro River basin.

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The independent Board of Scientific Counselors recognizes EPA's Ecosystem Services Research Program for being in a unique position to establish and communicate a greater understanding of the value of ecosystem services.

Partnerships

EPA's scientists are partnering with federal agencies, states, tribes, communities, universities, and non-governmental organizations to develop the best scientific tools and information. Collaboration provides an opportunity for outside input into EPA's work, and it helps our scientists tailor scientific products to the needs of those who use them to protect and restore ecosystem services.

Putting Science to Use

Research is underway to develop the following products:

- Innovative decision support-systems and an online platform will assist decision-makers in using scientific methods, models, and tools to explore the outcomes of alternative-management options.
- A first-ever national atlas of ecosystem services will identify and provide an inventory of ecosystem services by location, condition, and value for decision-making purposes. The atlas will be available in print, electronic, and online formats.
- A national survey of wetland condition and function will provide an improved scientific foundation for conserving and enhancing wetland services at the local, state, and regional levels.