



## ECOSYSTEM SERVICES RESEARCH PROGRAM

### STUDYING THE ROLE OF NATURE'S BENEFITS IN HUMAN HEALTH AND WELL-BEING

#### Issue:

Forests, rivers, wetlands and beaches, even city parks, benefit human society in many ways. Natural areas provide resources like food, fiber and recreation; they also filter pollutants and store precious rainwater. These are just a few examples of nature's benefits, or "ecosystem services," that support all life on our planet, and are the foundation for human health and well-being.

EPA research has traditionally focused on air, land and water pollution and its risks to human and ecosystem health. Bringing the perspective of nature's benefits to this research, and using a systems approach, expands our options for addressing current and emerging environmental health threats. These include polluted and scarce drinking water, fish and shellfish contamination, and storm-related injury, disease and displacement.

Ecosystem services are also important in traditional cultures, spirituality, community ties, and other fundamental components of human well-being. Further exploration into the many benefits of natural areas will deepen our understanding of the role of ecosystems in a sustainable society.

#### Scientific Objective:

EPA's Ecosystem Services Research Program (ESRP) includes studies on the relationships between multiple ecosystem services and specific aspects of human health and well-being. Resulting information can support decisions about how we manage the benefits of nature.

This framework will help direct habitat protection and restoration to where they are most needed, and support new economic markets for valuing and trading ecosystem services to maintain

the flow of benefits. EPA researchers are developing ways to measure these benefits and the costs of losing them, as well as examining what is causing environmental stress on their supply and quality.

Findings will populate interactive maps and models to show the human implications of policy action—or inaction—that affects the availability of nature's benefits.

The Human Well-Being research initiative opens investigations across typically discrete scientific fields, requiring interdisciplinary collaborations and analyses that represent new challenges for EPA's ecologists.

Activities include exploring and interpreting primary health data and social surveys; developing and using health and well-being indicators (such as health care

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and discretionary expenses, or pollution levels); and relating this information to the availability of ecosystem services.

Initial research leverages internal expertise, priority efforts of EPA collaborators, and existing tools for modeling economic and health benefits. The following studies are underway:

- Assessing the role of vegetative buffers in mitigating near-road air pollution
- Connecting forest fragmentation, biodiversity loss, and Lyme disease risk
- Developing an index of human well-being
- Quantifying air and water quality benefits from urban forests, using the U.S. Department of Agriculture Forest Service's i-Tree tool, for the ESRP National Atlas of ecosystem services, and for the Tampa Bay and Willamette River Valley studies

- Comparing health benefits, using EPA's BenMAP tool, from air quality modeled under biofuels and multiple-services scenarios in the Future Midwestern Landscapes study
- Mapping urban heat vulnerability from landcover, socioeconomic, and health data for the National Atlas

### Application and Impact

Greater understanding of the relationships between nature's benefits and human health and well-being will have broad applications for environmental management. Research findings can support urban planning by demonstrating the value of ecosystem services to urban infrastructure needs such as stormwater management.

Results will help target local to national ecosystem protection and restoration efforts to buffer communities from anticipated effects of climate change.

Studies can also inform human-health risk assessment by introducing nature's benefits as part of the environmental context in which cumulative community health risks are evaluated and addressed.

Human well-being is the centerpiece of the ecosystem services paradigm. Ongoing activities across the ESRP are demonstrating the relevance of ecological features and processes to humankind. It is EPA's research and communication on this topic that will resonate with decision makers by highlighting the societal implications of changes in the availability of nature's benefits.

EPA's Ecosystem Services Research Program invites and encourages partnerships directed to this critical area of emphasis.

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