

Ecosystem Services and Environmental Health

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Ecosystem Services and Environmental Health

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Supplement Aims and Scope

This special issue of *Environmental Health Insights* will be designed to explore the interrelated – and rapidly changing – issues of ecosystem services and environmental health. There are many challenges to ecosystem services which, in turn, threaten human health. These include the rapid process of urbanisation; the increased concentrations of poverty and pollution in the urban periphery; climate change and new patterns of ecosystem services; agricultural intensification and extractive mining industries. At the same time, ecosystem services perform many diverse and under-recognised roles in relation to human health, including as a source of ingredients for indigenous and other health, the provision of livelihoods and wellbeing, nutrient supplementation and so forth. The risks of ecosystem degradation and the benefits of ecosystem services are not always readily apparent and may only be fully realised many years down the line.

Yet, in many developed and undeveloped parts of the world, consequences of these interrelated processes and the risks and hazards that they pose to both human health and ecosystems remain underexplored. This special issue of the *Environmental Health Insights* will draw seek draw on new, empirical research which examines the nexus between ecosystem services and environmental health in the context of a rapidly changing world.

Environmental Health Insights aims to provide environmental health practitioners, researchers and the general public with online, open access to scholarly articles on environmental health hazards and associated risks. The journal aims to explore how these hazards and risks can be eliminated or limited or prevented to help protect human health and our environment.

In a field where the literature is ever-expanding, practitioners and researchers increasingly need to have ready access to up-to-date, high-quality scholarly articles on areas of ongoing interest in environmental health. This supplement aims to address this need by presenting contemporary articles by leading scholars, allowing readers to distinguish the signal from noise. We hope that through this effort practitioners and researchers will be aided in finding answers to some of the most complex and pressing issues of our time.

The essentials to life, from the air we breathe and the water we consume to the outdoor recreational activities we enjoy, all depend on healthy, natural ecosystems. Natural ecosystems (eg, wetlands, streams, estuaries, and forests) are indispensable for the survival of all species on Earth,^{1,2} because they are critical for regulating and maintaining the ecological processes essential

for providing the ecosystem services required to sustain human health.² Ecosystem services are goods and services provided directly or indirectly by nature.³ These services are classified as provisioning, regulating, cultural and supporting. Provisioning services are products created by ecosystems for humans to use such as food, freshwater, fiber and fuel. Regulating services control the ecological processes occurring in ecosystems such as climate regulation, water purification, pollination, natural hazard regulation and waste treatment. Cultural services provide non-material opportunities for spiritual and inspirational, educational, and recreational activities. Supporting services are processes required for the production of all ecosystem services such as nutrient cycling and soil formation.³⁻⁵ The supply and variety of ecosystem services differs at local, regional and global scales.⁴



The Millennium Ecosystem Assessment Report (2005) identified freshwater, food, raw materials, medicines, nutrient cycling, wastewater treatment, regulation of infectious disease and climate, cultural and recreational activities as the main ecosystem services linked to public health. Recreational ecosystem services have a direct impact on mental and physical health because people enjoy spending time outdoors relaxing or participating in activities (eg, fishing, swimming, boating, etc.) in healthy ecosystems. Food, clean air, freshwater, medicine and the regulation of diseases are services that minimize threats to human health.⁶

With our biosphere rapidly becoming unbalanced due to climate change, the protection of natural ecosystems and biodiversity in conjunction with sustainable management of natural resources is advantageous for maintaining economic growth, environmental health, and access to ecosystem services.⁷ Human activities (eg, deforestation, agricultural expansion, burning of fossil fuels, and spread of invasive species) disrupt the stability within natural ecosystems by simultaneously exposing them to multiple stressors which threaten ecosystem services and environmental health.⁷ For example, freshwater is declining in many areas around the world, which jeopardizes the food supply and the availability of clean water needed for drinking, bathing, and cooking. Impaired freshwater systems are common in agricultural and urbanized areas. People whose diet consists mainly of local food sources are experiencing a decline in their food supply due to a decline in biodiversity and agricultural intensification. Furthermore, impaired natural ecosystems suffering from habitat alteration, transfer of pathogens from one location to another, decline in biodiversity or human-driven genetic changes contribute to increased risk of human exposure to vectors and outbreaks of parasitic diseases.⁴

As natural resources become overexploited, degraded, or extinct, the value and demand for ecosystem services increases.^{8,9} It is challenging to maintain a balance between economic growth, sustainable environments and public health. There is a recognized need to evaluate both biogeochemical and socio-economic indicators in order to better conserve natural ecosystems and protect the ecosystem services needed to sustain public health.¹⁰ Linking human health to ecosystem services is complex because it involves several socio-economical, biological and environmental factors.^{4,6}

The aim of this Special Issue of Environmental Health Insights is to explore issues involving ecosystem services and environmental health. The articles in this supplement address specific tools for improvement of current ecosystem assessment practices or monitoring applications that directly affect public health. Some challenges for evaluating the relationships between ecosystem services and environmental health highlighted in this supplement include the need for: (a) new approaches in environmental quality and exposure assessments; (b) identification of the relationships between ecosystem services and environmental health; and (c) improvements in the integration of monitoring ecosystem services and its interconnectivity between

the environment and public health. Jordan and Benson (2015) discuss the term “watershed epidemiology” and the importance of integrating environmental and human health data to provide a more comprehensive approach and understanding of the relationship between the environmental stressors, water quality, ecosystem services and human well-being at a watershed scale.¹¹ Murry et al., (2015) conduct an exploratory study to evaluate the relationship between aquatic recreational activities and human health by surveying 197 recreational users of the Anacostia River to determine to potential risk of exposure to water, however, this study did not include routine water quality monitoring.¹² Spence (2015) identifies practical improvements to current watershed monitoring practices through a demonstration of the use of caffeine as a chemical indicator for domestic waste water.¹³ Huff et al., (2015) provide an improvement in the technology used to track the evolution of wildfires, provide advanced warning for evacuations and fire suppression efforts and monitor the transport of smoke plumes by providing an online near real time visualization tool. This technology allows air quality forecasters and fire management officials to use satellite observations to complement ground-based and aircraft measurements of wildfire activity.¹⁴

Each of these articles emphasizes the need for integrating ecological and human health data to explore the influences of ecosystem changes on environmental health and ecosystem services. Establishing complete datasets and employing new environmental assessment and monitoring tools to improve our understanding of the complex interactions between ecosystems and human health are currently emerging. Educating the general public about the potential risk of environmental contaminants, getting citizens involved with reducing the pollutants reaching their local and regional ecosystems, and effectively communicating the threats of altering natural ecosystems are needed sustain human well-being and ecosystem services.

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