

The human health costs of losing natural systems: Quantifying Earth's worth to public health

November 19 2013



On the island of Madagascar, a team of researchers from University of California, Berkeley, Harvard School of Public Health, and the Wildlife Conservation Society has found that the loss of access to wildlife for sustenance can lead to nutritional deficiencies in children. The researchers are shown here taking blood samples from a child enrolled in the study to measure levels of

hemoglobin. Credit: Christopher Golden

A new paper from members of the HEAL (Health & Ecosystems: Analysis of Linkages) consortium delineates a new branch of environmental health that focuses on the public health risks of human-caused changes to Earth's natural systems.

Looking comprehensively at available research to date, the paper's authors highlight repeated correlations between changes in natural systems and existing and potential human [health](#) outcomes, including:

- Forest fires used to clear land in Indonesia generate airborne particulates that are linked to cardiopulmonary disease in downwind population centers like Singapore.
- Risk of human exposure to Chagas disease in Panama and the Brazilian Amazon, and to Lyme disease in the United States, is positively correlated with reduced mammalian diversity.
- When households in rural Madagascar are unable to harvest wild meat for consumption, their children can experience a 30% higher risk of iron deficiency anemia—a condition that increases the risk for sickness and death from infectious disease, and reduces IQ and the lifelong capacity for physical activity.
- In Belize, nutrient enrichment from agricultural runoff hundreds of miles upstream causes a change in the vegetation pattern of lowland wetlands that favors more efficient malaria vectors, leading to increased malaria exposure among coastal populations.
- Human health impacts of anthropogenic climate change include exposure to heat stress, air pollution, infectious disease, respiratory allergens, and natural hazards as well as increased water scarcity, food insecurity and population displacement.

"Human activity is affecting nearly all of Earth's natural systems—altering the planet's land cover, rivers and oceans, climate, and the full range of complex ecological relationships and biogeochemical cycles that have long sustained life on Earth," said Dr. Samuel Myers of the Harvard School of Public Health and the study's lead author.

"Defining a new epoch, the Anthropocene, these changes and their effects put in question the ability of the planet to provide for a human population now exceeding 7 billion with an exponentially growing demand for goods and services."

In their paper, the authors demonstrate the far reaching effects of this little explored and increasingly critical focus on ecological change and [public health](#) by illustrating what is known, identifying gaps for and limitations of future research efforts, addressing the scale of the global burden of disease associated with changes to natural systems, and proposing a research framework that strengthens the scientific underpinnings of both public health and environmental conservation. Such efforts should lead to a more robust understanding of the human health impacts of accelerating environmental change and inform decision-making in the land-use planning, conservation, and public health policy realms. They also point out the equity and inter-generational justice issues related to this field, as most of the burdens associated with increased degradation of natural systems will be experienced by the poor and by future generations.

Dr. Steven Osofsky, who oversees the HEAL consortium and leads the Wildlife Conservation Society's Health programs around the world said, "Not all governments prioritize environmental stewardship, and many lack adequate resources to support public health. If we can combine forces and utilize sound science to build inter-sectoral bridges where conservation and public health interests are demonstrated to coincide, it's a win-win. On the other hand, if we don't work together to understand the global burden of disease that's associated with alterations in the

structure and function of natural systems, we may find ourselves testing planetary boundaries in ways that are frightening and difficult to reverse."

More information: The paper, titled "Human Health Impacts of Ecosystem Alteration," appears in the *Proceedings of the National Academy of Sciences*, Early Edition.

Provided by Wildlife Conservation Society

Citation: The human health costs of losing natural systems: Quantifying Earth's worth to public health (2013, November 19) retrieved 9 April 2024 from <https://medicalxpress.com/news/2013-11-human-health-natural-quantifying-earth.html>

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