

Science is essential to understanding how environmental changes or exposures affect and impact agricultural, ecological, and human health and disease. The emerging field of geohealth recognizes the intersection of Earth sciences, ecology, and health sciences.

The American Geophysical Union and its network of Earth and space scientists play a critical role:

- studying the cause and predictability of natural hazards
- investigating ways to reduce the geophysical, ecological, societal, and economic impacts
- helping to create resilient communities
- educating the public



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The Impacts

- changing climate can cause increased distribution of and prolonged exposure to the insects that spread vector-borne diseases, such as Lyme disease and West Nile virus.¹
- higher temperatures can lead to increased allergens and pollutants in the air, which can exacerbate asthma and allergies. Air quality issues tend to disproportionately affect the young, the poor, and those with compromised immune systems.²
- ocean acidification limits the ability of marine animals with shells or calcium carbonate skeletons to grow, survive, and reproduce. The decrease in abundance or health of these animals, many of which are food for commercial species, can negatively affect the entire marine food chain.³ Changes to marine-based food sources will challenge global economies and the approximately 3 billion people worldwide who depend on seafood as their primary source of protein.⁴
- chemical exposure, from pollution and contamination, that affects humans and wildlife is a concern. A 2016 U.S. Geological Survey study found that exposure to particles or



runoff from coal-tar-based sealcoat, a liquid sprayed on asphalt parking lots and driveways, can cause an elevated potential cancer risk for humans and toxicity in aquatic life.⁵

According to data from Web of Science™ from 2009 to 2013 there was a 37% increase in geohealth articles published. The top five global agencies funding research on geohealth are the following:

1. National Institutes of Health
2. National Natural Science Foundation of China
3. National Science Foundation
4. National Institute of Environmental Health Sciences
5. European Commission

Solutions

- every \$1 million invested in ecosystem restoration results in a return of \$2.2 to \$3.4 million in benefits.⁶
- investments and improvements to drinking water and sanitation can prevent nearly 10% of the global disease burden and amount to annual healthcare savings of \$7 billion for health agencies and \$134 million for individuals worldwide.⁷
- reducing greenhouse gas emissions to 50% of their 2005 levels could result in a 20%–40% reduction in premature deaths from chronic exposure to air pollution.⁸

¹ U.S. Centers for Disease Control and Prevention, "Climate Change Increase the Number and Geographic Range of Disease-Carrying Insects and Ticks," https://www.cdc.gov/climateandhealth/pubs/vector-borne-disease-final_508.pdf.

² U.S. Global Change Research Program, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*, edited by A. Crimmins et al., p. 77, Washington, D. C., 2016, https://s3.amazonaws.com/climatehealth2016/high/ClimateHealth2016_FullReport.pdf.

³ U.S. Global Change Research Program, 2014 National Climate Assessment, Washington, D. C., <http://nca2014.globalchange.gov/>.

⁴ World Wildlife Foundation, "Overview," <http://www.worldwildlife.org/industries/sustainable-seafood>.

⁵ B. J. Mahler, M. D. Woodside, and P. C. VanMetre, "Coal-Tar-Based Pavement Sealcoat—Potential Concerns for Human Health and Aquatic Life," U.S. Geol. Surv. Fact Sheet, 2016-3017, 6 pp., 2016, <http://dx.doi.org/10.3133/fs20163017>.

⁶ C. C. Thomas, C. Huber, K. Skrabis, and J. Sidon, "Estimating the Economic Impacts of Ecosystem Restoration—Methods and Case Studies," U.S. Geol. Surv. Open File Rep., 2016-1016, 2016, <http://pubs.usgs.gov/of/2016/1016/ofr20161016.pdf>.

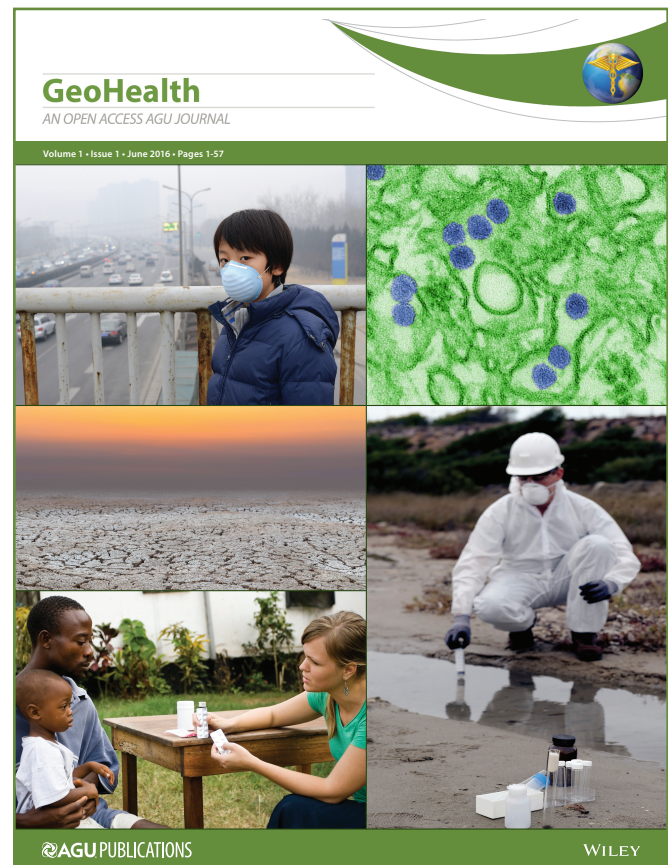
⁷ A. Prüss-Üstün, R. Bos, F. Gore, and J. Bartram, *Safer Water, Better Health: Costs, Benefits and Sustainability of Interventions to Protect and Promote Health*, World Health Organization, Geneva, 2008.

⁸ J. C. Bollen, C. J. Brink, H. C. Eerens, and A. J. G. Manders, "Co-benefits of Climate Policy," PBL Rep. 500116005, Netherlands Environmental Assessment Agency, The Hague, February 2009, http://www.unep.org/transport/gfei/autotool/understanding_the_problem/Netherlands%20Environment%20Agency.pdf.

AGU and Geohealth

AGU is committed to increasing scientific understanding and broadening the study of how climate, pollution, hazards, ecosystems, and agriculture shape human and ecological health in order to help ensure a sustainable future.

In August 2016, in an effort to support research in the rapidly emerging field of geohealth, AGU announced the launch of a new journal, **GeoHealth**.



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