Infectious disease

The ecological conditions of our planet inherently affect the organisms that inhabit it. As we continue to impact our climate, alter landscapes, and disrupt Earth’s natural systems, we undeniably influence the habitability of ecosystems for all species, including humans. Global environmental change has demonstrated to be a force in the redistribution and prevalence of infectious diseases, including those transmitted via vectors, water-borne diseases, and those transmitted person-to-person.

Scientific literature shows that warming climates alter the habitable ranges for mosquitoes that transmit malaria, Zika virus, and other diseases. Deforestation and subsequent development create and destroy habitats for mosquito breeding, altering species composition. These same forces bring humans in closer contact to fragmented natural systems, increasing tick exposure and the prevalence of Lyme disease. Increased rainfall threatens the integrity of water and sanitation systems in rural, low-income areas and exacerbates the incidence of diarrheal diseases, one of the world’s leading killers of children under five years old. Drier climates have implications for the ease in spread of influenza.

The materials listed below cover a broad range of these topics, from specific case examples to overarching thematic work, showing how a changing global ecology can alter patterns of infectious disease exposures. While reading through these articles, consider trends in data, broader implications for case studies, and steps that can be taken to manage shifting distributions of infectious diseases in a rapidly changing world.

Scientific literature:


Popular press articles:

- Howard (2018). “Pediatricians are concerned about climate change, and here's why.” CNN.
Nutrition

Today, there are about 820 million people worldwide who don’t get enough food to eat. Undernutrition has been sequentially rising every year for the last years, with more than two billion people currently suffering from micronutrient deficiencies. At the same time, we are faced with a global epidemic of obesity and metabolic diseases. As the human population rapidly expands, expected to reach about 9.8 billion people by 2050, we also need to scale up our food production -- by some estimates, by 70-100% by 2050 -- to keep up with demand.

On top of all of this, we must also consider the vast footprint of our food systems and their vulnerability to ongoing global environmental changes. Current agricultural practices can deplete our soil of nutrients, harm pollinators, decrease crop biodiversity, produce an excess of greenhouse gases, contribute to antimicrobial resistance, and create excess flows of nitrogen and phosphorus that lead to algal blooms and eutrophication. Simultaneously, our food systems are threatened by things like extreme weather and shifting patterns of rainfall and drought that can reduce global crop yields, increasing carbon dioxide concentrations that decrease key nutrients in staple crops, sea level rise and increasing groundwater salinity that make it harder, in many places in the world, to maintain farms, and collapsing fish and wildlife stocks that jeopardize the world’s food security, particularly local communities’ abilities to meet basic nutritional needs.

The materials cited below provide examples of how environmental change alters food systems and exacerbates our existing challenges to feed and provide adequate nutrition to a growing human population. As you explore these resources, consider how our demographic changes and our impacts on Earth’s natural systems can affect nutrition globally, and think through ways to increase our food systems’ efficacy and resilience in the face of global environmental threats.

Scientific literature:

Popular press articles:
- Kennedy (2018). “Scientists spy on bees, see harmful effects of common insecticide.” NPR.
- McDermott (2018). “Losing wild fish would be a nuisance in some places, a health crisis in others.” Oceana.
Mental health

Global environmental change threatens not only our susceptibility to disease, our nutrition, and other aspects of our physical health, but also our mental health. Depleted resources, rising temperatures, extreme weather events, drought, and other factors can change natural landscapes, disrupt food and water resources, change agricultural conditions, alter land use, weaken infrastructure, rise financial stress, increase risks of violence and aggression, and displace entire communities. Contending with all of these stressors -- as well as the hopelessness and despair that can arise from witnessing environmental degradation and the adverse health impacts of decreased nature contact -- can cause ecological grief and put people at greater risk for developing mental illnesses like depression, post-traumatic stress disorder, and anxiety, as well as for suicide.

Examples in the literature linking mental health threats to global environmental change are varied and numerous -- indigenous communities contending with cultural changes as the natural world underpinning many traditions undergoes fundamental shifts; farmers faced with the stress of more difficult growing conditions under drought, extreme storms, and other aspects of climate change; urban inhabitants suffering from a lack of exposure to green space; and more.

The materials listed below provide a taste of the far-reaching impacts of human-induced global environmental change on our mental health. Consider these numerous examples and their broader implications as you develop strategies to simultaneously safeguard mental health and the natural systems that underpin much of our spiritual, emotional, and psychological well-being.

Scientific literature:

- Carleton (2017). “Crop-damaging temperatures increase suicide rates in India.” *PNAS.*

Popular press articles:

- Kaplan (2018). “Global warming will cause more people to die by suicide, study predicts.” *WBUR.*
- McCue (2018). “Growing 'ecological grief' is the mental health cost of climate change.” *CBC.*