Factors affecting global environmental public health

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This article describes the key topic areas and most recent research findings emerging from the Global Environmental Public Health Initiative, a collaboration of faculty and students in the Department of Population Health Sciences with those in the Nelson Institute, Center for Sustainability and the Global Environment (SAGE) as well as those from across the University of Wisconsin-Madison (UW) campus and the University of Wisconsin Milwaukee. Currently, 3 priority areas are being pursued: (1) Climate Change, Energy, and Health; (2) the “Built” (Urban) Environment, Transportation, and Health; and (3) Land Use Change/Deforestation and Resurgent Infectious Diseases.¹

Climate Change, Energy, and Health
An Environmental Protection Agency-STAR program grant supports a team of researchers from UW-Madison and the Wisconsin Department of Health and Human Services in making projections for future rainfall and heatwaves. Some models predict that extremes of the hydrologic cycle will accompany global warming, particularly in middle and high latitudes. For southern Wisconsin, modeling projects a 10%-40% increase in extreme precipitation events resulting in the expected number of sewer overflow events (CSOs) into Lake Michigan to rise by 50%-120% by the end of this century.² Because the Great Lakes serve as a drinking water source for more than 40 million people, the health effect could be devastating. The model also predicts a 3°C (or 5.4°F) rise in average summer temperatures by mid-century, and a commensurate increase in morbidity, especially for people with renal or endocrine diseases.³

Energy Policy and Potential Health ‘Co-benefits’
With the UW-Madison Energy Institute, the team has begun to analyze greenhouse gases (GHGs) produced from electric power. These GHGs represent 41% of carbon dioxide (CO₂) emissions, 25% of nitrogen oxides (NOx) emissions, and about 70% of sulfur dioxide (SO₂) emissions. Thus, any policy that targets GHG reduction from the electric power sector will reduce air pollution and have beneficial health effects.

‘Built’ (Urban) Environment, Transportation, and Health
The transportation sector is responsible for one-third of US GHG emissions. According to the US Department of Transportation, 40% of car trips are less than 2 miles—and thus potentially easy to walk or bike, which would help reduce the number of Americans—the Centers for Disease Control and Prevention (CDC) estimate of 60%—who do not meet minimum daily levels of recommended exercise. The “Triple Win Bike Project” at UW-Madison analyzes biking’s benefits on: (1) personal fitness, (2) air pollution-related health benefits, and (3) reduced GHGs. Preliminary analysis predicts substantial declines in ozone and particulate air pollution, as well as marked reductions in cardiac and cancer deaths thanks to increased fitness.⁴

Land Use Change / Deforestation and Resurgent Infectious Diseases
The initiative on Global Environmental Public Health also conducts research on land use change (especially deforestation) in the Amazon. In July 2009, the group released findings showing that deforestation has greatly expanded the larval breeding habitat of a major malaria vector, Anopheles darlingi mosquitoes.⁵ With the expansion of their breeding habitat, the abundance of this species’ larvae has increased 8-fold,⁶ with a corresponding rise in the mosquito’s biting rate of more than 100-fold⁷ and the incidence of malaria in the region reaching epidemic levels.

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Through a new project titled HealthScapes, the group is developing a computer software framework to coalesce health, socio-demographic, and environmental data for early detection of disease emergence due to ecological change.

Building a Global Network
In addition to its work in modeling the effects of environmental changes on global climate change, the group actively participates in the International Association for Ecology and Health (www.eco-health.net) and maintains an educational website for middle school teachers and students (www.eco-health101.org).

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References
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