Landscape found to influence spread of malaria in Amazon

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(PhysOrg.com) -- The spread of malaria, one of the world's most prevalent insect-borne diseases and a leading killer of children, may have more to do with landscape than precipitation as the world warms, according to a new study.

Writing in the April issue of the journal *Emerging Infectious Diseases*, an international team of researchers reports that as climate changes and alters patterns of precipitation, the disease may become more prevalent in areas with less surface water, a finding that contradicts models that predict a uniform uptick in the incidence of the disease in places like the Amazon, where nearly 500,000 cases of malaria occur each year.

"Malaria is one of the most climate sensitive diseases," explains Jonathan Patz, the researcher who oversaw the study and who is a professor in the University of Wisconsin-Madison's Nelson Institute for Environmental Studies and Department of Population Health Sciences in the School of Medicine and Public Health. "Our findings show striking differences in malaria's response to weather fluctuations across the Amazon basin."

The new study was led by Sarah Olson, a UW-Madison graduate student.

Malaria, which kills nearly 2 million people globally each year, many of them children, is a parasitic disease transmitted by mosquitoes. It is widespread in tropical and subtropical regions of the world, and is often associated with surface water — marshes, swamps and other wetlands — where mosquitoes breed.

As global climate changes and prompts fluctuations in local weather, scientists are predicting changing patterns of disease. The current computer models scientists use to predict the ebb and flow of malaria under different climate scenarios rarely consider the effect of landscape features and presently show increasing malaria paralleling rainfall projections for the Amazon region.

But utilizing a high-quality malaria database compiled by the Pan American Health Organization and the Brazilian Ministry of Health, and comparing the incidence of disease with records of precipitation and temperature, the group led by Olson and Patz found striking differences of where in the Amazon malaria occurs in response to fluctuations in weather.

"In places with abundant wetlands along the Amazon River, malaria rates drop soon after rainfall," Olson explains, "whereas in the southern uplands of the Amazon basin, where there is much less surface water, malaria increases following rainfall."

Along rivers and wetlands in the Amazon, the incidence of malaria decreased by as much as 80 percent following five inches of rain. In those parts of the Amazon basin that are predominantly dry, a doubling in the incidence of the disease was experienced after a similar amount of rain.

The implications of the research, says Patz, are twofold: First, with a better idea of how malaria responds to rainfall in the context of a particular landscape, it may be possible for health officials to intervene and reduce the incidence of the disease in some places. Second, scientists can develop more precise regional models of the incidence of malaria across diverse landscapes in response to changing climate and weather.

Patz says his group will next explore the relationship between malaria and deforestation in the Amazon. His group previously linked deforestation to greater incidence of malaria by altering habitat in ways favorable to breeding mosquitoes.

Provided by UW-Madison