Climate change and risk projection: Dynamic spatial models of Tsetse and African Trypanosomiasis in Kenya

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Year: 2012

Source: http://dx.doi.org/10.1080/00045608.2012.671134

Abstract:
African trypanosomiasis, otherwise known as sleeping sickness in humans and nagana in animals, is a parasitic protist passed cyclically by the tsetse fly. Despite more than a century of control and eradication efforts, the fly remains widely distributed across Africa and coextensive with other prevalent diseases. Control and planning are hampered by spatially and temporally variant vector distributions, ecologically irrelevant boundaries, and neglect. Tsetse are particularly well suited to move into previously disease-free areas under climate change scenarios, placing unprepared populations at risk. Here we present the modeling framework ATcast, which combines a dynamically downscaled regional climate model with a temporally and spatially dynamic species distribution model to predict tsetse populations over space and time. These modeled results are integrated with Kenyan population data to predict, for the period 2050 to 2059, exposure potential to tsetse and, by association, sleeping sickness and nagana across Kenya.

Resource Description

Cross-cutting Themes: Adaptation

 Exposure: Ecosystem Change, Temperature, Other Exposure, Specify

 Temperature: Variability
 Other Exposure: soil moisture

Geographic Feature: General

Geographic Location: Non-United States
 Non-United States: Africa

Health Impact: Infectious Disease

 Infectious Disease: Vectorborne Disease
 Vectorborne Disease: Fly-borne Disease
 Fly-borne Disease: Trypanosomiasis

Model/Methodology: Exposure Change Prediction
Resource Type: Research Article

Adaptation: Secondary Health Impacts of Adaptation, Vulnerability Assessment

Timescale: Long-Term (>10 years)