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Title: Identifying Geographic Areas at Risk of Soil-transmitted Helminthes Infection Using Remote Sensing and Geographical Information Systems: Boaco, Nicaragua as a Case Study

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Abstract:
Several types of intestinal nematodes, that can infect humans and specially school-age children living in poverty, develop part of their life cycle in soil. Presence and survival of these parasites in the soil depend on given environmental characteristics like temperature and moisture that can be inferred with remote sensing (RS) technology. Prevalence of diseases caused by these parasitic worms can be controlled and even eradicated with anthelmintic drug treatments and sanitation improvement. Reliable and updated identification of geographic areas at risk is required to implement effective public health programs; to calculate amount of drug required and to distribute funding for sanitation projects. RS technology and geographical information systems (GIS) will be used to analyze for associations between in situ prevalence and remotely sensed data in order to establish RS proxies of environmental parameters that indicate the presence of these parasites. In situ data on helminthisis will be overlaid over an ecological map derived from RS data using ARC Map 9.3 (ESRI). Temperature, vegetation, and distance to bodies of water will be inferred using data from Moderate-Resolution Imaging Spectroradiometer (MODIS) and Landsat TM and ETM+. Elevation will be estimated with data from The Shuttle Radar Topography Mission (SRTM). Prevalence and intensity of infections are determined by parasitological survey (Kato Katz) of children enrolled in rural schools in Boaco, Nicaragua, in the communities of El Roblar, Cumaica Norte, Malacatoya 1, and Malacatoya 2). This study will demonstrate the importance of an integrated GIS/RS approach to define clusters and areas at risk. Such information will help to the implementation of time and cost efficient control programs and sanitation efforts.