Dynamic Monitoring and Spatio-Temporal Analysis of Schistosomiasis breeding Environment in Dongting Lake Wetland

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Schistosomiasis is one of the major infectious diseases, which seriously endangers public health. It is prevalent in 74 countries of tropical and subtropical regions around the world. As an endemic disease, the prevalence and distribution of schistosomiasis are closely related to its intermediate host oncomelania.

Therefore, monitoring and controlling of the number of oncomelania is key to reducing the risk of schistosomiasis transmission. Remote sensing technology can real-timely access the large-scale environmental information related to oncomelania breeding and reproduction, such as temperature, moisture, vegetation, soil, and rainfall, which can also provide the efficient informations to determine the location, area, and spread tendency of oncomelania.

The combination of ENVISAT/ASAR and Landsat/TM satellite remotely sensed data has been used to obtain the environmental factors (vegetation, soil, et al.), which are related to the living, multiplying and transmission of oncomelania, since TM image have multiple spectral information, while ASAR image contain hydrological dynamic information beneath vegetation canopy (benefit from the good wave penetration capability). Based on ground truth data, the spatial distribution model of oncomelania is established, which will help to supply the effective technical support for the schistosomiasis control strategies according to the ecological environment regulation. Three research aspects have been carried out: 1) Develop quantitative extraction algorithms of environmental factors related to oncomelania distribution based on the combination of optical and microwave remote sensing data. The environmental factors include vegetation index, leaf area index, vegetation fraction, surface temperature, etc., extracted from TM image; wetland water boundary, water level, soil moisture, etc., extracted from ASAR image; 2) Investigate the statistical correlation between environmental factors and oncomelania distribution, and establish prediction model of schistosomiasis prevalent high-risk areas based on oncomelania ground truth data from Dongting Lake Yueyang region; 3) Analyze the spatial and temporal variation of oncomelania in the Dongting Lake Yueyang region which had been induced by the Three Gorges Project, based the year 2003 and 2009 data. The effect of environmental change to the schistosomiasis spread trend was presented.