

Publication

Assessing the relationship between environmental factors and malaria vector breeding sites in Swaziland using multi-scale remotely sensed data

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Author(s) Dlamini, Sabelo Nick; Franke, Jonas; Vounatsou, Penelope

Author(s) at UniBasel [Vounatsou, Penelope](#) ;

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Many entomological studies have analyzed remotely sensed data to assess the relationship between malaria vector distribution and the associated environmental factors. However, the high cost of remotely sensed products with high spatial resolution has often resulted in analyses being conducted at coarse scales using open-source, archived remotely sensed data. In the present study, spatial prediction of potential breeding sites based on multi-scale remotely sensed information in conjunction with entomological data with special reference to presence or absence of larvae was realized. Selected water bodies were tested for mosquito larvae using the larva scooping method, and the results were compared with data on land cover, rainfall, land surface temperature (LST) and altitude presented with high spatial resolution. To assess which environmental factors best predict larval presence or absence, Decision Tree methodology and logistic regression techniques were applied. Both approaches showed that some environmental predictors can reliably distinguish between the two alternatives (existence and non-existence of larvae). For example, the results suggest that larvae are mainly present in very small water pools related to human activities, such as subsistence farming that were also found to be the major determinant for vector breeding. Rainfall, LST and altitude, on the other hand, were less useful as a basis for mapping the distribution of breeding sites. In conclusion, we found that models linking presence of larvae with high-resolution land use have good predictive ability of identifying potential breeding sites.

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