Title: Associations between urban structure and *Aedes aegypti* larval habitats in Puntarenas, Costa Rica

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Geospatial technologies have been increasingly applied to study vector-borne diseases, although their use in urban setting has been limited. In this study, high-resolution satellite imagery from QuickBird was analyzed to determine the relationships that urban structure, determined by tree cover and built area, may have with the abundance of mosquito larval habitats and the *Aedes aegypti* container index in an urban area of Costa Rica. Two cross-sectional entomological field surveys were performed in the city of Puntarenas during the wet season of 2006 and the dry season of 2007. A geographical sampling method was used to select the areas to be surveyed: a grid (100 by 100 meters) was constructed and a stratified random sample of 34 cells (10%) was selected. All possible larval habitats were noted per cell, and mosquito larvae were identified. Two seasonal land cover maps were prepared using QuickBird multispectral imagery (2.4 m spatial resolution) with "water", "built", "tree", "grass/bare soil", and "paved" classes. The proportion of tree cover and built area was extracted for each of the cells, and regression models were analyzed for the number of larval habitats, *Ae. aegypti* container index, and pupae per person. In the wet season and when corrected by the number of locations evaluated in each cell, tree cover (R^2 = 0.650, p<0.001) and built area (R^2 = 0.613, p<0.001) were able to significantly explain the variation in total larval habitats. Larval habitats were positively associated with tree cover and negatively associated with built area, while the proportion of *Ae. aegypti* positive containers was negatively associated with tree cover. The significant regression models were used to create maps of larval habitat abundance in Puntarenas at the cell level. Results showed that the abundance of mosquito habitats in urban environments may be explained and predicted by using remotely sensed information. Areas within the urban environment with greater tree cover probably contain numerous *Ae. aegypti* and other mosquito larval habitats in the wet season and should be targeted for more efficient vector control.