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### Title

Ecological determinants of the spatiotemporal distribution of *Aedes* mosquitoes in Phnom Penh, Cambodia

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### Abstract

*Aedes (Stegomyia) albopictus* and *Ae. aegypti* mosquitoes are present in the capital of Phnom Penh, Cambodia, where they are responsible for the regular transmission of dengue fever. As the capital undergoes very rapid growth and radical environmental changes (such as the filling in of wetlands and the general artificialisation of land), the distribution of *Aedes* mosquitoes in these urban and peri-urban areas must inevitably be greatly affected. In this context, this study aimed to characterise their distribution by trapping larvae every two months over a year, and using spatial observation to understand the ecological determinants of their spatio-temporal distributions.

The trapping (ovitrap) was organised exclusively in pagodas to ensure the possible replication of the study in the future. All the pagodas in the agglomeration were precisely mapped and 40 of them were randomly selected. The collected mosquito larvae were bred at the Institut Pasteur du Cambodge to be identified at the adult stage. A very high spatial resolution satellite image (SPOT7) and daily rainfall satellite estimates were acquired to provide a fine description of the environments around the capture sites using remote sensing techniques.

The densities of *Aedes* mosquitoes differ in space and time between the two species. *Ae. albopictus* is associated to a nearby environment with vegetation and water (*i.e.* in peri-urban areas), while *Ae. Aegypti* is associated to highly urbanised environments. Simple remotely-sensed environmental indicators were identified to estimate the potential presence of the two species. Beyond these results, this study provides a simple methodological framework that can be replicated in a few years' time in Phnom Penh or other areas to measure the impact of climate and environmental changes in the distribution of these populations.

**Keywords:** *Aedes aegypti*, *Aedes albopictus*, ecology, landscape, climate remote sensing, Dengue