Predicting mosquito outbreaks for disease control

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(PhysOrg.com) -- University of Adelaide researchers have shown they can predict the biggest population peaks of disease-carrying mosquitoes up to two months ahead.

This should help the fight against outbreaks of serious mosquito-borne disease like dengue and Ross River fever by allowing efficient and cost-effective mosquito control, says ecologist Associate Professor Corey Bradshaw.

"The risk of disease transmission is highest when mosquitoes are at their most abundant," says Associate Professor Bradshaw, who is from the University's School of Earth and Environmental Sciences and also employed as a Senior Scientist by the South Australian Research and Development Institute (SARDI).

"This model is a tool that helps predict when there is going to be a higher-than-average outbreak so that population control efforts can be implemented when they are going to be most effective and are most needed."

The University of Adelaide researchers analysed 15 years of population data of *Aedes vigilax* , the northern Australian mosquito that transmits the Ross River and Barmah Forest viruses, and compared it with environmental factors affecting populations including tides and rainfall.

"We found that basic environmental monitoring data can be coupled

with relatively simple population models to assist in predicting the timing and magnitude of mosquito peaks which lead to disease outbreaks in human populations," Associate Professor Bradshaw says.

In salt-loving species like the *Aedes vigilax* mosquito, populations tend to peak after very high tides. But the frequency of high tides and the amount of rainfall in the preceding months when mosquito numbers are low are the critical elements dictating the magnitude of eventual peaks.

"Previously, we didn't know how big that peak would be," says Associate Professor Bradshaw. "With this model, mosquito control efforts can be scaled according to the expected size of a future peak."

Associate Professor Bradshaw said the same model could be applied to other mosquito species, for instance dengue- or malaria-transmitting species, and others in tropical regions worldwide.

More information: The research is detailed in a paper published online in the Public Library of Science journal *PLOS Neglected Tropical Diseases* at www.plosntds.org/ (For article access, see dx.doi.org/10.1371/journal.pntd.0000385)

Source: University of Adelaide