

**Institute for Mathematics and its Applications**  
**2011 Seminar Series: 9**  
University of Wollongong

**Title:** North QLD: nothing beats the infectious disease transmission

**Speaker:** Roslyn Hickson (Australian National University)

**Time and Date:** 1:30pm, Thursday, August 25, 2011

**Location:** Room 15.206

**Abstract:** Mathematical modelling is a useful tool for informing the control of infectious diseases. I illustrate the use of modelling by two examples of infectious diseases currently problematic in northern QLD: tuberculosis (TB) and dengue.

Papua New Guinea (PNG) has a high burden of TB, and is suspected to have the highest proportion of multidrug-resistant TB in the world. The border between PNG and the Australian Torres Strait Islands is highly porous, with over 59,000 crossings a year protected by an international treaty. The common approach is to use a population level compartment model, where the population is divided into groups corresponding to different aspects of TB. This is used in conjunction with a metapopulation model to capture the border crossing behaviour in the region, to evaluate the effect of the World Health Organisation's (WHO) control strategy.

Dengue is a growing problem in North QLD, with outbreak sizes increasing, and dengue overwintering in 2010. Dengue is transmitted via the mosquito vector *Aedes Aegypti*, which is becoming increasingly resistant to insecticides. An alternative strategy has been proposed, which introduces the *Wolbachia* bacterium into the mosquito population, and halves the adult lifespan. However, with the decreased fitness of the *Wolbachia* infected mosquitoes, it is not clear if they will be outcompeted in the wild. Mathematical modelling is used to evaluate the conditions under which they are likely to survive.