CABDyN / INET Oxford SEMINAR SERIES

Saïd Business School – Michaelmas 2015

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'Predicting weighted ecological networks in human-modified habitats'

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Tuesday 20th October, 12.30 -14.00
Seminar Room 8, Saïd Business School

ABSTRACT:

Species in a community interact with one another with different frequency: predators attack some prey more than others and pollinating insects visit some plants more than others. The resulting pattern of interactions among species can be represented as a weighted bipartite network that, unlike a simpler binary network, describes the relative frequency of interactions in addition to their presence or absence. Field studies from the past ten years suggest that weighted network structure can change dramatically following anthropogenic habitat modification, with critical implications for the effectiveness of ecosystem services such as biological pest control. However, ecologists still lack models to explain and predict how interactions between species will reorganise following environmental change.

In this talk, I show how weighted network structure can be accurately predicted in human-modified habitats by combining data from unmodified habitats with models based on simple ecological mechanisms. Even the simplest mechanistic model, which assumes only random encounter between interacting species and requires little data to calibrate, provides good predictions of weighted network structure. Predictions can be improved by using models based on more complex ecological mechanisms (e.g., systematic changes in consumer foraging behaviour following deforestation) that require only slightly more data to calibrate. I conclude by suggesting general properties of species and interactions that should be targeted for empirical study to make accurate predictions in new regions and habitats. The approach I describe is applicable to other systems that can be represented as weighted bipartite networks.

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