The structure of global invasive species assemblages and their relationship to regional habitat variables: Converting scientifically relevant data into decision relevant information

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Eligible for student prize

Biological invasions continue to intensify in response to globalisation and climate change. To protect biodiversity in indigenous and managed ecosystems, to protect human and animal health, and to fulfil international trade obligations, biosecurity agencies require effective policy decisions based on robust science. The overall aim of my research is to develop methods to help biosecurity risk assessors to address two important questions regarding new invasive species: 1) which species out of a large list of potential invaders are more likely to establish if they arrive in the target region? 2) can species that pose the greatest risk be identified? The answers to these questions help prioritise policy and resources. In previous studies, self-organising maps (SOMs) and other artificial intelligence approaches, along with some ecological principles have been used to successfully filter large amounts of information regarding the known global distribution of insect, plant pathogen, as well as virus and bacterial species for risk assessment. The computational intelligence approaches used are essentially clustering algorithms that are able to handle large amounts of high dimensional noisy data. However, many issues remain. The most important of which is to determine the best methods for clustering high dimensional data. Additionally, there is opportunity to combine information about climate and host plant with the distributional data to improve predictions. Comparative studies will be carried out involving the application of computational intelligence and ecological principles for greater prioritisation and preparedness to prevent impact of dangerous invasive species.