Simon Judd - The Wilderness Society, Western Australia, Australia

Conserving Biodiversity found in the Great Western Woodlands

This paper examines biodiversity found in the largest remaining temperate woodland and heathland mosaic left on Earth. The Great Western Woodlands covers almost 16 million hectares in the southwest of Western Australia. Although the southwest is internationally recognised as a biodiversity hotspot, very little is known of the trends in biodiversity across the Woodlands. In this research, biogeographic analysis was conducted on approximately 5 million hectares to assess both patterns of species diversity (alpha and beta) and surrogacy among different taxa. This analysis involved collating all plant, bird, mammal, reptile and amphibian records within 41 cells that were each 0.5 x 0.5 degrees in size. It was revealed that there is enormous heterogeneity across the landscape for all taxa, with very little surrogacy among taxa. Species recognised as requiring conservation management by State and Federal Governments are found across the study site. We believe traditional approaches to conservation, such as designing a "Comprehensive Adequate and Representative" reserve system, will not adequately protect the biodiversity across the region. We suggest a new, whole of landscape conservation approach for the Great Western Woodlands, one that manages the ecological processes that provided the platform for the evolution of a spectacular biodiversity.

Submitted by: Alexander Watson Email: alexander.watson@wilderness.org.au

Michael Kearney[1], Warren Porter[2] - [1]The University of Melbourne, Melbourne, Victoria, Australia, [2]The University of Wisconsin, Wisconsin, Madison, United States

Modelling Species Distributions Without Using Species Distributions: Applications to Invasive Species and Climate Change

It is increasingly important that we develop effective ways to predict how human activities will alter the distributions of species. Traditional methods of predicting species distributions rely on statistical associations between a species' current distribution and spatial data. These correlative methods must extrapolate beyond the underlying data set if predictions must be made under novel circumstances, with the risk of erroneous predictions. This will often be the case under climate change scenarios or species invasions. We present an alternative, mechanistic approach that uses the principles of biophysical ecology to link the functional traits of organisms to spatial data on climate and topography. Our approach provides a way to define the climatic components of a species' fundamental niche and map the niche to the landscape to predict distribution. We use this approach to predict the potential distribution of two pest species under current and future climates; the cane toad (Chaunus marinus) and the dengue mosquito (Aedes aegypti) in Australia. We show that the southern border of the cane toad is constrained by limitations on adult locomotor capacity, and that it is unlikely to increase its range into southwest WA or Victoria even under the anticipated 2050 climate scenario. The potential range of the dengue mosquito depends critically on the nature of the breeding site; small water containers (buckets) limit the species to its present distribution in the Far North Queensland while large containers (water tanks) permit a much wider potential range closely matching the historical distribution of the species. We predict minor direct impacts of climate change on the mosquito's potential range but show that indirect impacts through changed water storage practices may permit this species to expand its current range dramatically. Our approach provides a general method to predict the range of any species without having to extrapolate from its present distribution; an approach that will become increasingly necessary as humans continue to construct novel environments.

Submitted by: Michael Kearney: Email: mrke@unimelb.edu.au

David Keith[1], Resit Akcakaya[2], Wilfried Thuiller[1], Guy Midgley[3], Richard Pearson[4], Steven Phillips[1], Helen Regan[5], Miguel Araujo[1], Tony Rebelo[5] - [1]Department of Environment & Climae Change, Sydney (NSW), Australia, [2]Stony Brook University, New York (NY), United States, [3]National Biodiversity Institute, Cape Town (CP), Spain, [4]Natural History Museum, Washington DC, United Kingdom, [5]University of California Riverside, Riverside (CA), United States

Predicting Impacts of Climate Change on Biodiversity: A Mechanistic Approach Linking Habitat Models with Population Biology

Much uncertainty surrounds the future impact of global climate change on biodiversity. Current approaches have examined potential shifts and contractions in species' ranges that may occur in response to increased temperatures and changing precipitation regimes. The reality is likely to be far more complex, including