O'Connell, Mark ORCID logoORCID: https://orcid.org/0000-0003-3402-8880 (2013) Spatial ecology and conservation. Ecological Informatics, 14 (1). p. 1. doi:10.1016/j.ecoinf.2013.01.002

Official URL: http://www.sciencedirect.com/science/article/pii/S1574954113000034
DOI: http://dx.doi.org/10.1016/j.ecoinf.2013.01.002
EPrint URI: https://eprints.glos.ac.uk/id/eprint/4913

Ecological Informatics 14 (2013) 1
Spatial Ecology and Conservation

Environmental gradients in latitude, elevation, soil moisture, nutrient availability, etc., generate non-uniform and non-random spatial patterns in the distribution of organisms across the globe. Spatial ecology seeks to describe, measure and understand the spatial patterns that arise as a result of an organism's interactions with both the biotic and abiotic elements of its environment. Over the past few decades, spatial ecology has benefited from major advances in computer technology (specifically the ability to store, manipulate, represent and analyse complex spatial data), and in the remote sensing of both organisms (animal tracking) and habitats (using information derived from satellites). These developments, combined with ongoing improvement of statistical methods for analysing and controlling for the effects of spatial components within environmental data, have greatly increased both the scope and function of spatial ecology.

During the twentieth century, dramatic environmental alterations resulting from a range of human activities, have led to widespread loss and degradation of habitats and ecosystem function. The magnitude of anthropogenic impacts on the natural world is related to both the size of human populations (demand), and their ability/aspirations to use environmental resources (harvest). If ways of reducing human population size cannot be found, the extent of habitat loss and degradation will inevitably increase during the twenty first century. Although the wider context of human population size is rarely explicitly mentioned by conservation agencies, human-driven habitat loss and degradation are a major focus for conservation actions. This is because changes to landscape configuration have profound impacts on the distribution and abundance of species and populations. In some systems, such alterations can lead to increased landscape heterogeneity (effects on patch size and extent), whereas in others it leads to decreased heterogeneity (increased spatial uniformity). In each situation, the impacts on species and populations drive huge changes in biodiversity.

There is therefore a strong conceptual and functional link between spatial ecology and conservation. In recent years, conservation practitioners have realised the value of applying findings from spatial ecology research to guide the development and evaluation of their efforts. In particular, spatial ecology (and associated software tools), has provided conservation with the means to visualise, understand and measure: (i) the influence of landscape configuration on species and habitats, (ii) the magnitude, extent and consequences of human alterations to the environment, and (iii) the relative conservation status of different sites and associated spatial priorities.

It was in this context that a conference was held in September 2011 called *Spatial Ecology & Conservation* (http://www.ert-conservation.co. uk/SEC1-Homepage.htm). The meeting brought together an international field of over 200 ecological scientists, practitioners and conservationists to review, discuss and evaluate the latest advances in spatial ecology and associated technologies, and how these can best be deployed to underpin conservation. Current gaps and future needs were also identified, and a range of potential solutions discussed. The three core themes of the conference were: (1) generating ecological data, (2) undertaking spatial analysis, and (3) using spatial analyses for conservation. Over 70 oral presentations were made over the three days, and these proceedings contain a selection of 18 papers that have been chosen to reflect the breadth and scope of the key subjects and issues discussed.

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 http://dx.doi.org/10.1016/j.ecoinf.2013.01.002