Biodiversity hotspots and visitor flows in Oulanka National Park, Finland

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Introduction

The main goal of protected areas and parks, such as Oulanka National Park (ONP) in Finland, is to ensure nature conservation while offering visitors a high quality experience. Growth in outdoor recreation has fuelled concern about pressures on the environment (Marwijk 2009). Although impacts are an inevitable result of recreational use (Cole 2004), natural amenities are the foundation of tourism development, and sustainability depends greatly on the quality of those resources (Boers and Cottrell 2007).

At a time when conventional natural resource management is failing to meet goals of sustainability, it is being suggested that there is a need to consider the implicit relationship between humans and ecosystems (Alessa et al. 2008). The primary goal of this study is to identify areas of biological value (i.e. hotspots) within ONP and compare those to known visitor distributions.

Fig 1: Locational Map of Oulanka National Park, Finland

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Methods

Oulanka National Park, (28,000 ha) is located in northeastern Finland in the municipalities of Kuusamo and Salla and close to the Arctic Circle (Fig. 1). The eastern part of the park lies adjacent to the Russian border, where it joins to Paanajärvi National Park in Russia. ONP is one of the most popular national parks in Finland, with over 160,000 visitors per year (Metsähallitus 2009). Threatened and endangered species (lichen, moss, fungi, vascular plants) occurrence data are used to identify areas with high species density (i.e. biological hotspots). Coordinates for species occurrences were obtained from an existing database of samples collected by Metsähallitus (Finnish Forest and Park Service). A total of 912 red listed species occurrences were observed across the park during a 10-year period between 1997-2006. Campsite and trail usage during 2007 was determined by combining a number of different methods: trail counters, observation, on-site visitor surveys, and hut book registrations. Kernel density analysis (ArcGIS 9.3.1) was used to determine the density of species occurrences. The output, a raster image consisting of M grid nodes, shows the spatial pattern of species clustering. Campsite and trail usage were then added to the map to illustrate areas of potential human impact. Usage was symbolized using graduated symbols.

Results

Results of the density analysis illustrate areas with a high density of threatened and endangered species (i.e. hotspots, Fig. 2). Spatial distribution of visits during 2007 shows that trail use is highly concentrated in two destinations in the park: Kiutaköngäs and the Juuma-Pieni Karhunkierros area. Many of the high-use recreational areas like Kiutaköngäs are located in important habitats for endangered species (i.e. hotspots). In addition, high density areas of threatened and endangered species are often located outside or on the edge of the core zone leaving them vulnerable to human impacts.

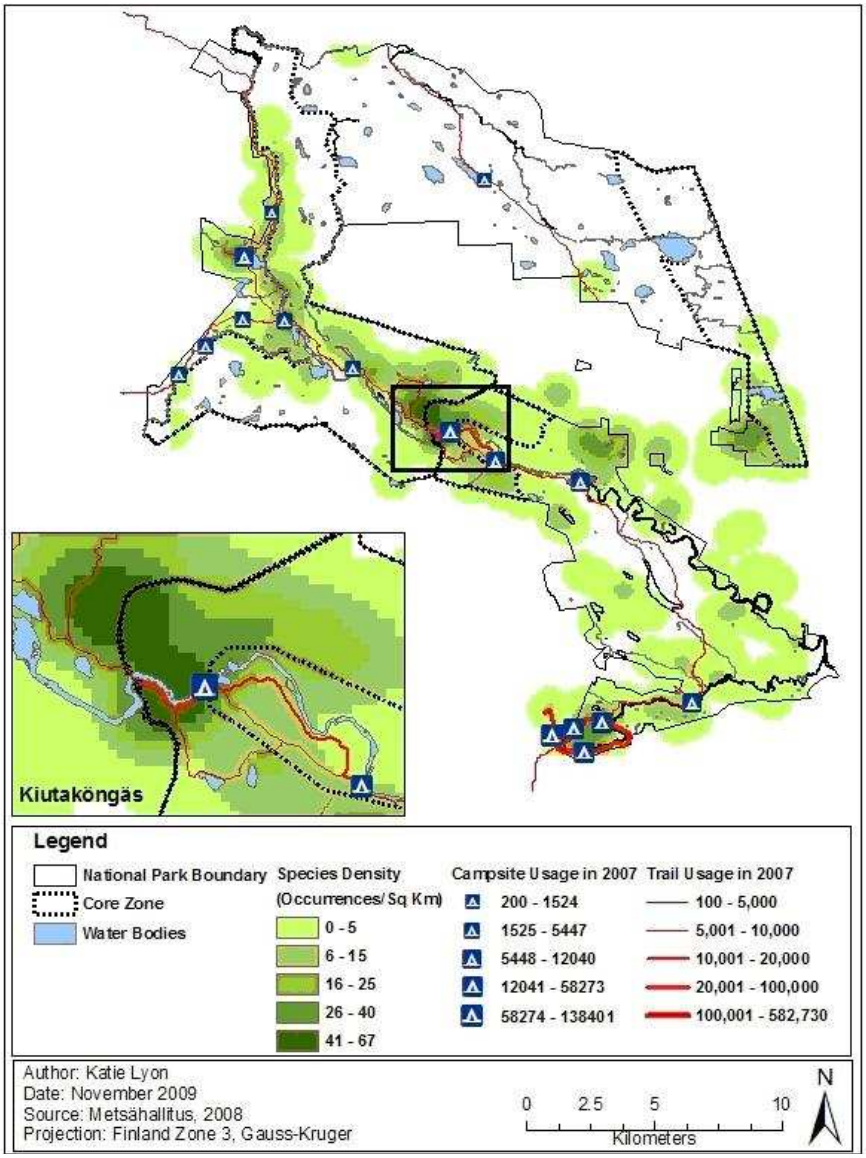

Fig. 2: Biological Hotspots and Trail Usage in Oulanka National Park

Conclusion

From a management perspective, understanding the spatial distribution of biodiversity and recreation could provide the basis to improve nature conservation and visitor management. Results of this analysis indicate that management measures may need to be adjusted, as appropriate, where adverse impacts on biological hotspots are detected. According to Siikamaki and Kangas (2009) the most suitable vegetation types for recreational activities (e.g. camping) are the meadows and flooded meadows; vegetation types least suitable for recreational activities are fens and stands located on rocky terrain. However, many of the high-use recreational areas in ONP are located in areas with rocky terrain. In addition to being very sensitive to trampling, calcareous rocky terrains are one of the most important habitat types for endangered plant, moss and lichen species. These issues should be considered in managing for recreational use in those areas.

Future Research

Future research will examine the relationship between biodiversity and social indicators such as attractiveness of the tourism destination and visitor satisfaction. Some questions to address include: (a) is there a link between biodiversity hotspots, attractiveness, and visitor satisfaction? and (b) do visitors recognize differences in biological diversity or are habitat characteristics such as openness and water more important to the visitor experience? Understanding this relationship is

crucial to managing use in an optimal way with regards to nature protection and visitor satisfaction.

Discussion

Social scientists are increasingly using spatial representations to examine human-environment relationships (Evans and Moran 2002). However, there is danger in viewing GIS as a technological solution to complex issues such as tourism in which human values, emotions, and behaviors take precedence over quantitative data. While there is no doubt that GIS can be a powerful tool in facilitating decisions, it is often misused and interpreted as the end in itself rather than the means to an end (Giles 2003). Maps can often be misleading; therefore, much depends on how the GIS analyst presents the data.

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