Spatial overlap of biodiversity and recreational use in protected areas

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Recreation and tourism in protected areas have a long history (Eagles et al. 2002, Rytteri & Puhakka 2009). Protected areas are attractive tourism destinations and the number of protected areas (Eagles et al. 2002), as well as the visitor numbers to protected areas, have increased worldwide (Eagles 2007). In Finland since the beginning of the 1990s, the number of visits in national parks has increased by an average of 6.5-fold (Puhakka 2008). In 2008, there were almost 1.8 million visits to Finnish national parks (Metsähallitus 2009). However, the increase has not been distributed evenly among parks and the development has been stronger in the parks that are situated close to major routes and tourist attractions, like ski resorts (Saarinen 2005). Also the main nature type in the park and the provision of tourism facilities within, as well as outside the park, can affect the number of visits to national parks (Puustinen et al. 2009). Indeed, in Finland, many tourism resorts are located very close to conservation areas, especially in Northern Finland (Saastamoinen et al. 2000, Puhakka 2008).

Tourism and recreation inevitably affects the terrestrial and aquatic environments. As nature conservation is generally the main purpose of the protected areas, the increased recreational use is challenging the management of these areas. In fact, recreational use is considered one of the major threats to the ecosystems of protected areas (Cole & Landres 1996) and it has become one of the main factors causing species endangerment (Czech et al. 2000). Therefore, it is essential to understand interrelationships between biodiversity and tourism to manage protected areas in a sustainable manner.

In this paper, our aim is to investigate the interrelationship between biodiversity and tourism in protected areas at two different levels. Firstly, we study whether the trails and recreational services of national parks are situated on areas with higher species richness within each park. Secondly, we will explore the relative importance of biodiversity, as well as the tourism service and facilities -related variables, in explaining the variation in number of visits to national parks in whole Finland. There are 35 national parks altogether in Finland with a total surface area of 8730 km2 and varying from 4.3 to 2850 km2 individually. In Finland one organisation, Metsähallitus, is managing all the national parks and thus a consistent practice is used in all the them for data collection. For the study we have obtained data on all 35 Finnish national parks from Metsähallitus. Data on parks includes information on the number of annual visits per park (in 2007), on the recreational facilities and services of parks and on the characteristics of natural features. As an indicator of species diversity we use the number occurrences of endangered species; for habitat diversity the number Natura2000 habitats; and for landscape level diversity we have calculated a Shannon-Wiener diversity index on the main components of the landscape. The tourism service and facilities include the length of recreational routes and the location of the park in relation to large cities (> 100 000 inhabitants) and tourist resorts. In the first part of the study, the number of endangered species and Natura2000 habitats within 200m wide buffers around each recreational route is compared to randomly picked control areas in 17 national parks. During the second part, it is investigated if the visitor numbers of Finnish national parks are related to biodiversity of protected areas as measured by different indicators of biodiversity.

According to the preliminary results, the number of red-listed species and habitat types were on average higher within the buffers around recreational routes than compared to control areas. Consequently, there is spatial overlap between biodiversity and recreational use within Finnish national parks. Preliminary results of generalized linear models show that the occurrences of red-listed species and the number of Natura200 habitats were associated with the number of visits parks received annually, i.e. its attractiveness. In addition, the distances from the closest city with > 100 000 inhabitants and resorts as well as the length of trails were related to visitor numbers of Finnish national parks. Thus, biodiversity features such as species-

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rich habitats, should be considered more carefully in the planning of protected area use. If new trails or tourism service infrastructure is planned, areas with simultaneously high species richness and vulnerable habitats should be ideally avoided or otherwise taken into account.

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