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Mapping and quantifying ecosystem services: analysis of trade-offs and synergies at the different spatial scales

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The importance of conserving the natural environment has been known for a long time. It can be fulfilled by designation of protected areas as well as proper management of broader landscapes. During past two decades, conservation has shifted from a predominantly species- and habitat-focus to a more holistic "ecosystem approach" with an emphasis on "ecosystem services", which underpin the benefits which society can obtain (directly or indirectly) from ecosystems.

This study aims to investigate and compare existing land use prioritization models and to develop new GIS-based frameworks for analysis for different spatial scales. Research were carried out in several conservation areas in UK and Poland. Main focus was on regulating (including regulation of soil erosion and landslide susceptibility) and recreation services. A new GIS-based model was developed which enabled to analysis of this services. Different spatial scales, ranging from whole conservation areas to single catchments were chosen for mapping and quantifying.

Based on different scenarios three sets of ecosystem services were calculated. Data contained specific land-cover/land-use resulting from the different strategy of the natural conservation for each of the study sites. Modelling was carried out based on the trends identified on the basis of past changes in land-use/land-cover (based on analysis of time-series satellite images), and the probability of a particular class of land-use/land-cover for the chosen scenario. Comparison between results revealed ecosystem service tradeoffs (when the obtaining of one service results in the reducing of another service) and synergies (when multiple services can be provides simultaneously). Results of the study shows where (and under which condition): (1) conservation areas can accommodate more visitors and in the same time provide regulation of soil erosion and protection against landslide developments, (2) further development of recreation services will lead to inevitable degradation of environment. Based on these results several further activities were proposed: from changing of conservation strategy for some part of the areas to changing of the land cover/land use.