Effectiveness of buffer zones of selected national parks in Poland in the context of lanscape changes and spatial planning

Nature conservation in Europe and other parts of the world is traditionally realized within designated protected areas and selected valuable species. Despite the quite big area of already existing nature conservation areas and the creation of new ones, research shows that biodiversity is still decreasing. We have fewer and fewer valuable species and habitats of animals and plants. This is related to the progressive isolation of conservation areas and problems with animal and plant migration between them. Numerous studies emphasized that the environmental changes between valuable natural areas, and in their immediate vicinity, are of great significance for this negative process. National parks (NP) and reserves are protected by law, and human activity in their area is limited and subject to ongoing control. As a result, no significant changes in land development occur in their areas. On the other hand, land use changes in places connecting protected areas are not covered by such restrictive control. In addition, the problem is intensified, because areas in the vicinity of national parks are often attractive for the development of tourism and settlement, and an intense development is observed there. In many countries, special buffer zones are introduced which are to protect against hazards and prevent the isolation of protected areas in order to limit the negative impact of human activity. The term and idea of buffer zones began to be more widely known and used in the 1970s, when the UNESCO program Man and Biosphere (MAB) and biosphere reserves were developed. Also, in Poland there are buffer zones, which are called *otuliny*. They are to protect and reduce the negative human impact on protected areas. Buffer zones have been obligatorily introduced for national parks in Poland, and voluntarily for other conservation areas, since the mid-1990s. Despite the existence of buffer zones many species of animals and plants, as well as their habitats, are still endangered, and biodiversity is still decreasing. Very few studies have been conducted around the world to assess the effectiveness of buffer zones. This type of research has not been conducted in Poland so far.

The aim of this project is to determine the effectiveness of the buffer zones of national parks in the context of landscape and planned land use changes for five selected national parks in Poland (Bory Tucholskie, Kampinoski, Ojcowski, Słowiński and Świętokrzyski). The assessment of the buffer zones will be based on analyses of the existing landscape changes and future changes in development taking place in the buffer zone itself, as well as with regard to other areas (park area, remaining area of the commune outside the buffer zone, and concentric wide ring buffers zone around the park borders). This will allow the analysis of changes in NPs and the buffer zones in comparison to areas without any legal protection. Moreover, the social aspect of buffer zones will be analyzed based on in-depth interviews with authorities responsible for spatial and environmental management and policy in the NPs and selected communes. It will provide an insight into institutional processes that impact NPs and their buffer zone management. Historical cartographic materials (topographic maps and aerial photographs), on the basis of which past and current land use maps will be developed, will be used in the analysis of landscape changes. Similar maps will be created for future land use. They will be developed based on existing planning documents and the maps contained in them. Processed and collected data will be used to develop land use maps for separate time periods (depending on the availability of materials) and maps with future development. Next, based on these data, statistical and spatial analyses of changes in land use and landscape structure will be carried out. The map overlay method, one of the most common methods applied in geography to analyse spatial relationships, will be used for land use analysis. In the case of landscape structure, landscape metrics (indicators) will be used. Landscape structure will be analysed on the basis of land use, and individual land use classes will be treated as patches, e.g. a forest patch, or built up areas patch. The simplest landscape metrics include i.a. the number of cover types, the surface share of each land use type in a given area, as well as patch area and boundary indicators. Obtaining results for different zones (park area, park buffer zone, the remaining area of the commune outside the buffer zone, and the zones around park borders) will make the detailed statistical analysis and a comparison between individual parks possible.

The research topic addresses in the project is important as it refers to the current problems related to landscape fragmentation and the isolation of protected areas. The results of the project will make it possible to understand and identify the main changes and environmental hazards for national parks in Poland, but they will also be helpful in relation to other protected areas in different regions of the world. The results may provide a key information to the effective management and monitoring of national parks and others protected areas.