

Doctoral Dissertation

Methodology of comprehensive environmental and social studies of protected areas on the example of the Lesser Poland Landscape Parks

Abstract

The main objective of the doctoral dissertation entitled "Methodology of comprehensive environmental and social research of protected areas on the example of the Lesser Poland Landscape Parks" was to summarise knowledge on the condition of the environment of the Jurassic Landscape Parks, including mainly elements of inanimate nature, to conduct research on soils and water, and above all, to present a unified vision of environmental and social research and monitoring in the areas of landscape parks.

The study comprised characteristics of the study area and a broad review of the current scientific research and monitoring activities of soils, waters, air and geological objects in the Jurassic Landscape Parks. These activities, combined with protective and educational ones, were subject to expert assessment, showing their insufficiency in the analysed area.

One of the most extensive parts of the study was the basic research of soils and distance research of soils at traffic routes in the area of Jurassic Landscape Parks. A total of 91 soil samples were collected, and their pH and contents of volatile aromatic hydrocarbons (BTEX) ($n=36$), polychlorinated biphenyls (PCB) ($n=36$), polycyclic aromatic hydrocarbons (PAHs) ($n=72$) and potentially toxic elements (PTEs) ($n=91$) were determined in laboratory analyses.. The obtained results were compared to the existing data from previous studies, as well as to the limit values set by Polish law. Numerous exceedances were found, which concerned mainly the content of Cd, Pb, Zn and PAHs. Transport routes were found to be the main source of soil pollution in the analysed area. However, the distribution of the contents of individual parameters was found to vary depending on the distance and type of traffic route.

As part of the study, water was also tested in surface watercourses and in springs in the area of the Jurassic Landscape Parks. A total of 30 samples were collected and physico-chemical analyses were performed to determine: pH, electrolytic conductivity (PEW), chemical oxygen demand (COD), biochemical oxygen demand (BOD₅), and the content of total nitrogen (N),

dissolved substances, selected cations (Ag, As, Be, Cd, Co, Cr, Cu, Hg, Mo, Ni, P, Pb, Sb, Se, Ti, Tl, V, W, Zr and Al, B, Ba, Ca, Fe, K , Li, Mg, Mn, Na, Si, Sr, Zn) and anions (Cl, SO₄, NO₃), as well as microbiological tests stating the presence of coliforms and *Escherichia coli*. The obtained results were compared to the existing data from previous studies, as well as to the limit values set by Polish law to determine the state of waters. They were found to be in poor condition in almost all of the surveyed watercourses, It was caused primarily by exceeding the content of Cl anions, Ca and Mg cations, total nitrogen, dissolved substances and PEW values.

In the study, basic social research was also carried out, as a supporting element, but also necessary for a proper assessment of the state of the environment and previous actions towards it, showing the insufficiency of environmental protection measures, but also low public awareness concerning the landscape parks.

Another element of the study was the analysis and modelling of anthropopressure in the area of the Jurassic Landscape Parks, which showed the most endangered areas and places where further monitoring and protective measures should be undertaken.

The most important element of the work was the creation of a catalogue of research and monitoring activities in relation to individual components of the environment (animate and inanimate), defining a unified vision of activities in relation to individual types of identified anthropopressure, the purpose of the research, the basic and additional scope of the research and the time of their implementation. The catalogue was also prepared in relation to social research.

Legislative changes in the regulations concerning: (i) soil quality assessment and (ii) the substantive scope of protection plans for landscape parks, based on the results of the study, were proposed

The dissertation also presents the possibilities and first attempts to implement the conclusions of the work, including in particular a catalogue of research and monitoring activities.