

Abstract

This thesis deals with the use of remote sensing data for studying and monitoring vegetation changes. Thanks to archival materials, we can now make extensive studies at the landscape and global level without the need for large-scale old field data. From the Middle Ages, we can rely on different types of maps, for vegetation studies, these are mainly forestry maps. Since the 1930's, aerial photographs have been available in Europe, and satellite imagery was available since the 1970's. Availability and quality of satellite imagery had increased rapidly during my study. The most recent data source are unmanned aerial systems and methods of processing their data, which allow inexpensive detailed mapping of large areas. The presented publications do not only solve ecological research questions, but also contribute to solving current environmental problems in the Czech Republic, from nature conservation in National Parks and protected areas to monitoring of plant invasions.

I have used archival forest maps for the reconstruction and analysis of large disturbances (windthrow and subsequent gradations of bark beetle) in forests of Šumava and the Bavarian Forest in 1868-1870. Species composition, as well as environmental factors derived from digital elevation model, were analyzed. The same topic was also studied in the current analysis of forest predisposition to bark beetle attack using the Landsat satellites data archive. I have used archival and contemporary aerial imagery for modeling of secondary succession of the abandoned landscape in the Doupov Mountains. Once again, environmental factors derived from the digital terrain model were used for analysis of development since 1952. The results show long-term changes in the environment that could not have been covered by fieldwork. Old cadastral map from the time of abandonment was also used here as a valuable source of data to understand the predispositions for change.

Thanks to the development of unmanned aerial systems it is now possible to monitor the occurrence of individual plant species, as we have done in articles dealing with the detection of invasive plants. This type of research relies on field data on the occurrence of individual species for calibration and validation. The current advances in machine processing of large amounts of image data promise considerable development in this field over the coming decades. However, archival data will continue to be important for understanding previous development.