Vegetation dynamics in the pilot region of Central Balkan National Park for the past 65 years in relation to livestock numbers

SUMMARY

The historical transition from the Bulgarian Kingdom through the Soviet period to the present state of Bulgaria has affected humans and their land use preferences. For example livestock numbers varied widely throughout the last century due to the transformation processes. This probably also affected the change in the vegetation patterns analyzed, as few other drivers are known from the Stara Planina Mts. In the study area we observed successive transition from extensive to intensive grazing and then the lack of grazing, leading to repeated transformations of the vegetation. The importance of acquiring data on historical ecosystem states to guide future land-management practices has been receiving increased attention. Aerial photographs are an important source of information about landscapes as they combine high spatial resolution, landscape scale extent, and often long-term coverage. In this study, we were interested in the parallel changes in landscape and livestock numbers over the last 65 years. We hypothesize that the historical development of the country should be reflected in the development of the landscape. Hence, we analysed the proportional change of land cover types in the Tsentralen Balkan National Park using aerial photographs from the last 65 years as well as object based image segmentation and compare with livestock numbers for the same spatio-temporal extent. We distinguished two main groups of events with respect to the changes during the studied period: first, nationalization of private sheep herds (1957) and a consequent livestock farming reform (1958); second, privatization of land and livestock after democratic changes in the country (1989) and declaration of the study area as part of a National Park (1991). These events distinguish three time frames, each about 20 years long.

The inventory of current vegetation showed great syntaxonomic diversity even on class level: 7 phytosociological classes (*Koelerio-Corynephoretea*, *Festuco-Brometea*, *Calluno-Ulicetea*, *Elyno-Seslerietea*, *Asplenietea trichomanis*, *Mulgedio-Aconitetea*, *Loiseleurio-Vaccinietea*), 8 alliances and 10 communities at association level. One class and one alliance were described for the first time from the Central Balkan Range floristic region. This diversity was classified into three land cover classes (vegetation types): shrubland, grassland, and

shrub-grassland mosaic. In order to interpret the observed proportional changes of these vegetation types we collated livestock numbers over the same period.

The shrub-grassland mosaic constantly decreased over the first 20 years, whereas shrublands and grasslands both increased. The beginning of the period (1947) was the time when the highest number of grazing animals occurred. Nevertheless, we explain this as an extensive management practice, because the native Karakachans possessed their own understanding of the optimal sheep density on pastures (i.e. carrying capacity) acquired by their long experience as shepherds. During the period 1969–1989, the trend continued and areas covered by the shrub-grassland mosaic decreased by 82%, while shrublands increased by 56% and grasslands increased by 18%. These changes coincided with the period of constant high numbers of grazing animals on the studied territory during the governance of the communistic party in Bulgaria. Land management type was already intensive as transhumance was stopped and also some new practices were implemented: e.g. public-cooperative animal management, the import of large, productive sheep breeds and their interbreeding with the local small breeds well-adapted for the mountain conditions, and the attempt to maintain large numbers of animals through artificial insemination. The species rich shrub-grassland mosaics were most affected by the land use changes. The overall land cover diversity pattern reduced from three equally represented land cover classes to only two dominating classes for the first 40 years. The period with the least changes was 1989–2012, when changes in landscape cover stabilized after the area was designated a National Park.

Historical series of aerial photographs are a useful source for the identification or reconstruction of historical changes in landscape cover, even from 65 years ago. In terms of landscape maintenance, this knowledge is useful for the National Park authority for further determination of the carrying capacity of mountain pastures.