

## The role of protected areas in ungulate research

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The role of ungulates in the natural development of ecosystems in protected areas has always been subject of controversies (BOYCE 1991). The question of habitat over-utilisation is often discussed. Elk *Cervus canadensis* in the Yellowstone National park serve as a good example, as their population size and impact on ecosystem properties has fueled many heated debates (CHASE 1986, KAY 1990). In national parks that allow natural dynamics to take place, the problem of habitat over-use is not an issue (COUGHENOUR & SINGER 1991), especially because it assumes a balance between vegetation and ungulates, which can only be achieved by human control. Due to the complex interactions between ungulates and their environment, these animals are difficult to study. This is in particular accentuated in and around protected areas, since not only the ecological environment must be considered, but also the social environment involving conservationists, national park visitors, hunters and land owners must be considered.

For large herbivores in European alpine ecosystem LOISON et al. (2003) outlined the future research in an overview. They pointed out:

1. Large herbivores in mountainous areas may have an increasing impact on ecosystem functions and dynamics through their interactions with plant communities, their role in shaping habitat, and their importance for large carnivores. Changes occur rapidly, and as this review suggests, there are large gaps in our knowledge of mountainous ecosystems.
2. A traditional research approach based on single-species studies is necessary. However, an integrated approach, using long-term studies (and experiments where applicable), should focus on (1) interspecific competition, (2) interaction between domestic and wild ungulates, (3) the role of predation, (4) the role of wild ungulates on plant communities, (5) the effects of space, landscape patterns and their changes on the dynamics of ungulates, (6) the evaluation of climatic variation on population dynamics, and (7) defining management strategies (e.g. through culling) to satisfy multi-user management objectives.

Given the above facts the role of protected areas in ungulate research seems to be obvious. The controversial discussion about the role and management of ungulates in protected areas shows in addition that scientifically sound data are needed. An example for such a process are the red deer *Cervus e. elaphus* in the Swiss National Park (HALLER 2002). Such information could be provided by protected area staff in collaboration with research institutes. Protected area can also guarantee the long time aspect of the studies, which is an important factor in studying long living species and ecosystems. In most of the protected areas the native ungulates are present, so that interspecific competition could or should be investigated. The protection status, especially in Biosphere reserves allows comparative studies of interactions between domestic and wild ungulates. The role of predation, in turn, can only be studied if the necessary basic knowledge of ungulates and their environment is available, which is the case in many protected areas. Investigations on ungulates-plant community interactions at the ecosystem and landscape level require broad environmental data, which often is given for protected areas.

Ungulate research, especially long term, requires a lot of perseverance. For such projects a good organisation is more than helpful. For the data interpretation a well working GIS containing the complementary information and adequate meteorological data are needed. Remote sensing data, as for example HABITALP data (LOTZ 2006) furthermore allows a comparison of several alpine protected areas.

Another important issue are the visitors of protected area. For example, 72.7 % of the visitors of the Swiss National Park come to see wild animals. Their preferred creatures are large ungulates like red deer or ibex *Capra i. ibex*. Thus, the high public interest expectation to see ungulates is much higher than the one to spot, for example, a cute marmots *Marmota marmota*. Thus, the high

public interest in ungulates of protected areas can be an excellent platform for communication of new knowledge from actual research projects and visitors could be sensitized, for example, for habitat requirements of ungulates, even in other, non-protected areas. Also, the possibility to consume venison from the region as in Biosphere Reserves can promote the market for natural and sustainable products.

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