

Managing externally caused impacts on protected ecosystems in a long-term perspective – lessons learnt from the Swiss National Park

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Keywords

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Even if the Swiss National Park (SNP) is strictly protected (IUCN Ia) since more than 100 years, this near-natural area and its ecosystems have been influenced and even altered by impacts caused outside the Park. Experiences over a long period show, that specific strategies have to be developed for managing externally caused impacts in order to mitigate or control them.

A short chronology of conflicting impacts in SNP

Serious conflicts raised after 30 years of protection, when red deer population in the region grew constantly and obviously altered vegetation in the Park and in adjacent regions. Simultaneously the project to use the river Spöl for hydropower production was launched and, finally, the planned dams were constructed from 1960 to 1970 (Tab 1.). These two conflicts have been very much present in the public discussion for many decades and influenced the image of the Park, until appropriate management practices have been implemented. Later, in the 1960-ies and 1970-ies the number of Park visitors and the traffic on the main road crossing the Park (the only road linking the Engadin with Val Müstair over the Pass dal Fuorn) increased constantly. Consequently, the road was extended and straightened, and infrastructure in the Park (parking, trails, resting areas) was installed or improved. Additionally, a new road from the Park to Livigno, a customs-free tourist destination in Italy, was constructed jointly with the Spöl dam at Punt dal Gall. Since, traffic is increasing constantly until today, whereas visitor frequencies remained in a constant belt of fluctuation since the 1990-ies. Another concern are effects of environmental change. Since the 1970-ies, scientific research stated relevant environmental effects on the Parks ecosystems and populations due to atmospheric depositions, increasing temperatures and drought periods, and related natural hazards.

Issue	main external impacts	detection	basic studies	Measures (selection)	management principles (outside / inside Park)
Red deer migration	vegetation (plants, forest), nutrients	since the 1940ies	1954-1978 1990ies	feeding in winter time, few shootings in the SNP	wildlife management and control by Grisons based on revised cantonal hunting law 1989: hunting outside SNP
Hydro-power (Spöl)	river ecology, sediments	since 1960	1990. 2000-2003	artificial floods & monitoring (since 2000)	adaptive management of residual flow based on new regulations and agreements 2012 & 2016 between SNP, Research Council and Hydropower Company
Traffic	noise, salt, artificial banks, barrier effects	since 1960ies	some few, punctual after 2000	improving security at parkings and trail crossings	
Visitors	trail erosion, disturbance of wildlife, waste	since 1970ies	1985-1995	new parkings and resting places, monitoring of visitors	restoration of existing infrastructure
Deposition	acidification, deposition of nutrients and pollutants	since 1970ies	Since 1970ies	monitoring of immissions and its effects	observe evolution
Climate	temperature precipitation, vegetation period, immigration of new species, morphodynamic	since 1980ies	since 1950ies, after 1980	monitoring climate and related effects, research, control of invasive biota	observe evolution

Table 1: Overview on externally caused impacts in the Swiss National Park 1914 - 2016 and related research and management

From problem detection to management

The first important concern for Park authorities was a long lasting conflict (from the 1950ies until late 1980ies) related to the increasing population of red deer (JENNY & FILLI in BAUR & SCHEURER 2014). Main issues were obvious effects on Park vegetation, damages in pastures and forests outside the Park, and large amounts of dying animals in strong winters during the 1950ies. As red deer stayed in the Park during hunting period in autumn, the Park was seen as a main reason for increasing numbers of red deer and damages caused by it. At that time hunting in the Park was seen as a necessity by large parts of the local population. To avoid hunting in the Park, Park authorities initiated (between 1954 and 1979) a series of scientific studies on the migration and distribution patterns of red deer in the larger Park area.

Based on the ecological and biological findings of these studies, the canton of Grisons developed a management concept after 1980, that aimed at controlling red deer populations mainly with a better distribution of red deer by creating new 'quiet zones' and by introducing an additional hunting period in November, when red deer normally has left the Park. Like that, hunting in the Park could be avoided and the needed reduction of the population controlled. This system was legally fixed by a revision of the cantonal hunting law (1989). The adapted wildlife management was very effective in the Park region. After 1990 the population decreased and criticism concerning impacts caused by high densities of ungulates became rare.

Another challenge was the construction of equipments for hydropower production along Spöl and Inn (KUPPER in HALLER et al. 2013). The Park was affected mainly by two dams in the Spöl river, just outside the Park. Even if some land compensation and a higher flow of residual water during summer (for tourists) were negotiated, the damage for this river ecosystem was catastrophic. When hydropower production started in 1970, the Park did not pay attention to this 'lost area'. During a technical needed flood in 1990, a group of scientists from the Parks Research Council had the opportunity to investigate the effects of this artificial flood (SCHEURER et al. in BAUR & SCHEURER 2014). The flood caused, that the shallow water areas behind lateral sediments were transformed to streaming water again, and ecological integrity of fauna and flora was enhanced. Based on these striking results an alternative residual water management was developed: basic flow is reduced and saved water is used for annual artificial floods. Ten years passed until this concept could be implemented officially in 2000 and another 12 to 16 years passed until a legal fundament for an adaptive management was established. Since 2000 the Park, the cantonal authority and scientists decide annually on number and amounts of floods aiming at improving the ecological integrity of the river.

Currently, regarding the Swiss National Park, wildlife management and residual flow management are established and under control, while impacts from traffic and in some areas from visitors have to be tackled basically in future. On the other hand, influence of environmental change on natural processes is a framework condition that has to be tolerated, but used to understand better how nature adapts to such changes by itself.

These examples show, that the handling of externally caused impacts on the Parks strictly protected nature was case specific, as well as the result obtained. But the way from problem detection to management actions is following some principles: In all cases, scientific studies helped to become aware of an issue and in given cases (hunting, residual water management) to develop evidence based management tools. Yet, the time from problem detection to gaining evidence differs from 10 to 40 years a lot between the presented issues. For finally developing a legal framework for a common management, another 10 to 15 years have to be calculated. These time frames illustrate that finding management solution with concerned external authorities claims for institutional strategies that are valid for more than a generation in Park administration.

Managing externally caused impacts: lessons learnt

Regarding the presented causes and impacts, some lessons learnt during the last decades can be summarised in the following five points:

1. The Park has not the authority to manage external impacts and its causes by its own. Cooperation with external authorities are needed, as well as the understanding of opportunities and limits of the existing legal system related to the problems to be solved. Building up needed competences in the Park administration can be helpful.
2. In principle, all external impacts have to be monitored in a long-term (impact monitoring), in order to quantify external effects on natural processes and to provide data for evidence-based management and for scientific research.
3. Not all external impacts can be controlled, as depositions or climate change. Efforts have to be concentrated on relevant impacts, which can be mitigated or adapted in a long-term perspective.
4. Solutions for management can be successful, when they are legally anchored and binding (law, directive, agreements). To establish and implement such solutions will take some 10 to 15 years (in the Swiss legislation context). Therefore, long-term and evidence-based strategies are needed.
5. Most effective are solutions which are implemented by an adaptive management process supported by a monitoring programme, in order that management can respond to changing impacts or conditions or to failing measures.

References

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