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Sharing knowledge and research outcomes from within and around the Swiss National Park – the 2023 *Research Symposium SNP+*

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Abstract

On 2 June 2023, the first *Research Symposium SNP+* took place in Zernez, Switzerland, at the headquarters of the Swiss National Park (SNP). The symposium aimed to bring together active researchers from various scientific fields relevant to the work of the Swiss National Park, the Regional Nature Park Biosfera Val Müstair (BVM), and the overarching UNESCO Biosphere Reserve Engiadina Val Müstair (UBEVM) – all represented here by *SNP+*. Addressing subjects bridging the gap between strict nature preservation and cultivated landscape areas, the importance of ongoing monitoring over extended periods, and the influence of climate change on ecosystems and natural processes, the day unfolded as a profoundly captivating and interdisciplinary experience. This text aims to summarize the key messages of the symposium and provides a preview of upcoming events.

Profile

Protected area

Swiss National Park

Country

Alps, Switzerland

Introduction

Since the foundation of the Swiss National Park (SNP) in 1914, the first of its kind in the Alps, the systematic observation of nature, the comparison of changes inside and outside the park, and research in general have played vital roles. One of its founders, Carl Schröter from ETH Zürich, stated in 1920 that *"for science, the National Park represents an invaluable field of observation, unique in its kind due to the absolute elimination of the disturbance of the natural equilibrium by man"* (Schröter 1920, 5). An initial major task tackled since the beginning was to establish inventories of all taxa present in the park. Thus, taxa of lichens, plants, mollusks and various arthropods, mammals, fish and birds (see e.g. Baechler 1919; Bigler 1928; Bütikofer 1920) were all assembled. A second goal was to monitor the development of ecosystems, geomorphic features and climate, through the systematic and permanent monitoring of plant communities in permanent plots (Schütz et al. 2003), of rock glacier movements (Chaix 1923; Eugster 1973), and of meteorology (Uttinger 1966). In the first 30 years, around 20 research and 5 monitoring projects were carried out. Later, long-term research was explicitly listed as one of three legal roles of the SNP in the 1980 *Law on the Swiss National Park* (Swiss Confederation), along with nature conservation and communication.

Thus, over time, the number of projects has increased greatly (Figure 1). Today, in addition to the goals referred to above, topics include hydrology and hydrobiology, geomorphology and geology, climate change impacts, landscape science, sociology and socioeconomics, with over 90 research activities taking place each summer. This impressive number of projects carried out within the perimeter of the 170 km² protected area shows the great significance of the SNP as a study region. It also leads to substantial coordination, communication and networking efforts, both among the individual researchers as well as with the adjacent Regional Nature Park Biosfera Val Müstair (BVM) and the overarching UNESCO Biosphere Reserve Engiadina Val Müstair (UBEVM) (Figure 2). A particular effort has been made to make researchers aware that, by following their own research interests in the SNP region, they are contributing at the same time to fulfilling goals and visions expressed more than a century ago.

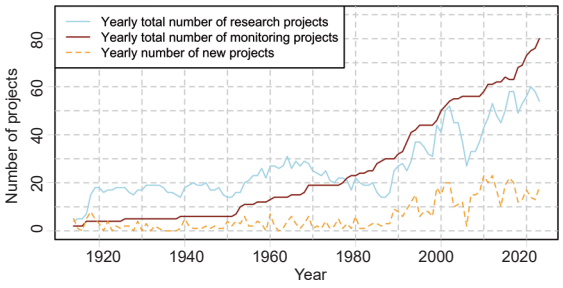

Figure 1 – Number of ongoing and new research and monitoring projects in the SNP. Data source: Swiss Academy of Sciences (SCNAT).

The Research Symposium SNP+

The research commission (*Forschungskommission* [FoK]) of the SNP, the SNP, the BVM and the UBEVM jointly organized the first SNP+ research symposium, held in Zernez on 2 June 2023. The symposium aimed at bringing a heterogeneous research community together, promoting the exchange of experience, methodologies and knowledge, and at sparking new research and monitoring ideas. The event's name, *Research Symposium SNP+*, reflects the organizations and areas involved (Figure 2), each with different protection and socio-economic development goals. It further symbolizes *"a plus in ideas, in projects, in topics, in networking and in knowledge"*, as the director of the SNP,

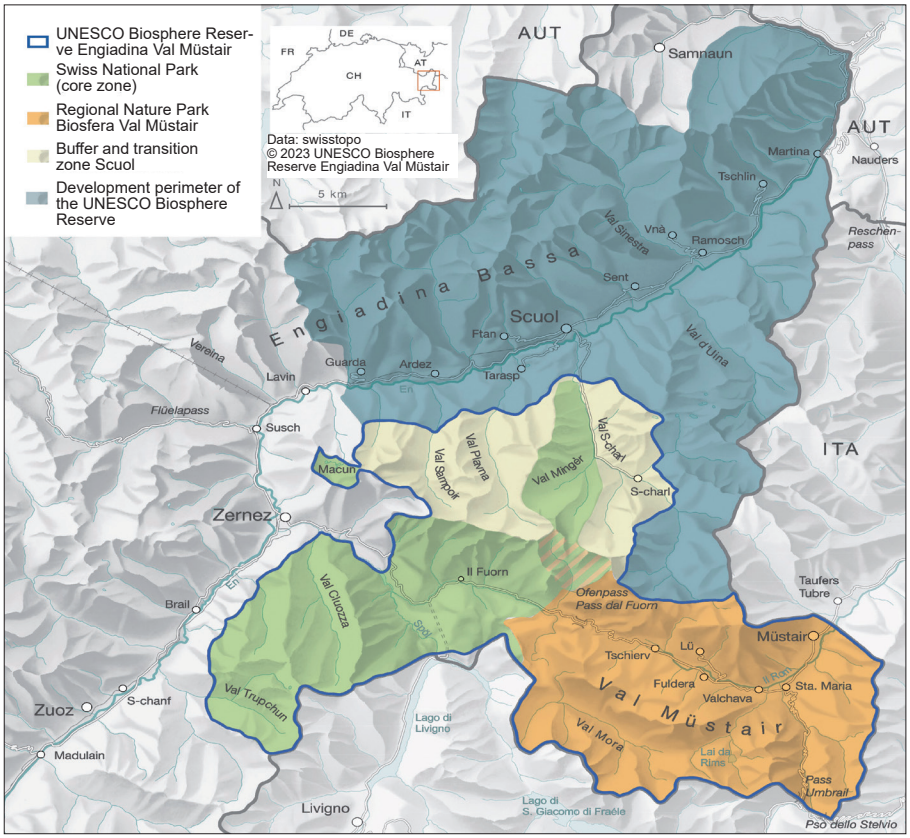

Figure 2 – UNESCO Biosphere Reserve Engiadina Val Müstair (UBEVM) with the three sub-areas: Swiss National Park; Regional Nature Park Biosfera Val Müstair; Scuol buffer and transition zone. In blue, the potential development perimeter of the UBEVM. The entire area is referred to as "SNP+". Cartography: Tamara Estermann, SNP

Rudolf Haller, emphasized in his welcome speech. Gian Cla Feuerstein, vice president of the research commission, further highlighted the importance of a platform for exchange, for promoting collaboration to strengthen interdisciplinarity, and for informing the public about the importance of research in the SNP+.

The symposium started with a keynote lecture by Michael Maroschek, co-head of research and monitoring of the Berchtesgaden National Park, on forest development and management in various national parks. He explored aspects of the development of natural forests, the differing effects of *rewilding* versus managed *forest restoration*, and discussed the effects of human-induced climate change on pristine subalpine forests. He concluded that although the SNP was considered an area where *"the disturbance of the natural equilibrium by man is absolutely excluded"* (Schröter 1920, 5), today, the effects of anthropogenic climate change on nature and natural processes call this non-influence of humans into question. Following this intriguing start, the symposium proceeded with three distinct thematic sessions.

Thematic sessions

The first session on *Wilderness and Cultural Landscape* emphasized the contrasts colliding in a small region of an IUCN Category 1a nature reserve. On the one hand, the SNP represents a *rewilding* experiment that has been ongoing for over 100 years. On the other hand, the surrounding regions are characterized by more or less intensive human use, including agriculture, tourism and economic development. Research approaches and questions vary substantially within this small region, ranging from social sciences to economics and natural sciences – and while this diversity and interdisciplinarity can be very fruitful, they also pose challenges to mutual understanding and joint progress.

The first input of the session illustrated the perception and values of nature and wilderness during the recent Covid-19 pandemic. The results of Gattiker's Master's thesis (2023) highlight the importance of relational values about nature and wilderness in the SNP, thus going beyond the frequent discussion of humans as threats to or custodians of nature. Further, this contribution also showed that in 2020 and 2021, the SNP experienced a significant increase in younger, less experienced park visitors (Wipf et al. 2023). Another presentation introduced a newly developed approach (Bürgi & Lock 2022) – an interdisciplinary combination of historical analyses, aerial photo evaluations, oral history interviews and rephotography, which will be adapted to develop a comprehensive picture of the highest continuous area of unmixed *Pinus cembra* forest in Europe, the *God da Tamangur*. The third input discussed the values of nature and farm animals to

humans, values that can act as leverage points for sustainable transformation (Chapman & Deplazes-Zemp 2023). The last input discussed the influence of human disturbance and predation risk on roe deer habitats and the important role of protected areas in the conservation of wild ungulates.

As already stated, the SNP can look back on more than 100 years of research and monitoring. The importance of monitoring natural evolution was emphasized by Schröter (1923, pp. 480–481): *"by means of exact surveys of selected areas, repeated from time to time, it is hoped to study – as the previous influence of man and his domestic animals becomes more remote – the gradual restoration of the original flora and fauna, the re-conquest of pasture by forest, and so on."* Therefore, the second session of the symposium was dedicated to the topic of *Monitoring in Protected Areas*. The presentations gave interesting insights into a variety of monitoring projects ranging from geomorphology to biodiversity. For instance, the unique records of rock glacier kinematics spanning more than 100 years (Muñoz-Torrero Manchado et al. 2023) were introduced, as well as a study on debris flow derived from tree ring records. The Swiss monitoring programme for the effectiveness of habitat conservation (*Wirkungskontrolle Biotopschutz Schweiz*) introduced its findings, with a focus on the SNP alpine floodplain site (Bergamini et al. 2019). A monitoring study on saproxylic beetles and fungi confirmed the effectiveness of forest reserves for enhancing species richness. Another input on sympatric Alpine chamois and red deer revealed a physiological stress response to drought conditions during summer and snow depth in winter, but not visitor disturbance (Anderwald et al. 2021). Finally, the potential of non-intrusive environmental DNA (eDNA) analysis as a monitoring tool was highlighted. The session clearly showed that long-term monitoring is pivotal for understanding natural processes, their dynamics and interactions, and the impact of long-term influences on nature, such as climate change.

This led directly to the last session, *Effects of Climate Change on Ecosystems and Landscapes*. Mountain areas such as the Alps are particularly affected by climate change, for instance by an increase of extreme events such as debris flows, decrease of snow and its impact on hydrology, or the shifts of species to higher altitudes. This is true for the SNP and its surroundings, both in habitats largely untouched by humans, and in cultural landscapes in the Val Müstair and the lower Engadin.

The session illustrated topics such as changes in snow cover in and around the SNP, demonstrating that snow water equivalent (SWE) in the region decreased by around 4% between the periods 1962–1990 and 1991–2020 (Danioth 2023). A further reduction of around 30 to 50% of the snow cover is predicted at elevations similar to those of the SNP throughout the Swiss Alps by 2060 under an RCP8.5 climate scenario – i. e., without any mitigation measures being taken (CH2018). Preliminary results of a long-term survey on nine mountain summits in and around the SNP (part of GLORIA) illustrated that plant species richness in extreme habitats is rising due to the influx of species from lower altitudes. Another contribution presented changes in the altitudinal distribution of ungulates and in the synchrony of plant growth and the rearing of young in roe deer, illustrating that different responses of individual species in the food chain can lead to mismatched interactions (Plard et al. 2014). In addition, it was shown that spring and headwater temperatures remain essentially constant, even though air temperatures vary significantly throughout the year and from year to year. Further, the increased melting of ice in rock glaciers can lead to the release of toxic elements into mountain rivers (Wanner et al. 2023). The session ended with a case study showing the potential effects of climate change on the cultural landscapes of Ramosch, and emphasizing the importance of climate adaptation in Alpine environments (Siegrist 2022).

Last but not least, local delicacies by Cilgia Etter from San Niclà were enjoyed during the poster sessions that took place during breaks.

Conclusions

The SNP+ 2023 research symposium attracted over 80 researchers and practitioners from all over Switzerland and abroad. A short online survey revealed that over 40% of the participants had travelled more than 3h to reach Zernez for this one-day event, demonstrating the high interest in research done in the area and the motivation for exchange among researchers.

The main benefits of participating in the symposium were identified. Gaining new insights into topics from research areas other than one's own was ranked as most important by 37%, closely followed by informal exchanges during the breaks (31%). Next, gaining new insights from research in the SNP+ region was mentioned. Less important was the fact that the event took place in Engadin (6%), and learning from one's own research area played only a minor role (3%). The survey showed that the SNP+ is a region with a lot of interesting interdisciplinary research and that there is a great need and desire for exchange between researchers working in the region.

The symposium was a lively event with vivid exchanges of experiences and ideas, and animated discussions in the courtyard of the Chastè Planta-Wildenberg during breaks. These continued during the festivities around the opening of the new visitor exhibition the following day. A large majority of participants (over 95%) indicated that they would like to attend a further similar symposium in one to two years' time. We accept the challenge posed in the survey and plan to offer a second symposium in 2025 – so look out for further information!

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