



eco.mont

Journal on Protected
Mountain Areas Research
and Management



Vol. 13 No. 2 – July 2021

eco.mont – Journal on Protected Mountain Areas Research and Management
is published by Austrian Academy of Sciences Press and *innsbruck university press*

Content

Editorial by the editorial board of eco.mont	3
Research	
Culture wars and protected areas: narratives against national parks. An exploratory qualitative comparison of the movements opposing Adula Park and Locarnese Park <i>Mosè Cometta</i>	5
Two perspectives – one goal: resilience research in protected mountain regions <i>Lisa Huber, Eva Posch, Rainer Bell, Karl Michael Höferl, Robert Steiger, Rike Stotten, Erich Tasser & Georg Leitinger</i>	12
Motives for visiting the national parks of Serbia <i>Živana Krejić & Snežana Milićević</i>	21
Management & Policy Issues	
Sustainable forest development in the Styrian Eisenwurzen Nature and Geopark and beyond <i>Oliver Gulas, Veronika Frank & Christoph Nitsch</i>	29
Let's partner up! From resistance to collaboration: A strategy for regional development, or how to create partnerships between nature conservation and local companies – a success story <i>Marco Schiefer & Eva Maria Vorwagner</i>	35
The participatory process for a regional spatial development concept in the UNESCO Biosphere Reserve Großes Walsertal <i>Christine Klenovec</i>	39
Opportunities and challenges for transdisciplinary research in flood risk management: some critical reflections and lessons learnt for research on sustainability <i>Thomas Thaler, Christoph Clar, Lena Junger & Ralf Nordbeck</i>	42
„Spessart“ field project of Weihe-Stephan-Triesdorf University of Applied Sciences reaches final stage of the 2020 EU-Natura 2000 Award <i>Bernd Stöcklein, Christoph Moning & Volker Zahner</i>	48
Mediating mind-sets: the Cerro Khapía Landscape Reserve in the Peruvian Andes <i>Domenico Branca, Andreas Haller, Boris Blanco-Gallegos & Vicente Alanoca-Arocutipa</i>	52
Current status and future prospects of Lhalu wetland on the Tibetan Plateau <i>Hui Wang, Dong Xie, Wen Xiong, Wei Tang, Zhigang Wu, Keyan Xiao & Qiang Wang</i>	58
Mountain Biodiversity Day 2021 – biodiversity and pandemic <i>Chris Walzer & Guido Plassmann</i>	62
The ValPar.CH project – Assessing the added value of ecological infrastructure in Swiss Parks <i>Emmanuel Reynard, Adrienne Grêt-Regamey & Roger Keller</i>	64
News	69

Published by:

ÖAW

AUSTRIAN
ACADEMY OF
SCIENCES



universität
innsbruck

Publisher:

AUSTRIAN
ACADEMY
OF SCIENCES
PRESS

innsbruck university press
peer reviewed

Initiated by:



ISSN 2073-106X print version

ISSN 2073-1558 online version: <http://epub.oeaw.ac.at/eco.mont>

Editorial

This editorial differs from previous editorials. Since Covid-19 forced many of us to stay at home and work from there, many meetings were held online or even cancelled altogether. The advantage of online meetings is that they can be organized within a very short time span and, in the case of eco.mont, almost all members of the editorial board participated. Journeys to protected areas within the Alpine Arc to meet were not possible in the last year. Yet these meetings are very important to share information on protected mountain areas, to recognize new developments and to keep the journal's idea afloat. Virtual meetings, advanced they may be, have not been able to really replace physical meetings. Thus, in our last virtual meeting we decided to introduce ourselves to our readers and to share our enthusiasm for the journal's idea with you.

Serena Arduino is an Italian, living in Milan, and a board member of CIPRA International. Serena has a degree in natural sciences and a Master of Science degree in environmental planning. Originally she focused in her studies on wildlife issues (research on Alpine chamois' behaviour), and later embraced integrated approaches related to natural resources and larger ecosystems in Europe, Africa, Asia, North and South America. Recently she has concentrated on ecosystem restoration in the Mediterranean and transnational river governance in the Alps, addressing the political processes that influence biodiversity and ecosystems, and has always been interested in expert-based processes. Her contribution to the Journal is her experience of individual mountain PAs in the context of broader trends and processes.

Carole Birck is in charge of scientific programmes in the nine nature reserves of Haute-Savoie (French northern Alps) within the Conservatoire d'Espaces Naturels de Haute-Savoie and has specialized over time in network management and in bringing scientists into contact with nature managers. Although her initial training in conservation ecology (the relationship between man and nature) and ethology remain her favourite subjects, she is also interested in many of the Alpine topics covered in the journal eco.mont, such as the impacts of global change on ecosystems. She coordinates the sentinel lakes network (study of high altitude lakes in relation to global changes) in the French Alps.

Massimo Bocca was born in Aosta, within the Italian western Alps, where he also lives. He had been working for more than 40 years on conservation topics in mountain areas and holds an MsC in agronomic sciences from the University of Turin, with a thesis in entomology. He has authored or co-authored more than 50 scientific zoological papers, focusing on entomology, herpetology and, especially, on ornithology. His main research interest is in the ecology and conservation of boreo-alpine bird species. He was the director of the regional Natural History Museum of the Aosta Valley for six years and became the director of the Mont Avic Nature Park in 1991. This park is the first protected area to get the European EMAS certification (Eco-Management and Audit Scheme). He is currently member of the ALPARC council.

Valerie Braun lives and works in Innsbruck, Austria. She studied botany at the University of Innsbruck with a thesis on the physiological ecology of plants at high altitudes. Among other things, she is now responsible for the smooth running of the journal eco.mont at the Institute for Interdisciplinary Mountain Research (Austrian Academy of Sciences). Her work on the journal has given her a broad understanding of the challenges, tasks and scientific findings in protected mountain areas.

Martin Coy is a professor of Applied Geography at the University of Innsbruck. He studied in Frankfurt / Main and Paris and holds a PhD from Tübingen University. His main research is on resource conflicts, sustainable regional and urban development and biosphere reserves with a focus on Brazil. In 2016 he became co-editor of eco.mont.

Cedric Dentant is a botanist at the scientific department of Ecrins National Park (France). He works on the conservation and monitoring of alpine natural habitats and flora. He is a specialist on the uppermost elevation plant species and his research focuses taxonomy, historical ecology, as well as epistemology on life science in these extreme ecosystems (Alps and Andes). He also collaborates in phylogenetic research on these communities, leading to the description of an unexpected biodiversity of the heights. Being part of the eco.mont editorial board allows him to be very aware of the scientific activity in other protected areas.

Leopold Füreder is a professor at the Institute of Ecology, University of Innsbruck, Austria. He holds a doctorate in limnology and tropical ecology, and *habilitated* (a post-doc qualification) in limnology and zoology. Key research topics are effects of climate change on freshwater ecosystems, trophic ecology, indicators of environmental status

and change, and aquatic conservation. His research focuses on regions of the Alps, Eastern Europe, Svalbard, Central America and Asia. He makes his wide range of expertise available to ensure the journals' high quality.

Matej Gabrovec is a geographer working at the Anton Melik Geographical institute of the Scientific Research Centre of the Slovenian Academy of Sciences and Arts in Ljubljana and teaching regional geography at the Faculty of Humanities, University of Primorska in Koper. He has been involved in several research projects in Triglav National Park: he has coordinated the Triglav Glacier observations, studied land use changes in past 200 years and he also prepared some studies on sustainable mobility with special regard on public transport. He is a member of the Triglav National Park professional board.

Günter Köck is Secretary-General of the Austrian National Committee for UNESCO's Man and the Biosphere (MAB) Programme, Vice-Chair and Rapporteur of the MAB International Coordinating Council, member of the Scientific Board of Hohe Tauern National Park, as well as one of the Austrian delegates to the International Scientific Committee for Alpine Research (ISCAR). As Arctic scientist he is associate researcher at the Institute for Interdisciplinary Mountain Research (Austrian Academy of Sciences) in Innsbruck. As coordinator of international research programmes and closely involved in protected area networks such as the World Network of Biosphere Reserves, it was his concern from the beginning to make scientific findings accessible to a wider scientific community. As one of the two founding editors of *eco.mont*, he was able to put this into practice.

Guido Plassmann has been studying, living and working in the Alps since 1985. His studies in Alpine geography and management of natural resources, economics and history gave him a solid appreciation for complex Alpine conservation processes. He has been developing and coordinating the Alpine Network of Protected Areas (ALPARC) since 1995. ALPARC was one of the initiators of *eco.mont* to propose a scientific platform for the exchange of research results and management experiences in protected areas. His main fields of expertise are the system of Alpine protected areas, nature protection policies and strategies, and ecological connectivity. Further current fields of work within the network are new challenges for the management of protected areas from new conditions linked to climate change and a higher volume of visitors in sensitive sites as a result of the pandemics. A further important field of work within the network is the implementation of EU projects especially within the Alpine Space Programme.

Roland Psenner has been trained in microbiology and biogeochemistry, two disciplines which led him into the field of limnology. By now he has a broader view of Alpine ecology and interdisciplinary aspects of climate change and biodiversity issues. His past activities as editor and reviewer of leading journals, but also his jobs in academia and private research institutions, are helpful for *eco.mont*. Currently he is president of Eurac Research where he is engaged in disciplines as diverse as language and minority studies on the one hand, and biomedicine and renewable energy questions on the other.

Astrid Wallner works as project coordinator at the Forum Landscape, Alps, Parks of the Swiss Academy of Sciences in Berne. She studied social anthropology and geography at the University of Zurich (Switzerland), worked on the local acceptance of protected areas in Switzerland and Ukraine for her PhD and built up the research coordination of protected areas in Switzerland. She is also member of the Swiss MAB board and of the *eco.mont* editorial board. The journal *eco.mont* is especially valuable for her work due to the wide variety of topics from various disciplines and the combination of research articles and management reports.

Herbert Wölger is Managing Director of Gesäuse National Park. There are only 13 national parks in the Alpine regions, to be responsible for one of them is a rewarding task. National parks stand for protecting large-scale ecological processes and allow people to see, learn, experience and enjoy *untouched* nature. His primary goal is to balance conservation, education and touristic development. Research has to supply the necessary information to take the right decisions. His role in the editorial board is to see the output of research in the light of practical conservation management. His education and some professional years in forest management has focused his interest on forests. That is fine because forests represent the most distinguishing feature whenever comparing Alpine national parks with their surroundings.

We would also like to take this opportunity to thank **Dominik Siegrist** for his many years of support to *eco.mont* as an editorial member since 2009 until 2021. We wish him all the best for the future.

The editors and the editorial board members of *eco.mont*

Culture wars and protected areas: narratives against national parks. An exploratory qualitative comparison of the movements opposing Adula Park and Locarnese Park

Mosè Cometta

Keywords: *cultural hegemony, discursive asynchrony, consensus, communication, Ticino, Switzerland*

Abstract

This paper analyses the discourses of two movements opposing National Park projects in Switzerland, focusing on their strategies and the political causes of their actions. Five in-depth qualitative interviews were conducted with the leaders of the opponents of Adula Park and Locarnese Park. The results reveal a cultural war between nature conservation advocates and park opponents. The existence of this radical opposition prevented bottom-up schemes from working. Further studies should aim to better understand the causes of this malaise in order to facilitate greater acceptance of new Protected Areas.

Profile

Protected area

proposed Adula Park &

Locarnese Park

Mountain range

Alps, Switzerland

Introduction

This paper is the last of a tryptic of studies I have carried out on the rejection of two Swiss national park projects (Cometta, forthcoming 2020). It aims to understand the broader ideological links between two groups of opponents, highlighting their shared values. In doing so, it paves the way for a broader understanding of issues related to the implementation of Protected Areas (PAs).

The hypothesis of a second or reflexive modernity (Beck & Lau 2005; Zuboff 2018) is fundamental for understanding the drive for personal, individual, development in contemporary society. Such personalization generates tensions at the political level (Flanagan 2003), which translate into an increasing difficulty for the state to fully satisfy individual needs, and hence into a loss of political legitimacy (Bobbio 1995). Some scholars, to define the tensions between the expectations of different social groups and the clash between their ontologies, have referred to “*culture wars*”. This notion applies in particular to the battles between universalism and multiculturalism in the United States in the 20th century, although it tends to simplify the historical process (Singh 1998). I suggest that the concept can help shed light on some aspects of the controversies around the creation of PAs. The impossibility of establishing fruitful dialogue and reciprocal understanding – that is, discursive asynchrony (Cometta 2020) – and the increase in aggressiveness in communication to strengthen intra-group unity at the expense of social unity (Garcés-Conejos Blitvich 2009) are in fact common to both culture wars and the debates on the creation of new PAs. Within this framework, the study of social polarization underlines the causes of the rejection of PAs. The repeated failures of some PAs’ negotiations in Western Europe (Depraz & Laslaz 2017; Michel & Bruggman 2019) point up the

failure of arbitration and negotiation as democratic instruments (Mouffe 2013).

The notion of *culture wars* hints at the attempt by white middle-class males to regain possession of the hegemonic media space – their privileged position. I suggest that a parallel can be made with discussions on PAs in Switzerland, where the centrality of mountain villages is at stake. They have long been at the centre of Swiss identity (Diener et al. 2006; Salomon Cavin & Marchand 2010), but the neoliberal socio-territorial paradigm (Haughton et al. 2013; Häussermann 2005; Ranci 2017) has increasingly eroded their historical privileges: pre-neoliberal anti-centralist and anti-urban policies had higher per capita expenditure for mountain villages. The reaction against the proposals for the creation of PAs can be understood as the will to counter the new institutional paradigm, defending traditional values and privileges: an example of the conflict between city and country. As in culture wars, the creation of PAs provokes disagreement about how to express the founding values of a nation (Jensen 1995); thus, the disagreement should not be understood simply as a punctual opposition to a territorial project.

In this paper I will be using this framework to analyse the motivations of the group leaders who opposed two National Park projects in Switzerland. I will try to show how anti-PA groups emerged, organized themselves and communicated, and how the political causes of this phenomenon can be interpreted.

Study area

This paper focuses on the rejection of two National Park projects in Ticino Canton, Switzerland. Both projects competed to be the second Swiss National Park, under IUCN category II; in accordance with the Ordinance on Parks of National Importance, they were put to the vote in the municipalities involved.

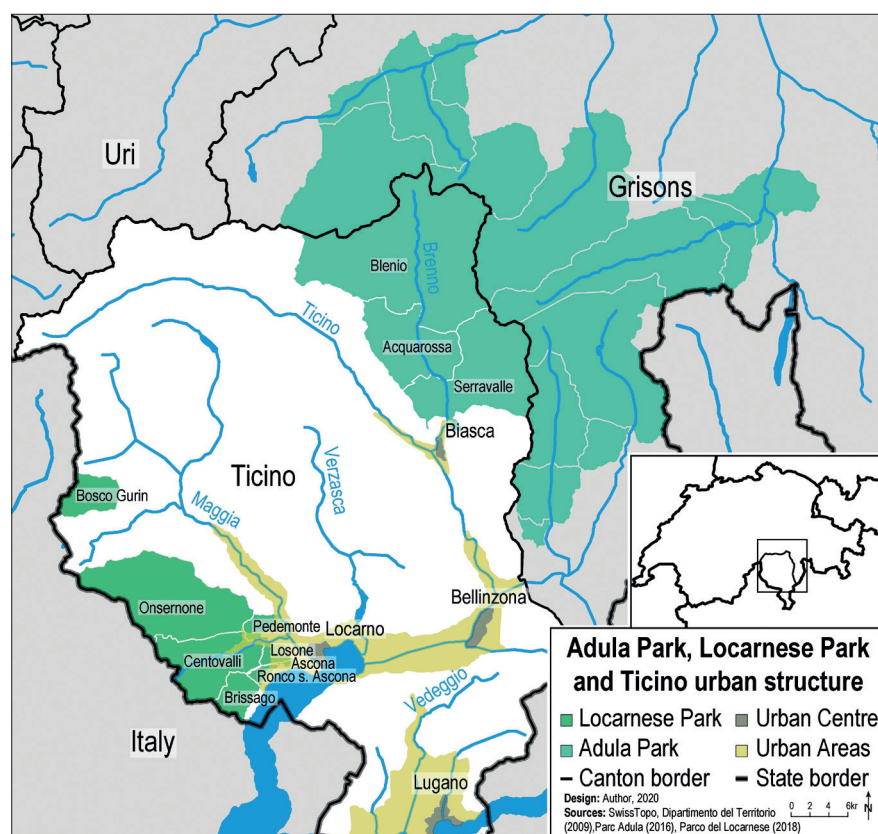


Figure 1 – Proposed extents of Adula Park and Locarnese Park, and the Ticino urbanized areas. The white lines within the green areas indicate the municipal borders.

Adula Park (Mount Adula's central peak is located at 46° 29' N, 9° 2' E) was an inter-cantonal project (Ticino and Grisons) comprising 17 municipalities from three different linguistic areas, with a population of around 16 000 people; just three of the municipalities and almost 6 000 people in the Ticino valley were involved. The project was rejected in November 2016. For additional context, there is an extensive body of literature on this case (Cometta 2020; Michel 2017, 2019; Michel & Backhaus 2019; Michel & Bruggman 2019).

Locarnese Park, which is centred roughly on the village of Mosogno (46° 11' N, 8° 38' E), was a Ticinese project, which, after a difficult initial phase and the withdrawal of a number of municipalities, finally included 8 municipalities with a population of about 19 000 people on the outskirts of the city of Locarno. In June 2018 the project was rejected by 6 of the 8 mu-

nicipalities by a narrow majority. Currently, there is almost no literature on this case (Cometta, forthcoming).

Methodology

This research is based on 5 qualitative semi-directive interviews with leaders of the anti-PA groups. To identify them, a preliminary search was carried out in the cantonal Digital Archive of newspapers and periodicals. The two most important cantonal newspapers – *Corriere del Ticino* and *la Regione* – were searched using the following keywords: Parc Adula, PA, Parco, Parco Nazionale del Locarnese, PNL, Parco del Locarnese. The results were skimmed to identify only those articles and letters from readers that were relevant to the topic (Figure 2). Reading the 464 texts (334 items published between 01.01.2004 and 31.12.2017 for Adula Park, and 130 items published between 01.01.2000

Table 1 – Biographical data of interviewees.

Interviewees			
Adula Park	Town council member and later village mayor (referred in the results as TC1)	Cantonal MP, hunter (MP2)	Former town council member, resides outside the proposed Park area (TC3)
	Right-wing populist party		Liberal party
Locarnese Park	Emeritus Professor and former senior cantonal official, resides outside the proposed Park area (EP4)	Member of a local civic corporation that owns public land in the proposed Park area, resides outside the proposed Park area (P5)	
	Self-defined former left-wing sympathizer; set himself against political fair-play	Identifies himself with right-wing values	

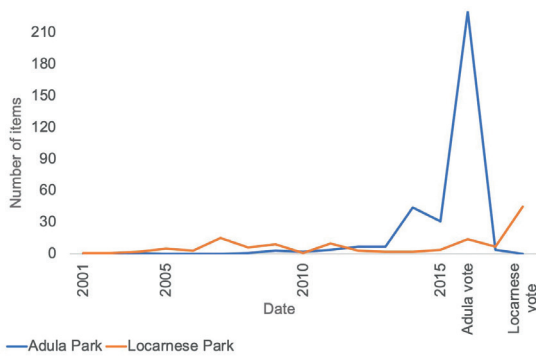


Figure 2 – Number of newspaper texts analysed, based on year of publication.

and 31.12.2018 for Locarnese Park) led to the identification of the eight leaders of the movements opposing the two parks: 3 for Locarnese Park and 5 for Adula Park. This paper focuses mainly on the leaders' perspectives and narratives (Ferreira 2014; Robinson 2014), which are important for understanding local people's opposition to the projects (Moscovici 1988, p. 224).

Five in-depth semi-structured qualitative interviews (Duchesne 1996; Mercuri Chapuis 2015; Pekarek 1993; Torkar et al. 2011) were carried out, in accordance with the saturation criterion (Bowen 2008; Guest et al. 2006) – 3 interviews for Adula Park and 2 for Locarnese Park. Repetitions across the answers, especially in the case of Locarnese Park, suggest that little information about the anti-park leadership perspective had been omitted, demonstrating the soundness of the choice of leaders who were interviewed (Marshall et al. 2013).

The interviews lasted approximately an hour and a quarter, and followed a protocol covering various aspects but leaving the interviewee ample freedom of answer. The interviews were recorded, and the answers received were partly transcribed. Every aspect of the analysis was discussed by a group of 3 researchers to ensure its reliability (Sykes 1991) without falling into excessive quantification (Stenbacka 2001).

Results

The questions posed in the semi-directive interviews focused mainly on two aspects: the organization and communication of the groups opposing the Parks, and the causes and consequences of their victories. According to their leaders, the organization of the movements was mostly spontaneous, and their communicative approach used aggressive tactics including insults, mockery and spreading rumours about PA's board of directors. Almost everyone pointed out that the vote split local communities deeply.

The birth of dissent

TC3 argues that during the 16-year gestation period of the Park project, he was repeatedly urged by other

citizens to organize some form of opposition to the Park, because they were afraid to expose themselves publicly. TC1 maintains that the movement arose spontaneously from a small group of like-minded people, and that it took root particularly in Blenio. She says that there have been only sporadic contacts with Park-opponents from other language regions (particularly those of Surselva), while MP2 suggests that there were good relations with this German-speaking group.

In the Locarnese case, P5 claims that dissent was already present, but its organization started when he opened a Facebook page against the Park. The page allowed EP4 to get in touch with P5 and form a small group of three activists. Both argue that other opponents, who were living in places where the Park was to be established, were afraid of retaliation if they exposed themselves publicly.

All interviewees state that there have been hardly any contacts or alliances between the opponents of the two Parks, despite all expressing mutual sympathy. EP4 claims that being few in number allowed the core group of Locarnese opponents to be more agile, speeding up decision-making and allowing continuous internal discussion. TC3 argues that the Locarnese group was significantly more structured, while Blenio's group was less organized. While all five interviewees maintain that they were not directly inspired by any particular political movement, EP4 concedes that support came mostly from the right wing. Furthermore, MP2, TC3 and P5 argue that the vote on Adula Park (November 2016) influenced the vote on Locarnese Park (June 2018): the dissenting local voices surrounding Adula raised doubts about the validity of a National Park project for the Alpine territories in general.

The communication battle

Regarding Adula Park, TC1 claims that the Park's promoters had a huge budget and the support of communications professionals to articulate their message. By contrast, those against the Park had only improvised means (newspaper articles, banners, social media posts). According to MP2, the promoters were looking for a consensus at grass-roots level across the canton, while opponents focused on the local community that was eligible to vote. Where Locarnese Park is concerned, EP4 claims that the promoters spent around 700 000 francs on promoting the project, while those campaigning against the Park spent only 20 000. To counter this capital difference, opponents focused on direct, provocative messages, using irony and emotive language. All respondents indicate that the public debate was aggressive and quite emotional. EP4 highlights the difficulty that opponents felt in being able to participate in the debate. Both leaders of those who were against the Locarnese project perceived an attempt to censor them, especially by the newspapers, which in their view were supportive of the Park. In the Adula Park debate, on the other hand, the opponents felt less ostracized by the newspapers,

except for *TC3*, who claims to have had to publish some letters under false names. Everyone points out that social media played a key role in communicating the opinions of opponents, especially to young people. In the Locarnese case, both leaders insist on the absence of censorship in social media and the possibility of communicating via video as an effective way to quickly present strong arguments against the project through evocative images. In the case of Adula Park, *MP2* stresses that social media acted as catalysts for confrontation, encouraging aggressive language and personal verbal attacks.

According to the Bleniese leaders, their greatest communicative victory was to present concrete arguments against the project, disproving what they believed to be the lies of the promoters and insisting on ideas of autonomy and freedom. For the Locarnese, their greatest success was being able to contradict the promoters using irony and sarcasm – through videos and photos on social networks, and through a printed pamphlet addressed to all the inhabitants of the villages involved.

In the opinion of Adula Park's opponents, the promoters' major mistakes were the vagueness of their plans and the abstract nature of their promises, while they also tried to gain the support of prominent political personalities instead of attempting to convince local people of the benefits that the Park would bring. Another problem reported relates to the longevity of the Park. The continued existence of any PA that was created would be subject to a vote after ten years, but the Park's opponents were convinced that it would not be dismantled even if a majority of local people voted against retaining the area. Opponents, however, had no factual evidence for any such strategy, and their claim was repeatedly refuted by cantonal and federal authorities. The *fact* that the project was promoted mainly by environmental organizations and was therefore not perceived as being aimed at local development but at nature conservation is reported as a further major mistake.

As for Locarnese Park, opponents of Adula Park argue that the promoters' worst faults were their arrogance, their confidence that they would win, and their lack of preparation for the public debates. The constant negotiations between various stakeholders and the attempt to find compromises that would suit everyone, which were presented by the promoters as evidence that the Park would respect the local population and their needs, were instead interpreted by its opponents as a lack of consistency.

The consequences of the vote

When asked whether the local community came out strengthened or weakened by the vote, almost everyone admits a deep split within the population. *MP2* points out that the older generation is the most bound to the ideals of the municipalities' autonomy and freedom. *P5* indicates how the vote reflected the existence

of two opposing but internally very cohesive groups among the population. *TC3* argues that the vote led to the breaking of relations of friendship, and *EP4* maintains that these enmities, in such a small social context, will last at least a generation. Finally, *TC1* mentions tensions in the collaboration between the municipal councils that voted for and against the project.

Imagining the enemies

The last section of the interviews focused on how the leaders of the Parks' opponents imagine their political opponents – i.e. the Parks' promoters, supporters and their values – and what broader significance they attribute to the vote. For *TC1*, their direct opponent was the world of environmentalism and “*extreme nature conservation*”. *TC3* points to Adula Park's board of directors as their main adversary, followed by municipalities and town councillors, “*who in small villages are all relatives*”. Opponents accused such figures of trying to *buy* the support of local people, notably farmers, by emphasizing the grants and subsidies that the Park and other authorities would make available to them. *MP2* states that the Park's proponents have a very visible media presence and a considerable amount of money at their disposal, and continue to pursue “*an excessively abstract idea*”. For *EP4* the promoters of the Locarnese Park were a few people in good faith and about 200 who were seeking enrichment and public subsidies, while the general public who supported the project was basically in good faith. *P5* points out that the Park's management did not believe sufficiently in their project or its goals. According to *P5*, the management therefore refused to engage in public discussion to defend the Park, and left their communications vague so as to avoid confrontation with local interest groups. The Canton was another direct opponent – one politically interested in the creation of National Parks to be used as a *bargaining chip* with the Federal Office for the Environment. Globally, however, *P5* identifies their enemy as a “*new ecological ideology with the aim of moving people away from nature*” and of resettling the population in large urban areas.

In general, all the leaders recognized that their battle was not against the project of a National Park per se, but against a broader political strategy that they considered harmful to the inhabitants of the Alpine valleys. Those who were against the Locarnese Park, being considerably more organized, had a very structured overall vision of the *enemy*, which they identified as an ideology and labelled “*fundamentalist*” (common, in their opinion, to both the OECD and the IUCN), of environmental protection that wants to separate man and nature. In the analysis of *EP4*, former employees of international “*mega-rich environmental organizations*” have started working for the Federal Office for the Environment, radicalizing Swiss environmental policy towards a rewilding of Alpine areas. According to this interpretation, Adula Park and Locarnese Park would be followed by other PAs, to the point of transform-

ing the entire Alpine region into a nature conservation area that would drive out its inhabitants. The leaders against Adula Park express similar feelings, albeit in a more general way. *TC1* fears that such projects will turn the area into a living museum, expelling its inhabitants and restricting human activities. *TC3* reiterates that the inhabitants of the valleys want to continue to be free, and that the Confederation must understand that it cannot turn the Alps into a Park.

Discussion

First, it is important to emphasize how the opponents represent themselves as spokespersons for a population frightened by censorship. In small villages, where, despite democratic rules, semi-oligarchies are in force and key power players seem immutable (RCT 1998, p. 45), it is difficult to oppose the plans of the municipalities without being ostracized. The attempt by the two Parks to ally themselves with local authorities in order to show their closeness to the population seems to have had the opposite effect, alarming some of the residents. In turn, this allowed the opponents to set themselves up as heroes of the censored people, exploiting the communication mechanisms of victimization (Samet 2013), blame (Gerodimos 2015) and offensive language. Indeed, *“the politics of resentment and victimization, so typical of populism, might resonate well with ethno-regional minorities that perceive a lack of recognition or fair treatment of their region by the state elites”* (Heinisch et al. 2018, p. 928). The victory by the opponents suggests that a proportion of the population experienced the Park projects as an imposition by the central state despite bottom-up processes put in place by the promoters.

The example of the Locarnese, in particular, shows how the action of a tiny and well-coordinated group can frustrate the actions of a whole set of local and national institutions. To understand this surprising reversal, it may be useful to resort to the notion of the struggle for cultural hegemony. From a Gramscian perspective, society is divided into groups with conflicting interests and visions of reality (Gramsci 1971). Institutions, guarantors of social functioning, defend and propagate the vision of the hegemonic group, while non-hegemonic groups try to gain power and change the population's perception of reality.

In the two cases that interest us, we can observe how there are (at least) two distinct perspectives on PA projects: that of promoters and local institutions, who see them as proactive and democratic projects, and that of PA opponents, who see the projects as an imposition from above, by interests external to the valleys. This can also be described as a polemical representation of reality influenced by local identity requirements (Breakwell, 2001; Moscovici, 1988), and it is here that the notion of culture war can be useful.

During the second half of the 20th century, the Ticino valleys received a great deal of aid to combat

depopulation and ensure the survival of their villages. Numerous improvements to infrastructure were built, ample economic resources were guaranteed, and all this was carried out by local authorities themselves, who had decisional autonomy (Carloni 1998; Diener et al. 2006; Toppi 1998). Overall, therefore, the fragile position of the Alpine valleys has guaranteed them a privileged position with regard to public policies. Since the 1990s, however, with the advent of neo-liberal ideology within federal and cantonal institutions, a new paradigm has taken hold. More emphasis has since been placed on the profitability of public investment (Gunder 2010; Haughton et al. 2013; Ranci 2017). From this perspective, it therefore became absurd to continue to invest in the infrastructural development of areas that were too peripheral. Category II National Park projects – following the so-called neoliberal turn in nature conservation (Büscher & Arsel 2012a, b) – were a good alternative to redirect the development of Alpine valleys.

The shift in status and the loss of historical privileges fostered the emergence of a sense of victimhood. In the eyes of the population, it became possible to interpret the PA project as an expression of a wider strategy of transformation of the Alpine areas. *EP4* and *TC1* have emphasized how, in their opinion, this new ideology, which is carried out on a global scale by nature protection organizations, wants to erase the historical links between the inhabitants of the Alpine valleys and their territory, making all traces of human presence above 700 m a.s.l. disappear.

We can see a culture war developing before our eyes. For those opposed to them, National Parks imply submission to a strategy akin to the half-earth hypothesis (Vettese 2018; Wilson 2016). They stress that this kind of nature conservation is carried out at the expense of the most fragile communities, for example in Switzerland's poor and remote Alpine valleys, and therefore constitutes an injustice and prevarication by the wealthiest urban population. As Lele puts it with reference to the Global South: *“the willingness to sacrifice concern for justice on the altar of global climate sustainability has been a hallmark of green growth thinking”* (Lele 2020, p. 50; see also Büscher et al. 2017).

Hence, the two National Park projects possess a complexity of meanings that goes far beyond the concrete set of rules that each abides by. For instance, they may represent the loss of privileged status of the Alpine valleys, or even the sacrifice of peripheral communities by virtue of an unfair ecological realpolitik (see Pollin 2018, p. 21). This in turn demonstrates well how National Parks imply much more than might initially be thought: they can become pawns in the cultural war between ways of conceiving the relationship between humans and nature, or cities and the countryside. If a project for a new PA is not to be hijacked by controversy and populism, if the project is to be implemented, these are all aspects that need to be considered before embarking on the design of a new PA.

Conclusion

Although they did not have close contacts with each other, the two opposition campaigns analysed here have many features in common. In particular, their ability to exploit victimization in their discourse and to use potentially offensive tactics results in the almost complete frustration of the promoters' attempts to construct bottom-up approaches. Another fundamental point in common is the existence of a culture war between advocates of nature conservation and those who see the creation of the new national parks as entailing the destruction of the human-nature relationship and the erasure of the history of Alpine communities. To constructively overcome these challenges is likely to take a long time, as well as considerable effort to better include those who feel excluded and marginalized. The first step towards this is an assessment of the quality of public debate: understanding whether the conditions for constructive discussion exist is a fundamental prerequisite for enabling bottom-up processes to succeed. Thus, the social sciences can contribute significantly to the creation of new PAs. For example, additional qualitative as well as quantitative studies exploring the feelings of the population towards both concrete territorial projects and broader territorial policy over a sufficient time span could reveal possible changes in attitude more clearly and new opportunities for the creation of PAs. Furthermore, efforts should be made to include opponents of PAs at an early stage through working groups, so that dissent does not manifest itself only in a destructive form at the end of the process.

Acknowledgements

This work was supported by the Forum Landscape, Alps, Parks of the Swiss Academy of Sciences (SC-NAT) and the Institute of Geography and Sustainability – University of Lausanne.

References

- Beck, U., & C. Lau 2005. Second modernity as a research agenda: Theoretical and empirical explorations in the 'meta-change' of modern society. *The British Journal of Sociology* 56(4): 525–557.
- Bobbio, N. 1995. *Stato, governo, società*. Einaudi.
- Bowen, G. A. (2008). Naturalistic inquiry and the saturation concept: A research note. *Qualitative Research* 8(1): 137–152.
- Breakwell, G.M. 2001. Mental models and social representations of hazards: The significance of identity processes. *Journal of Risk Research* 4(4): 341–351. doi: 10.1080/13669870110062730
- Büscher, B. & M. Arsel 2012a. Introduction: Neoliberal conservation, uneven geographical development and the dynamics of contemporary capitalism. *Tijdschrift Voor Economische En Sociale Geografie* 103(2): 129–135.
- Büscher, B., & M. Arsel 2012b. Nature™ Inc.: Changes and Continuities in Neoliberal Conservation and Market-based Environmental Policy. *Development and Change* 43(1): 53–78.
- Büscher, B., R. Fletcher, D. Brockington, C. Sandbrook, W.M. Adams, L. Campbell, C. Corson, W. Dressler, R. Duffy, N. Gray, G. Holmes, A. Kelly, E. Lunstrum, M. Ramutsindela & K. Shanker 2017. Half-Earth or Whole Earth? Radical ideas for conservation, and their implications. *Oryx* 51(3): 407–410. doi: 10.1017/S0030605316001228
- Carlioni, T. 1998. La grande trasformazione del territorio. In: Ceschi, R. (ed.), *Storia del Cantone Ticino*: Vol. II: 671–700. Stato del Cantone Ticino.
- Cometta, M. (forthcoming). Insufficiencies of a bottom-up approach at the time of fake news. Parco del Locarnese refusal example. *Revista Brasileira de Estudos Políticos*.
- Cometta, M. 2020. Protected Areas and Territorial Tensions: The Ticinese Case of Adula Park. *eco.mont - Journal on protected mountain areas research and management* 12(2): 4–10.
- Depraz, S. & L. Laslaz 2017. Conflicts, acceptance problems and participative policies in the national parks of the French Alps. *eco.mont - Journal on protected mountain areas research and management* 9(1): 46–56.
- Diener, R., J. Herzog, M. Meili, P. de Meuron & C. Schmid 2006. *Switzerland. An Urban Portrait*.
- Duchesne, S. 1996. Entretien non préstructuré, stratégie de recherche et étude des représentations. Ou: Peut-on déjà faire l'économie de l'entretien 'non-directif' en sociologie? *Politix* 9(35): 189–206.
- Ferreira, V.S. 2014. Arts and tricks of comprehensive interview. *Saúde e Sociedade* 23(3). Available at: <https://www.scielo.org/article/sausoc/2014.v23n3/979-992/en/> (accessed 10.10.2020)
- Flanagan, S. 2003. The new politics, culture wars, and the authoritarian-libertarian value change in advanced industrial democracies. *Comparative Political Studies* 36(3): 235–270.
- Garcés-Conejos Blitvich, P. 2009. Impoliteness and identity in the American news media: The "Culture Wars". *Journal of Politeness Research* 5: 273–303.
- Gerodimos, R. 2015. The Ideology of Far Left Populism in Greece: Blame, Victimhood and Revenge in the Discourse of Greek Anarchists. *Political Studies* 63(3): 608–625. doi: 10.1111/1467-9248.12079
- Gramsci, A. 1971. *Prison Notebooks*.
- Guest, G., A. Bunce & L. Johnson 2006. How Many Interviews Are Enough? An Experiment with Data Saturation and Variability. *Field Methods* 18(1): 59–82.
- Gunder, M. 2010. Planning as the ideology of (neoliberal) space. *Planning Theory* 9(4): 298–314.
- Haughton, G., P. Allmendinger & S. Oosterlynck 2013. Spaces of neoliberal experimentation: Soft spaces, postpolitics, and neoliberal governmentality. *Environment and Planning* 45: 217–234.

- Häussermann, H. 2005. The end of the European City? *European Review* 13(2): 237–249. doi: 10.1017/S1062798705000372
- Heinisch, R., E. Massetti & O. Mazzoleni 2018. Populism and ethno-territorial politics in European multi-level systems. *Comparative European Politics* 16(6): 923–936. doi: 10.1057/s41295-018-0142-1
- Jensen, R. 1995. The Culture Wars, 1965–1995: A Historian's Map. *Journal of Social History* 29: 17–37.
- Lele, S. 2020. Environment and Well-being. A Perspective from the Global South. *New Left Review* 123: 41–63.
- Marshall, B., P. Cardon, A. Poddar & R. Fontenot 2013. Does Sample Size Matter in Qualitative Research?: A Review of Qualitative Interviews in is Research. *Journal of Computer Information Systems* 54(1): 11–22.
- Mercuri Chapuis, S. 2015. Using semi-directive interview: An analysis of the power and social responsibility of researchers. In: Cassar, V. (ed.), *Proceedings of the 14th European Conference on Research Methodology for Business and Management Studies*: 282–289.
- Michel, A.H. 2017. 'What is a national park for?' – Principles of worth in a Swiss national park project. 6th Symposium for Research in Protected Areas, Vienna.
- Michel, A.H. 2019. How conceptions of equity and justice shape national park negotiations: The case of Parc Adula, Switzerland. *eco.mont - Journal on protected mountain areas research and management* 11(1): 25–31.
- Michel, A.H. & N. Backhaus 2019. Unravelling Reasons for the Non-Establishment of Protected Areas: Justification Regimes and Principles of Worth in a Swiss National Park Project. *Environmental Values* 28(2): 171–190. doi: 10.3197/096327119X15515267418511
- Michel, A.H. & A. Bruggman 2019. Conflicting Discourses: Understanding the Rejection of a Swiss National Park Project Using Data Analysis Triangulation. *Mountain Research and Development* 39(1). doi: 10.1659/MRD-JOURNAL-D-18-00081.1
- Moscovici, S. 1988. Notes towards a description of Social Representations. *European Journal of Social Psychology* 18(3): 211–250. doi: 10.1002/ejsp.2420180303
- Mouffe, C. 2013. *Agonistics. Thinking the world politically*.
- Pekarek, S. 1993. Gestion des rôles dans l'interview semi-directive de recherche: Activités de guidage et travail relationnel de l'intervieweur. *Bulletin CIL4* 57: 85–103.
- Pollin, R. 2018. De-Growth vs a Green New Deal. *New Left Review* 112: 5–25.
- Ranci, C. 2017. Neoliberalism and the European city: Reshaping the competitiveness/social cohesion nexus. In: Morel Journel, C. & G. Pinson (eds.), *Debating the neoliberal city*: 136–152.
- RCT. 1998. *Il Cantone ed i suoi comuni. L'esigenza di cambiare*.
- Robinson, O.C. 2014. Sampling in Interview-Based Qualitative Research: A Theoretical and Practical Guide. *Qualitative Research in Psychology* 11(1): 25–41.
- Salomon Cavin, J. & B. Marchand 2010. *Antiurbain: Origines et conséquences de l'urbaphobie*. Presses polytechniques et universitaires romandes.
- Samet, R. 2013. The photographer's body: Populism, polarization, and the uses of victimhood in Venezuela: The photographer's body. *American Ethnologist* 40(3): 525–539. doi: 10.1111/amet.12037
- Singh, N.P. 1998. Culture/Wars: Recoding Empire in an Age of Democracy. *American Quarterly* 50(3): 471–522.
- Stenbacka, C. 2001. Qualitative research requires quality concepts of its own. *Management Decision* 39(7): 551–556. doi: 10.1108/EUM0000000005801
- Sykes, W. 1991. Taking Stock: Issues from the Literature on Validity and Reliability in Qualitative Research. *Market Research Society. Journal* 33(1): 1–11. doi: 10.1177/147078539103300101
- Toppi, S. 1998. La crescita economica (1945–1975): La scommessa industriale. In: Ceschi, R. (ed.), *Storia del Cantone Ticino* Vol. II: 593–614. Stato del Cantone Ticino.
- Torkar, G., B. Zimmermann & T. Willebrand 2011. Qualitative Interviews in Human Dimensions Studies About Nature Conservation. *Varstvo Narave* 25: 39–52.
- Vettese, T. 2018. To Freeze the Thames. Natural Geo-Engineering and Biodiversity. *New Left Review* 111: 63–86.
- Wilson, E.O. 2016. *Half-earth: Our planet's fight for life* (First edition).
- Zuboff, S. 2018. *The age of surveillance capitalism: The fight for a human future at the new frontier of power*.

Author

Mosè Cometta

is working as a post-doc at the University of Turin. His main research interests are identity construction dynamics, cultural hegemony struggles, and political and territorial philosophy. E-mail: mose.cometta@unil.ch. ORCID-ID: <https://orcid.org/0000-0001-8700-2030>

Two perspectives – one goal: resilience research in protected mountain regions

Lisa Huber, Eva Posch, Rainer Bell, Karl Michael Höferl, Robert Steiger, Rike Stotten, Erich Tasser & Georg Leitinger

Keywords: resilience research, Nepalese Himalayas, Austrian Alps, ecosystem services, tourism, agriculture

Abstract

Resilience at various levels of the social and environmental domains is a key aspect of sustainable development in mountain areas. However, resilience research is hampered by inconsistent definitions and conceptualizations of resilience. Using the examples of two research projects from protected mountain areas in different regions of the world (in the Austrian Alps and the Nepalese Himalayas), we illustrate two distinct perspectives on resilience: a system-based perspective and an agency-based one. We identify common characteristics of these views on resilience and apparent contradictions between them, and discuss how the two perspectives can be integrated to enhance understanding of resilience and to support sustainable development.

Profile

Protected area

Ruhegebiet Ötztaler

Alpen & Nature Park

Ötztal Mountain range

in Austria; Sagarmatha

National Park & An-

napurna Conservation

Area in Nepal

Introduction

Communities in mountain regions across the globe are facing numerous challenges: they are disproportionately affected by natural hazards, limited agricultural production, as well as economic and political marginalization (Sati 2014). Moreover, additional pressure is put on mountain environments by climate change, exploitation of natural resources and land use changes, affecting the provision of ecosystem services and the livelihoods of people dependent upon them (Price et al. 2004; Einhorn et al. 2015, Pepin et al. 2015, Hock et al. 2019). This interplay of natural and social factors and drivers makes mountain areas complex social-ecological systems (SES), which are challenging to investigate (Cumming & Allen 2017).

The management of mountain areas can be further complicated by the designation of protected areas subject to specific guidelines and regulations. Being rich in natural and cultural resources and providing manifold essential ecosystem services, 16.9% of mountain areas globally (excluding Antarctica) are nationally designated protected areas (status as of 2009; Rodríguez-Rodríguez et al. 2011). A protected area is defined as “a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values” (Dudley 2008). In protected mountain areas, finding a balance between conflicting (interests e.g. tourism, agriculture, prevention of natural hazards) is often challenging due to differing management priorities and the perceived legitimacy of various actors involved (e.g. scientists,

policymakers, NGOs and communities) (Lockwood 2010).

Subsuming the ability to respond to and prepare for change, the concept of resilience is often considered a central element of sustainable mountain development in general (Manuelli et al. 2014; Wymann von Dach et al. 2018), in particular for the establishment of protected mountain areas (e.g. Cumming et al. 2015). Despite ongoing research efforts (e.g. Nettiier et al. 2017; Ingrisich & Bahn 2018), *however*, just how resilience of mountain regions, communities and environments can be defined, operationalized and assessed remains problematic. Different resilience concepts are used interchangeably and / or with ambiguous meanings (Gardner & Dekens 2007; Hosseini et al. 2016). In ecology, resilience usually defines the ability of a system to absorb disturbances while keeping the same functions, characteristics and identity (Holling 1996; Walker et al. 2004; Quinlan et al. 2016). Under this definition, the possibility of reaching alternative equilibria is included (Holling 1996). For application to SES such as protected mountain areas, the definition of resilience was extended: social-ecological resilience explicitly includes adaptability and transformability, implying that a system does not necessarily have one or more states of equilibrium but is adapting and changing continuously (Davoudi et al. 2012). In contrast to these traditional system-oriented perspectives on resilience, some recent approaches follow agency-centred perspectives, where social entities and their agency (e.g. ability and willingness to act) are the focus of attention (Bohle et al. 2009; Bristow & Healy 2013). In applying the resilience concept to protected moun-

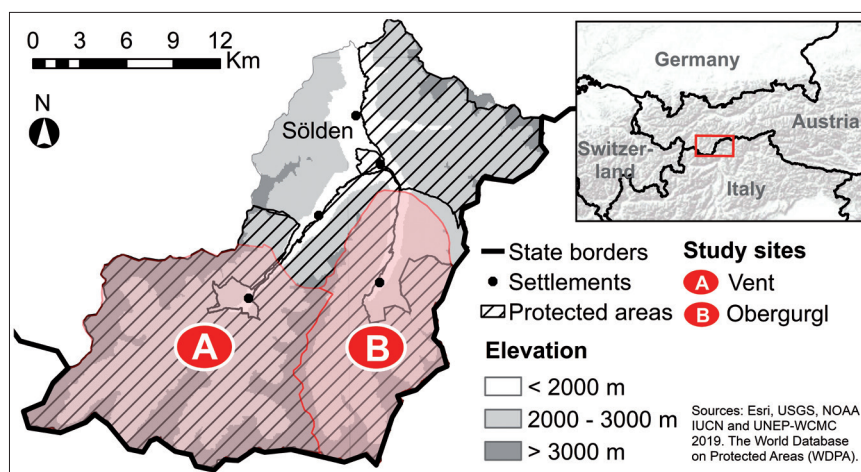


Figure 1 – Location of the study sites in the RESULT project, showing Vent and Obergurgl (both part of the community of Sölden, Tyrol, Austria).

tain areas, this means that managers, stakeholders and related institutions, and their ability and willingness to act, are explicitly investigated in resilience evaluations.

The aim of this paper is to compare system-based and agency-based perspectives on resilience in mountain regions by looking at their conceptual, methodological and practical differences, and discussing advantages and limitations of both approaches. We compare two projects investigating the resilience of livelihoods, in two mountain regions that are undergoing changing conditions: socio-economic changes (e.g. change of economic structure), and environmental changes (e.g. climate change, natural hazards). The case studies belong to protected areas with different designations. In both projects, the protection status has played an ambiguous role in addressing resilience, which will be examined below.

For the investigation of resilience in the case study regions, self-moderated focus groups were created, comprising all researchers of the two projects. The focus groups' findings are presented here, structured and summarized in an analytical grid. Finally, advantages and shortcomings of system- and agency-based perspectives are discussed, and suggestions for how to combine these approaches with each other are made. With these findings, this paper contributes to a more holistic understanding of resilience in mountain areas.

Material and methods: analysing resilience in protected mountain areas

To better understand the empirical implications of different theoretical approaches towards resilience in mountain regions, we present insights from two projects funded by the Austrian Academy of Sciences (ÖAW) within the 2015 Earth System Sciences research programme. Members of both research projects – from different scientific fields such as Geography, Ecology, Public Finance and Sociology – took part in a series of self-moderated focus groups (based

on Stewart & Shamdasani 1991; Schulz 2012) to identify common characteristics, apparent contradictions and differing understandings of resilience research in mountain regions. First, researchers from both project teams presented their conceptualization of resilience. Based on these perceptions, several questions were developed by the authors to guide the subsequent series of focus groups. The guiding questions were:

1. How do you define resilience in your project?
2. Whose resilience is observed?
3. Do you quantify resilience? – If yes, what indicator(s) do you use?

In order to fully exploit the potential, discussions were kept open, and each participant was allowed to raise further spontaneous questions. To structure the findings, all participating researchers agreed a set of dimensions for an analytical grid to contrast the two approaches to the analysis of resilience in protected mountain areas. In addition, advantages and limitations of system- and agency-based perspectives were collected and discussed.

Social-ecological resilience: focus on the system

Using two study sites, Vent and Obergurgl in the Upper Ötz Valley, Tyrol, Austria (Figure 1), the RESULT project (Resilience through synergies between agriculture and tourism: A comparison of two contrasting trajectories in the Tyrolean Alps) investigates the effects of interactions between agriculture and the tourism industry on the resilience of mountain regions and the local communities. The research aim is to investigate the resilience of two mountain communities facing long-term changes in climate and socio-economic trajectories.

Case study sites

The two sites provide a unique opportunity to study the interdependencies between tourism and agriculture over a long time period, because both vil-

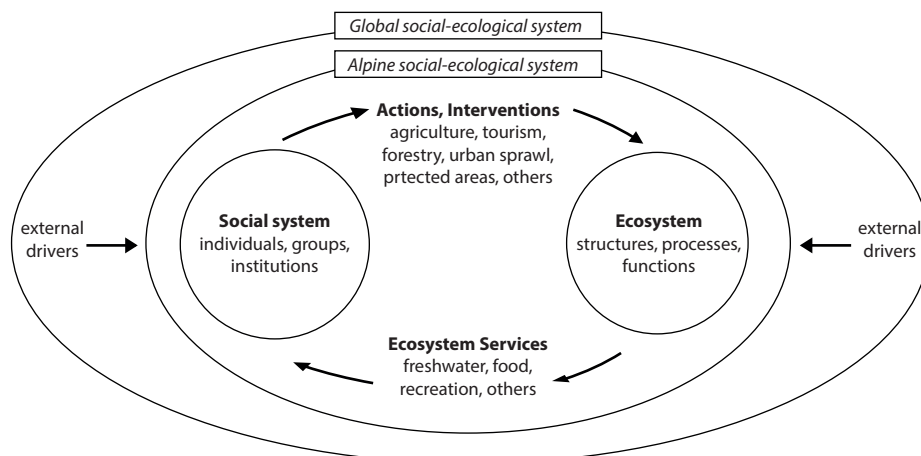


Figure 2 – The social-ecological system (adapted from Resilience Alliance 2007).

lages were typical Alpine agrarian communities that developed into tourist destinations at the beginning of the 19th century (Busse et al. 1987), but without the complete disappearance of agricultural activities. However, their touristic development trajectories are different: Obergurgl focuses almost entirely on skiing tourism, whereas Vent has positioned itself as a *mountaineering village* for gentle tourism in winter and summer (Wilson et al. 2018). Obergurgl and Vent lie in two different protected areas classified by the International Union for Conservation of Nature (IUCN): the National Rest Area *Ruhegebiet Ötztaler Alpen* (IUCN category IV), and the Nature Park *Naturpark Ötztal* (IUCN category V) (IUCN & UNEP-WCMC 2019). While in selecting the case-study sites their protection status played only a minor role, it has proven to be essential for further assessments of resilience.

Resilience understanding and methods used

Based on the resilience definition of Walker et al. (2004, p. 2), RESULT assesses resilience as “*the capacity of a system to absorb disturbance and reorganize while undergoing change so as to still retain essentially the same function, structure, identity, and feedbacks*”. Instead of observing the social and the ecological systems separately, we treat the study sites as SES: “*integrated systems of ecosystems and human society with reciprocal feedback and interdependence*” (Resilience Alliance 2007, p. 1) (Figure 2).

The two case study sites (Alpine social-ecological systems in Figure 2) generate ecosystem services (ES) that are crucial to human well-being (Haines-Young & Potschin 2010). In Obergurgl and Vent, the livelihoods of the inhabitants have always been based on local ES, i.e. provisioning services (e.g. agricultural products, water supply), regulating and maintaining services (e.g. regulating natural hazards, soil fertility), and cultural services (e.g. recreational and aesthetic value for tourism). To ensure the economic and social well-being of the two communities, it is crucial that the SES is able to maintain flows of desired ES within tolerable limits (Biggs et al. 2012). If the flows move outside these limits, disadvantages for society may occur (Janssen et

al. 2007). Hence, for the application of the resilience concept in the study, we equated resilience with a stable flow of desired ES in the face of long-term changes to climate and socio-economic trajectories (Janssen et al. 2007; Brunner & Grêt-Regamey 2016). Changes over time include the loss of protected status by a case-study region, a factor which was taken into consideration when assessing resilience. According to Kohler et al. (2017, pp. 117–118), “*a resilient [social-ecological] system will adapt its structure to change while keeping the same set of states and associated ecosystem services*”. Therefore, the project modelled and mapped a wide range of relevant ES for five time-steps from 1860 to 2015, and the changes in ES supply and demand were quantified as a measure for resilience. The selection of the ES was based on studies by Zoderer et al. (2019) and Tasser et al. (2020), in which the importance of a large number of ES for society in the Tyrol was surveyed. In addition, Gruber (2019) verified these Tyrol-wide assessments in both local communities. Small changes in ES are practically unavoidable as the SES is characterized by constant dynamics and change (Walker & Salt 2006), but the transformation into a fundamentally different system would entail a fundamental shift in the ES bundles or even a complete loss of specific ES.

Social resilience: putting people first

Using empirical evidence from Nepal, the touRES project (Resilience of tourism systems to natural hazards in the Himalayas) analyses the resilience of owners of businesses in the tourism sector to natural hazards in two case study areas (Figure 3).

Case study sites

The two study sites Kali Gandaki Valley and Khumbu Valley provide a good opportunity to study the interdependencies between tourism and natural hazards. Both study areas belong to major tourist regions in the Himalayas, with outdoor-based activities as the central attraction (e.g. trekking, hiking, mountain biking). Additionally, natural hazard processes such as earthquakes, floods and landslides happen frequently

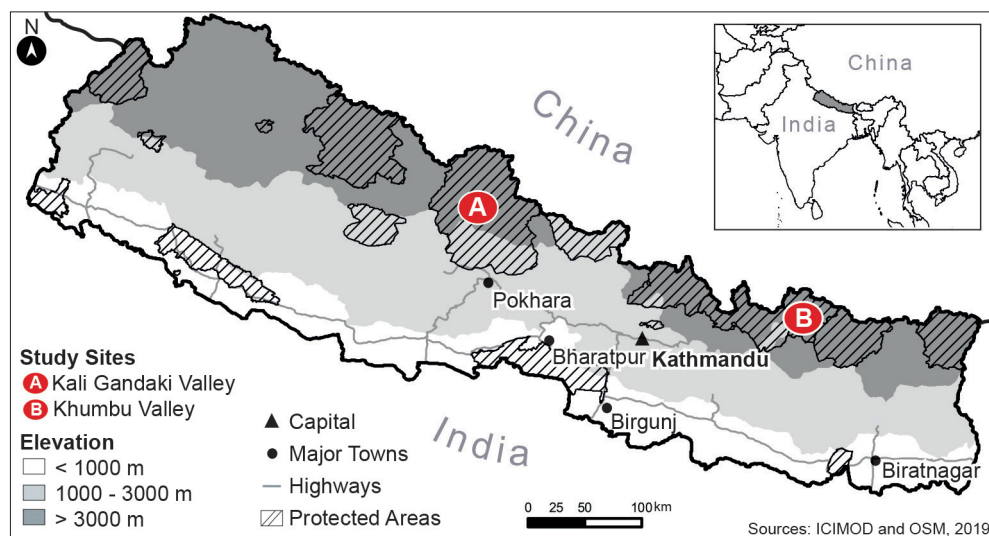


Figure 3 – Location of the study sites in the touRES project.

in the Himalayan region and could increase under conditions of global climate change (Petley et al. 2007; ICIMOD 2011; United Nations ESCAP 2015; Kargel et al. 2016). The various natural hazard processes have direct and indirect impacts on local tourism, and local businesses in the tourism sector take different actions in order to prepare for, prevent and respond to these events. Kali Gandaki Valley and Khumbu Valley were selected because they are located within two different IUCN protected areas – Sagarmatha National Park and Buffer Zone (SNP: IUCN category II) and Annapurna Conservation Area (ACA: IUCN category VI) (IUCN & UNEP-WCMC 2019). It is a general assumption that different protection designations entail different regulations for tourism activities as well as for risk management. However, while this is mostly the case, in practice it has largely proved difficult to implement the various levels of regulation, and these differences did not affect the agency of the individual actors, which was the focus of the analysis.

Understanding of resilience, and methods used

The overall aims of the touRES project are to analyse the resilience of owners of businesses in the tourism sector to natural hazards, and to provide future development paths for improving this resilience. To carry out its aims, the project follows an actor-oriented and agency-based conceptualization of resilience that is grounded in Bohle et al.'s (2009) claim of “*reframing resilience as agency*”. Building on theories from environmental psychology and health psychology – the *Value-Belief-Norm* (VBN) theory (Stern 1999) and *Protection Motivation Theory* (PMT: Rogers 1975) – the model of *Agency Towards Resilience* (ATR; Figure 4) was developed (see Posch et al. 2020).

The individual actor is the starting point of the analysis. Practical actions are taken at different social levels, ranging from the individual to the collective, and directly and indirectly improve their resilience (Hutter & Lorenz 2018). These practical actions towards resilience depend on the actor's ability and willingness

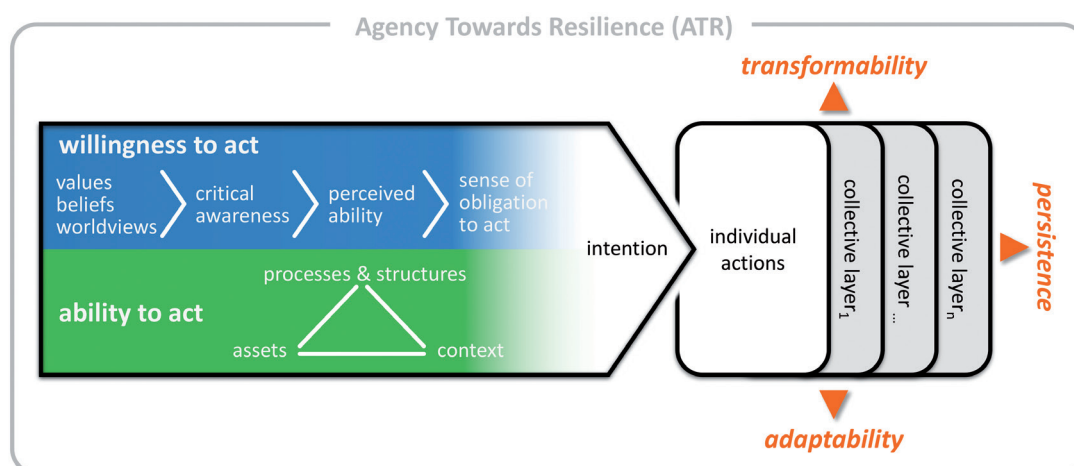


Figure 4 – The Agency Towards Resilience (ATR) model (based on Posch et al. 2020).

to act. While the ability to act is based on access to assets and on the context (e.g. policy setting, institutional, political, historical, demographic, social, environmental, and socio-economic conditions) (Scoones 1998), the willingness to act is shaped by individual goals and trade-offs, which are rooted in, among other things, values, beliefs, critical awareness, and the perceived ability to act and an obligation to do so (Rogers 1975; Stern 1999). In our study, we argue that human agency cannot be reduced to whether or not social entities have access to assets and resources; nor can it be equated with these entities' capabilities and skills to act. A human-agency perspective acknowledges that actors' rationales differ, that they use different strategies, and have different levels of willingness to act (Pain & Levine 2012; Darnhofer et al. 2016). Access to economic, social, natural, physical or human assets is not seen as the main determinant of an entity's resilience. Therefore improved access to assets does not necessarily lead to an increased level of resilience (Adger 2003; Norris et al. 2008; Speranza et al. 2014). Thus, a better understanding is needed of why social entities behave or act in certain ways, why they make certain choices, and why they have certain priorities and goals (Bristow & Healy 2013).

Results: dimensions of resilience research in mountain areas

In the two projects presented, different approaches are used to investigate resilience in mountain regions involving different scales of analysis and methodologies. These are outlined in an analytical grid (Table 1). Within the focus groups, we framed five dimensions that characterize the approaches of resilience research in mountain regions: (1) resilience of whom/what; (2) scope/scale of analysis; (3) resilience to what; (4) methodological approach; and (5) aim of the analysis.

In the RESULT project, the crucial *resilience of whom/what* question is centred on a mountain social-ecological system. In contrast, the focus of the touRES project is on owners of businesses in the tourism sector. RESULT does not account for individual elements of the system and their behaviour, whereas the tourism-business owners in the touRES project are considered active actors with a certain abil-

ity and willingness to proactively prepare, prevent and adapt, as well as to respond reactively, to disturbances. These definitions of subjects seem to determine the *scope/scale of analysis*: the RESULT project deals with the overall behaviour of the system (system-based perspective); the touRES project studies the individual system elements (agency-based perspective).

The aspect *resilient to what* is also viewed from contrasting perspectives. In the RESULT project, the resilience to long-term changes in climate and socio-economic trajectories is observed, changes being identified from an external perspective by collecting data (on climatic variables, demographic development, agricultural change, tourism change, infrastructure expansion, etc.) from publicly available databases and literature (Huber et al. 2020). In the touRES project, on the other hand, resilience to natural hazards is central and is studied by investigating people's critical awareness of natural hazards in two regions after developing an inventory of past, present and potential future natural hazard events.

Moreover, the *methodological approach* of the two projects differs. In the RESULT project, resilience assessment is based on measurement, modelling and mapping of ES (Schirpke et al. 2019; Huber et al. 2020). In contrast, the ATR model of the touRES project (Posch et al. 2020) avoids measuring resilience, which often results in benchmarking, implying that social entities always behave as homogeneous, rational agents (Darnhofer et al. 2016; Quinlan et al. 2016). Instead, the touRES approach is based on investigating the range of actions that people are able and willing to perform, and examining the factors behind peoples' ability and willingness to act (e.g. access to assets, structural conditions, values, beliefs and worldviews) (Posch et al. 2019).

Thus, the *aim of analysis* is also different for the two projects. The RESULT project aims at finding recommendations for ensuring and improving ES supply for the local inhabitants, whereas the touRES project does not recommend *optimal* actions, because they may be ineffective or inappropriate (Pain & Levine 2012). Instead, the focus is on *local optima* (e.g. actions people are able and willing to carry out) that can be encouraged or facilitated by outside support and may serve as entry points to enhance resilience.

Table 1 – Analytical grid of characteristics in the two projects' views on resilience.

Dimension	RESULT	touRES
1. Resilience of whom/what	Mountain social-ecological systems (mountain ecosystems and their local inhabitants)	Owners of tourism businesses
2. Scope/Scale of analysis	System-based	Agency-based
3. Resilience to what	Long-term changes in climate and socio-economic trajectories.	Natural hazards
4. Methodological approach	Mapping, modelling and quantifying ecosystem services (by spatial modelling in geographic information systems, surveys, expert interviews).	Understanding poly-rational values and worldviews, evaluating actions taken/not taken (by surveys and interviews), natural hazards analysis.
5. Aim of analysis	Develop recommendations to ensure and improve the supply of ecosystem services to local inhabitants.	Improve local optimum by identifying the range of actions people are able and willing to take that increase their resilience to natural hazards.

Discussion

The projects differed not only in the definition of the units of analysis, but also as to which aspects they should be resilient to, their methodological approach, and the aim of the analysis. The system-oriented and agency-centred perspectives each offer various advantages and limitations, which will be discussed in this section. We will end with some thoughts on whether these approaches and methodologies are mutually and strictly exclusive, or whether some integration of the two is possible and even desirable.

Advantages and limitations of system- and agent-based perspectives

It seems to be an advantage of system-based approaches such as the one used in the RESULT project that optimal solutions for improving system resilience can be derived from models that simulate interactions within the system as well as consequences of external impacts. However, although the practical implementation of resilience-enhancing measures can be suggested by scientists, implementation by local and / or political actors at different spatial levels presents a great challenge (Davoudi et al. 2012). Here, the actors' knowledge might be insufficient to understand the complexities of the system or the effects (and effectiveness) of measures, leading to ineffective measures or even non-action (Herrera 2017). We find a further limitation in the need to reflect whether resilience is used as a normative, an analytical or a descriptive concept (Kruse et al. 2017). If resilience analysis implies the identification of optimal resilience-enhancing measures, one needs to ask what the desired outcome is, and for whom. While certain outcomes may be perceived by some as optimal and therefore desirable, they might not be so perceived by others (Davoudi et al. 2012). Another controversial question is that of who decides what being *resilient enough* is (MacKinnon & Derickson 2012).

In our projects, the protection status of the mountain regions offered two interesting findings: in the touRES project, the protected area designation was a substantial reason for selecting the case study sites, as the designation was assumed to be crucial for tourism and natural hazard management practices. However, it turned out to be of minor importance for the agency of individual actors – the unit of analysis of the study. On the other hand, in the RESULT project, the protection designation was unimportant for the selection of the case study sites but subsequently proved to be of great significance for the resilience assessment, because the loss of protected status of part of the study area had an impact on the provision of ecosystem services, which we were able to analyse using the particular resilience assessment methodology applied.

However, even if sufficient specialist knowledge is available, discrepancies between objective knowledge, behavioural intentions and actual behaviour can be ex-

pected (Hurlimann et al. 2009). In the worst-case scenario, no improvement of the system can be reached at all, because what is known as effective practice from theory and science is not actually implemented in policy and practice (Fixsen et al. 2005). Reasons for ineffective measures or non-actions can include conflicting (hidden) interests, worldviews or cultural backgrounds. In the touRES project, for example, an important link between peoples' values, beliefs and their engagement in disaster preparedness and prevention activities was examined (Posch et al. 2019). A possible solution is to consider the willingness and abilities of agents to act by using an agency-based approach. Following this approach, measures to improve the system can be tailored to the needs and potential of the agents, but it is likely to create a dilemma for science: against empirical findings, *good* rather than the scientifically determined *optimal* measures are suggested. In the worst case, this can mean that the aim of the research (e.g. improvement of the system) cannot be attained, because the measures that are accepted and implemented by the local and political actors are insufficient to fully implement *optimal* measures. Thus, instead of giving *optimal* recommendations, a transdisciplinary approach in research projects may help to achieve a more comprehensive range of plausible options by involving non-academic actors in the formulation of the research questions, problem definition, and understanding of solutions (Sarkki et al. 2013).

Combining the two perspectives?

To model complex system phenomena that involve human and / or institutional behaviour, it can be helpful to use an agent-based modelling approach. Such approaches are used to simulate the behaviour and mutual interactions of autonomous agents in order to assess the response of a system as a whole (An 2012). Here, inviting practitioners to define the behaviour of the model's agents, in what is called *participatory agent-based modelling*, is recommended. Stakeholder involvement in the modelling processes can reduce the inherent limitations and improve understanding of the relevant system components (Voinov & Bousquet 2010); in this way, participatory modelling not only helps the scientists to incorporate local knowledge into system modelling but also enhances the stakeholders' system knowledge and gives them a chance to reflect on possible consequences of their individual willingness (or not) to act. As a minimum, participatory modelling supports the scientists in identifying the limits of the willingness to act, which is the first prerequisite if actors are going to be engaged in increasing their willingness to act. Particularly appealing ways to include stakeholders in modelling are found in serious *games*, where scientific models are implemented in computer games and role-playing (see e.g. Meadows 1986; Resnick & Wilensky 1998).

Conclusion

In this paper, we compared different conceptual, methodological and practical approaches in resilience research in protected mountain areas. Based on two research projects in protected regions in the Austrian Alps and the Nepalese Himalaya, we framed 5 dimensions that characterize approaches of resilience research in mountain regions: (1) Resilience of who / what, (2) Resilience to what, (3) Scale of analysis, (4) Methodological Approach, and (5) Aim of Analysis. These dimensions cover typical characteristics of system-based and agency-oriented views on resilience. Both approaches have advantages and limitations regarding practical applicability and societal desirability. Future research could cover the integration of the two conceptual, methodological and practical approaches, for example by participatory agent-based modelling that is rooted in a transdisciplinary tradition.

Acknowledgment

This work was funded by the Earth System Sciences Program of the Austrian Academy of Sciences and the University of Innsbruck.

References

- Adger, W.N. 2003. Social Capital, Collective Action, and Adaptation to Climate Change. *Journal of economic geography* 79: 387–404.
- An, L. 2012. Modeling human decisions in coupled human and natural systems: Review of agent-based models. *Ecological Modelling* 229: 25–36.
- Biggs, R., M. Schlüter, D. Biggs, E.L. Bohensky, S. BurnSilver, G. Cundill, V. Dakos, T.M. Daw, L.S. Evans, K. Kotschy, A.M. Leitch, C. Meek, A. Quinlan, C. Raudsepp-Hearne, M.D. Robards, M.L. Schoon, L. Schultz & P.C. West 2012. Toward Principles for Enhancing the Resilience of Ecosystem Services. *Annual Review of Environment and Resources* 37: 421–448.
- Bohle, H.-G., B. Etzold & M. Keck 2009. Resilience as Agency. *IHDP update*: 8–13.
- Bristow, G. & A. Healy 2013. Regional Resilience: An Agency Perspective. *Regional Studies* 48: 923–935.
- Brunner, S.H. & A. Grêt-Regamey 2016. Policy strategies to foster the resilience of mountain social-ecological systems under uncertain global change. *Environmental Science and Policy* 66: 129–139.
- Busse, H., T. Seidel, D. Munz & H. Heuberger 1987. Der sozioökonomische Strukturwandel des inneren Ötztals (Gemeinde Sölden) – Untersuchungen über Bevölkerungsentwicklung, Arbeitskräfte und Fremdenverkehr. In: Patzelt, G. (ed.), *MaB – Projekt Oberurg*: 25–114. Innsbruck.
- Cumming, G. & C. Allen 2017. Protected areas as social-ecological systems: perspectives from resilience and sociol-ecological systems theory. *Ecological Applications* 27: 1709–1717.
- Cumming, G.S., C.R. Allen, N.C. Ban, D. Biggs, H.C. Biggs, D.H.M. Cumming, A. De Vos, G. Epstein, M. Etienne, K. Maciejewski, R. Mathevet, C. Moore, M. Nenadovic & M. Schoon 2015. Understanding protected area resilience: a multiscale, social-ecological approach. *Ecological Applications* 25: 299–319.
- Darnhofer, I., C. Lamine, A. Strauss & M. Navarrete 2016. The resilience of family farms: Towards a relational approach. *Journal of Rural Studies* 44: 111–122.
- Davoudi, S., K. Shaw, L.J. Haider, A.E. Quinlan, G.D. Peterson, C. Wilkinson, H. Fünfgeld, D. McEvoy, L. Porter & S. Davoudi 2012. Resilience: A Bridging Concept or a Dead End? “Reframing” Resilience: Challenges for Planning Theory and Practice Interacting Traps: Resilience Assessment of a Pasture Management System in Northern Afghanistan Urban Resilience: What Does it Mean in Planning Practice? Resilience as a Useful Concept for Climate Change Adaptation? The Politics of Resilience for Planning: A Cautionary Note. *Planning Theory and Practice* 13: 299–333.
- Dudley, N. 2008. *Guidelines for applying protected area management categories*. IUCN.
- Einhorn, B., N. Eckert, C. Chaix, L. Ravel, P. Deline, M. Gardent, V. Boudières, D. Richard, J.-M. Vengeon, G. Giraud & P. Schoeneich 2015. Climate change and natural hazards in the Alps. *Revue de géographie alpine*. doi: 10.4000/rga.2878
- Fixsen, D.L., S.F. Naoom, K.A. Blase, R.M. Friedman & F. Wallace 2005. *Implementation Research: A Synthesis of the Literature*. FL: University of South Florida, Louis de la Parte Florida Mental Health Institute, The National Implementation Research Network.
- Gardner, J.S. & J. Dekens 2007. Mountain hazards and the resilience of social-ecological systems: lessons learned in India and Canada. *Natural Hazards* 41: 317–336.
- Gruber, C. 2019. *Landschaft im oberen Ötztal: Wandel - Wahrnehmung - Wertschätzung*. Innsbruck.
- Haines-Young, R. & M. Potschin 2010. The links between biodiversity, ecosystem services and human well-being. In: Frid, C.L.J. & D.G. Raffaelli (eds.), *Ecosystem Ecology: A New Synthesis*. Cambridge.
- Herrera, H. 2017. Resilience for Whom? The Problem Structuring Process of the Resilience Analysis. *Sustainability* 9.
- Hock, R., G. Rasul, C. Adler, S. Cáceres, S. Gruber, et al. 2019. High Mountain Areas. In: Pörtner, H.-O., D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama & N.M. Weyer (eds.), *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*.
- Holling, C.S. 1996. Engineering Resilience versus Ecological Resilience. In: Schulze, P. (ed.), *Engineering Within Ecological Constraints*. Washington, DC.
- Hosseini, S., K. Barker & J. E. Ramirez-Marquez 2016. A review of definitions and measures of system resilience. *Reliability Engineering and System Safety* 145: 47–61.

- Huber, L., U. Schirpke, T. Marsoner, E. Tasser & G. Leitinger 2020. Does socioeconomic diversification enhance multifunctionality of mountain landscapes? *Ecosystem Services* 44: 101122.
- Hurlimann, A., S. Dolnicar & P. Meyer 2009. Understanding behaviour to inform water supply management in developed nations - a review of literature, conceptual model and research agenda. *Journal of Environmental Management* 91: 47–56.
- Hutter, G. & D.F. Lorenz 2018. Social Resilience. In: Fuchs, S. & T. Thaler (eds.), *Vulnerability and Resilience to Natural Hazards*: 190–213 Cambridge.
- ICIMOD 2011. *Glacial lakes and glacial lake outburst-floods in Nepal*. Kathmandu, Nepal.
- Ingrisch, J. & M. Bahn 2018. Towards a Comparable Quantification of Resilience. *Trends in Ecology and Evolution* 33: 251–259.
- IUCN & UNEP-WCMC 2019. *The World Database on Protected Areas (WDPA)*. UNEP World Conservation Monitoring Centre, Cambridge.
- Janssen, M.A., J.M. Anderies & E. Ostrom 2007. Robustness of Social-Ecological Systems to Spatial and Temporal Variability. *Society and Natural Resources* 20: 307–322.
- Kargel, J.S., G.J. Leonard, D.H. Shugar, U.K. Haritashya, A. Bevington, et al. 2016. Geomorphic and geologic controls of geohazards induced by Nepal's 2015 Gorkha earthquake. *Science* 351. doi: 10.1126/science.aac8353
- Kohler, M., C. Devaux, K. Grigulis, G. Leitinger, S. Lavorel & U. Tappeiner 2017. Plant functional assemblages as indicators of the resilience of grassland ecosystem service provision. *Ecological Indicators* 73: 118–127.
- Kruse, S., T. Abeling, H. Deeming, M. Fordham, J. Forrester, S. Jülich, A.N. Karanci, C. Kuhlicke, M. Pelling, L. Pedoth & S. Schneiderbauer 2017. Conceptualizing community resilience to natural hazards – the emBRACE framework. *Natural Hazards and Earth Systems* 17: 2321–2333.
- Lockwood, M. 2010. Good governance for terrestrial protected areas: A framework, principles and performance outcomes. *Journal of environmental management* 91: 754–766.
- MacKinnon, D. & K.D. Derickson 2012. From resilience to resourcefulness. *Progress in Human Geography* 37: 253–270.
- Manuelli, S., T. Hofer & A. Vita 2014. FAO's Work on Sustainable Mountain Development and Watershed Management. *Mountain Research and Development Journal* 34: 66–70.
- Meadows, D. 1986. *Fishbanks*. Software.
- Nettier, B., L. Dobremez, S. Lavorel & G. Brunschwig 2017. Resilience as a framework for analyzing the adaptation of mountain summer pasture systems to climate change. *Ecology and Society* 22.
- Norris, F.H., S.P. Stevens, B. Pfefferbaum, K.F. Wyche & R.L. Pfefferbaum 2008. Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness. *American journal of community psychology* 41: 127–150.
- Pain, A. & S. Levine 2012. *A conceptual analysis of livelihoods and resilience: addressing the 'insecurity of agency'*. HPG Working Paper. Overseas Development Institute (ODI).
- Pepin, N., R.S. Bradley, H.F. Diaz, M. Baraer, E.B. Caceres, N. Forsythe, H. Fowler, G. Greenwood, M.Z. Hashmi, X.D. Liu, J.R. Miller, L. Ning, A. Ohmura, E. Palazzi, I. Rangwala, W. Schöner, I. Severskiy, M. Shagedanova, M.B. Wang, S.N. Williamson & D.Q. Yang 2015. Elevation-dependent warming in mountain regions of the world. *Nature Climate Change* 5: 424–430.
- Petley, D.N., G.J. Hearn, A. Hart, N.J. Rosser, S.A. Dunning, K. Owen & W.A. Mitchell 2007. Trends in landslide occurrence in Nepal. *Natural Hazards* 43: 23–44.
- Posch, E., K.-M. Höferl, R. Steiger & R. Bell 2020. Another take on reframing resilience as agency: The Agency Towards Resilience (ATR) model. In: Santos, P.P., J. v. Meding, K. Chmutina & E. Raju (eds.), *Understanding Disaster Risk*.
- Posch, E., K.-M. Höferl, R. Steiger, R. Bell & L. Gurung 2019. Ke garne? How values and worldviews influence resilience to natural hazards: A case study from Mustang, Nepal. *Mountain Research and Development Journal* 39.
- Price, M.F., L.F. Jansky & A.A. Iatsenia 2004. Key issues for mountain areas. Tokyo - New York - Paris.
- Quinlan, A.E., M. Berbés-Blázquez, L.J. Haider, G.D. Peterson & C. Allen 2016. Measuring and assessing resilience: broadening understanding through multiple disciplinary perspectives. *Journal of Applied Ecology* 53: 677–687.
- Resilience Alliance 2007. *Assessing and managing resilience in social-ecological systems: A practitioners workbook*. Version 1.0.
- Resnick, M. & U. Wilensky 1998. Diving Into Complexity: Developing Probabilistic Decentralized Thinking Through Role-Playing Activities. *Journal of Science Learning* 7: 153–172.
- Rodríguez-Rodríguez, D., B. Bomhard, S.H.M. Butchart & M. Foster 2011. Progress towards international targets for protected area coverage in mountains: A multi-scale assessment. *Biological Conservation* 144: 2978–2983.
- Rogers, R.W. 1975. A Protection Motivation Theory of Fear Appeals and Attitude Change. *Journal of psychology* 91: 93–114.
- Sarkki, S., H.I. Heikkinen & T.P. Karjalainen 2013. Sensitivity in transdisciplinary projects: A case of reindeer management in Finland. *Land Use Policy* 34: 183–192.
- Sati, V.P. 2014. *Towards Sustainable Livelihoods and Ecosystems in Mountain Regions*. Cham, Heidelberg, New York, Dordrecht, London.
- Schirpke, U., A. Altzinger, G. Leitinger & E. Tasser 2019. Change from agricultural to touristic use: Effects

on the aesthetic value of landscapes over the last 150 years. *Landscape and Urban Planning* 187: 23–35.

Schulz, M. 2012. Quick and easy!? Fokusgruppen in der angewandten Sozialwissenschaft. In: Schulz, M., B. Mack & O. Renn (eds.), *Fokusgruppen in der empirischen Sozialwissenschaft: Von der Konzeption bis zur Auswertung*. Wiesbaden.

Scoones, I. 1998. *Sustainable Rural Livelihoods: A Framework for Analysis*.

Speranza, C.I., U. Wiesmann & S. Rist 2014. An indicator framework for assessing livelihood resilience in the context of social-ecological dynamics. *Global Environmental Change* 28: 109–119.

Stern, P.C. 1999. A Value-Belief-Norm Theory of Support for Social Movements: The Case of Environmentalism. *Human Ecology Review* 6: 81–97.

Stewart, D.W. & P.N. Shamdasani 1991. *Focus groups: theory and practice*. 3. print edition. Newbury Park, Calif.

Tasser, E., U. Schirpke, B.M. Zoderer & U. Tappeiner 2020. Towards an integrative assessment of land-use type values from the perspective of ecosystem services. *Ecosystem Services* 42. doi: 10.1016/j.ecoser.2020.101082.

United Nations ESCAP 2015. *Disasters in Asia and the Pacific: 2015. Year in Review*.

Voinov, A. & F. Bousquet 2010. Modelling with stakeholders. *Environ. Modell. Softw.* 25:1268–1281.

Walker, B., C.S. Holling, S.R. Carpenter & A.P. Kinzig 2004. Resilience, Adaptability and Transformability in Social-ecological Systems. *Ecology and Society* 9.

Walker, B.H. & D. Salt 2006. *Resilience thinking: sustaining ecosystems and people in a changing world*. Washington, DC [u.a.].

Wilson, G.A., M. Schermer & R. Stotten 2018. The resilience and vulnerability of remote mountain communities: The case of Vent, Austrian Alps. *Land Use Policy* 71: 372–383.

Wymann von Dach, S., C. Brache, M. Peralvo, K. Perez & C. Adler 2018. *Leaving no one in mountains behind: Localizing the SDGs for resilience of mountain people and ecosystems*. Centre for Development and Environment and Mountain Research Initiative, Bern, Switzerland.

Zoderer, B.M., E. Tasser, S. Carver & U. Tappeiner 2019. Stakeholder perspectives on ecosystem service supply and ecosystem service demand bundles. *Ecosystem Services* 37. doi: 10.1016/j.ecoser.2019.100938

Authors

Lisa Huber¹

is a project collaborator and PhD candidate at the Department of Ecology, University of Innsbruck. Her research focus lies on the analyses of social-ecological systems and the modelling and mapping of ecosystem services in the European Alps. E-mail: Lisa.Huber@uibk.ac.at

Eva Posch²

is a project collaborator and PhD candidate at the Department of Geography, University of Innsbruck.

Her research interests are the interfaces of disaster risk management, social resilience, and tourism development in mountain regions. E-mail: Eva.Posch@uibk.ac.at

Rainer Bell³

is Postdoc researcher at the Department of Geography, University of Bonn. His research focuses on geomorphology, and integrative natural hazard and risk analysis and management in mountain regions.

Karl-Michael Höferl²

is a Senior Lecturer at the Department of Geography, University of Innsbruck. His research focuses on resilient and responsible development.

Robert Steiger⁴

is Assistant Professor at the Department of Public Finance, University of Innsbruck. His research interests are in the field of sustainable tourism development, man–environment relationships, and climate-change impacts on tourism and tourist behaviour.

Rike Stotten⁵

is Assistant Professor at the Department of Sociology, University of Innsbruck. Her research interests are in the fields of agri-food studies and rural sociology in mountain areas.

Erich Tasser⁶

is Senior scientist at the Institute for Alpine Environment, Eurac Research. His research encompasses landscape ecology, geostatistical analysis and links with socio-economic science, with a particular focus on the effects of land-use changes on biodiversity and ecosystem services.

Georg Leitinger¹

is Associate Professor at the Department of Ecology, University of Innsbruck. His research integrates ecosystem and landscape ecology, with a special emphasis on social-ecological systems, to analyse ecosystem functions and services across spatial and temporal scales.

¹ Department of Ecology, University of Innsbruck, Austria

² Department of Geography, University of Innsbruck, Austria

³ Department of Geography, University of Bonn, Germany

⁴ Department of Public Finance, University of Innsbruck, Austria

⁵ Department of Sociology, University of Innsbruck, Austria

⁶ Institute for Alpine Environment, Eurac research, Bozen, Italy

Motives for visiting the national parks of Serbia

Živana Krejić¹ & Snežana Milićević²

Keywords: *visitor motives, sociodemographic characteristics, national parks, Serbia, sustainable development*

Abstract

This paper explores motives for visiting national parks in Serbia. The results were obtained from the responses of 840 visitors who were surveyed while they were staying in Serbia's national parks during June 2020. The aim of the paper is to examine whether the motives for visiting the parks correlate with visitors' sociodemographic characteristics: gender, age, educational level and employment status. The results showed that there are statistically significant differences in motives to visit national parks in relation to gender, while among other sociodemographic characteristics such as employment status, education and age, the correlation is negligible. The scientific contribution of the paper lies in the possibility of applying the research results elsewhere, to help understand visitors' motives, as well as create attractive tourist offers in national parks based on sustainable development.

Introduction

National Parks (NP) and natural areas are powerful attractions for visitors, are major foreign currency earners, and constitute an important part of the tourist industry (Kruger & Saayman 2009). Traditionally located in remote areas, NPs can present unique visitor attractions (Mayer et al. 2010; Amuquandoh 2017) and offer activities such as photography, observing plant and animal species and landscapes, sports and other recreational activities (hiking, biking, mountain climbing, rafting, fishing, etc.), and exploring cultural heritage. The approaches by individual countries differ from each other and their application in practice usually depends on the level of economic development of the country (Eagles 2009). Thus, NPs play crucial roles in the conservation of vulnerable natural ecosystems, but at the same time they may serve as tourist destinations and attract large numbers of people (Hibner et al. 2018).

There are five NPs in Serbia. Four of them are in mountainous areas: Šara Mountain NP, Fruška Gora NP, Kopaonik NP, Tara NP; the fifth is Đerdap Gorge NP. Đerdap NP is located in the north-eastern part of the Republic of Serbia and covers part of the Đerdap Gorge (Iron Gate) in the midstream of the river Danube (63786.48 ha). Fruška Gora NP is located in the north of Serbia in the Autonomous Province of Vojvodina (26672 ha), while Kopaonik NP is in the southern part of the country and covers the most valuable natural resources and highest parts of Kopaonik mountain (11969.04 ha). Tara NP is located in the far west of Serbia (24991.82 ha); the Šara Mountain NP is in the far south, in the Autonomous Province of Ko-

sovo and Metohija (22805.43 ha) (Institute for Nature Conservation of Serbia 2020), see Figure 1.

The subject of this paper is the motives for visiting NPs in Serbia. A visitor survey was conducted during June 2020 in all five NPs. The aim of the paper is to examine whether motives for visiting NPs correlate with visitors' sociodemographic characteristics.

Literature review

The IUCN (2019) defines a NP as a large natural or near natural area that protects large-scale ecological processes, that has characteristic species and ecosystems, and which also has environmentally and culturally compatible spiritual, scientific, educational, recreational and visitor opportunities. NPs provide local communities with socio-economic benefits such as regulated and sustainable use of grazing, hunting and fishing, and other recreational and tourist opportunities (Al-Tokhais & Thapa 2019). Important environmental factors attracting visitors to NPs are outdoor recreation opportunities, landscape and scenery, natural resources such as wildlife, and unspoiled nature (Haukeland et al. 2010). When people visit NPs, this impacts the various forms of economic activity of the local populations (Tomićević et al. 2011). Due to the growth in popularity of nature-based tourism, NPs have become increasingly attractive tourist destinations (Esfandiar et al. 2019). Nature-based tourism refers to all forms of tourism where natural environments form the primary attraction (Taczanowska et al. 2019; Coghlan & Buckley 2012; Lundmark & Muller 2010). In other words, fundamental to nature-based tourism are natural resources (e.g. mountains, lakes, rivers, forests and beaches) that are attractive enough to trigger travel (Lundberg & Fredman 2012).

Activities that do not endanger the authenticity of nature are permitted in NPs, as are activities that relate to education, health, recreation and tourist needs, and the continuation of local traditional ways of life, in a

¹ Union University-Nikola Tesla, Faculty of Business Studies and Law, Belgrade, Serbia

² University of Kragujevac, Faculty of Hotel Management and Tourism in Vrnjačka Banja, Vrnjačka Banja, Serbia.

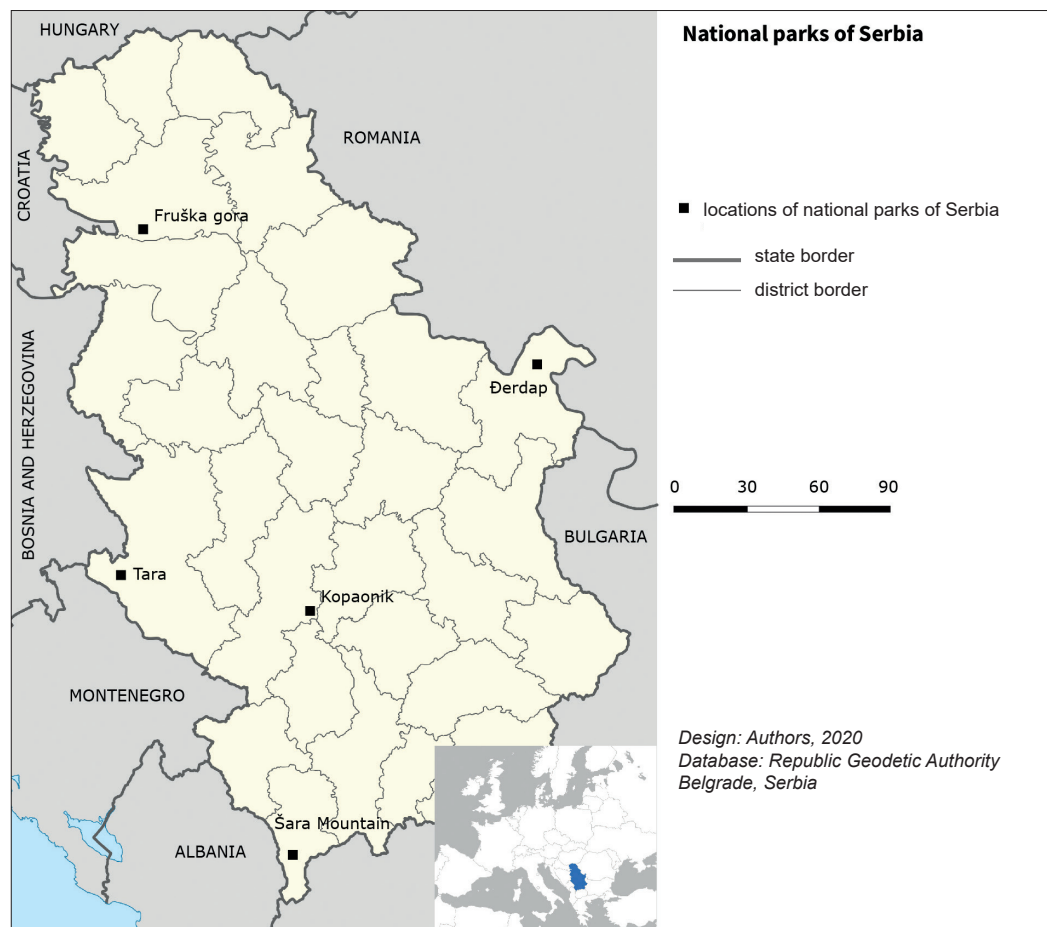


Figure 1 – National Parks in Serbia.

manner that does not endanger the survival of species, natural ecosystems and landscapes (Institute for Nature Conservation of Serbia 2020). Azara et al. (2018) point out how deeply human health and wellbeing are connected to the benefits, both tangible (e.g. recreation) and intangible (e.g. sounds), which NPs provide for the visitor experience.

The reasons for visiting a certain NP can be as diverse as the visitors themselves. They include individual factors (e.g. personality, preferences, attitudes, way of life, sociodemographic characteristics), environmental or managerial factors (e.g. facilities, restrictions), and social factors (e.g. level of crowding, solitude, types of activities, accommodation) (Selvaag et al. 2020). Visitors to NPs are characterized by different motives, needs and expectations with regard to specific types of experience (Leask 2016). Insights into motives are central to developing tourism offers and the provision of satisfactory visitor experiences. Relaxation and the need to escape to a peaceful natural environment have been cited by nature-based tourists as one of the most important motives (Holden & Sparrowhawk 2002). Kamri and Radam (2013) concluded that the primary motives for visiting Bako NP in Malaysia were to go on an excursion, social trip, nature tour or daytrip to escape the city. Basic motives for visiting NPs in Iran are to relax in nature, spend

time with family and friends, seek adventure, escape routine and the urban environment, see wildlife, have a picnic, connect with nature, and improve quality of life in general (Reihanian et al., 2015). Gundersen et al. (2019) concluded that the main motive of visitors to Norwegian NPs during the summer season is hiking along marked tracks. Basic motives for visiting NPs in Zimbabwe are recreation and knowledge-seeking, appreciating wildlife and feeling close to nature (Mutanga et al., 2017). Wildlife watching (primarily bison, bears and olves), as well as organized hiking, orienteering, horse riding and mountain biking, are among the major motives to visit NPs in the US (Cherry 2018; Newsome & Hughes 2018).

Numerous authors have analysed relationships between visitors' sociodemographic characteristics (such as gender, age, place of residence, educational level, employment status and income) and motivation (Kim et al. 2008; Chen et al. 2014; Newton et al. 2018; Milohnić et al. 2019; Moniz et al. 2020; Silva et al. 2020; Milićević et al. 2020). Motives such as relaxation, escape, nature or recreation have frequently emerged in different studies, although the most influential factor may vary according to the visitors' sociodemographic characteristics (Magadan-Díaz & Rivas-García 2019). For example, Gundersen et al. (2015) state that hiking in Norwegian NPs attracts more visitors from higher

socio-economic classes. Some authors state that gender differences in leisure behaviour may be related to the socio-cultural norms and values of people's home environment and social structure (Meng & Uysal 2008). According to Ma et al. (2018), age has a positive influence on an individual's desire for relaxation and exploring nature in protected areas. Their study indicated that in southern China older Chinese visitors usually prefer exploring and appreciating nature in the region's protected areas. Further, they found that educational level is negatively correlated with how visitors feel they might be viewed by family and friends occupying higher social positions. The study by Tepavčević et al. (2019) on London residents found that younger people are less motivated to visit NPs in England than others – i.e. they are less motivated by enjoying the views, observation of plants and animals, visitor centres, and escape from the city. Visitors who left education after secondary school or college are more motivated by enjoyment of the scenery than are those with PhDs. Indeed, people with higher degrees are less motivated than any other group by enjoyment of the scenery. In terms of employment status, it has been found that there is a significant difference between the motives of visitors who are in employment and all others. The results of the study conducted at Kakum NP in Ghana show that eco-attractions and eco-based activities are becoming increasingly important motives for younger visitors. The results further revealed that search for adventure and acquisition of knowledge about the park and the environment are the main motives for female visitors (Adam et al. 2019). Saayman and Dieske (2015) state that females are more motivated than males to visit the Kgalagadi Transfrontier Park in South Africa for exploration. Further, only moderate statistically significant differences were found between the motivational factors and educational level of respondents. Respondents with a first or higher degree attribute less importance to *park attributes* and *exploration* than people with lower educational levels. Mutanga et al. (2017) investigated tourist motivation at two NPs in Zimbabwe (Gonarezhou and Matusadona). No significant differences in motivation were found between groups of different genders, educational level, income or nationality. Only age was found to correlate positively with two motives: recreation and knowledge-seeking, and appreciating wildlife. Cheung and Jim (2013) in their study of nature-based tourism in Hong Kong indicated that elderly visitors, as well as visitors with a university degree and higher income levels, tended to have higher expectations regarding the quality of nature-based tourism services and facilities.

Research methodology

The subject of our study is the motives of visitors to the NPs of Serbia in June 2020, with the aim of determining whether their motives correlated with

their sociodemographic characteristics. Surveys were conducted in all the NPs in Serbia: Šara Mountain NP (N=159), Fruška Gora NP (N=174), Kopaonik NP (N=172), Tara NP (N=170), and Đerdap NP (N=165) (total 840). The surveys were conducted in one of two ways: the authors visited Šara Mountain and Đerdap Gorge and personally conducted a survey of visitors in the field; for the other three NPs, the questionnaire was forwarded to larger hotels located within the parks, whose guests completed it. The Omorika Hotel in Tara, the Grand Hotel in Kopaonik and the Fruške terme Hotel in Fruška Gora were chosen.

The questionnaire was identical for all the parks and had two parts. The first related to visitors' sociodemographic characteristics: gender, age, educational level and employment status. The second part consisted of 13 closed questions, covering the basic motives for visiting NPs. Respondents rated the motives using a 5-point Likert scale (1 = completely disagree, 5 = completely agree). The motives were chosen by consulting earlier studies (Hibner et al. 2018; Amuquandoh 2017; Gundersen et al. 2015; Kamri & Radam 2013).

Based on the research objective, the following hypotheses were formulated:

H₁: There are statistically significant differences in motives for visiting NPs in relation to visitors' age;

H₂: There are statistically significant differences in motives for visiting NPs in relation to visitors' educational level;

H₃: There are statistically significant differences in motives for visiting NPs in relation to visitors' employment status;

H₄: There are statistically significant differences in motives for visiting NPs in relation to visitors' gender.

Non-parametric techniques that are suitable for ordinal sizes were used in the data processing and analysis process: Spearman's rank correlation coefficient (Spearman's ρ) and the Kruskal-Wallis test were used with the aim of measuring correlations, and determining the strength and direction of the linear relationship between the variables – that is, between motives for visiting NPs and selected sociodemographic characteristics of the visitors.

Results and discussion

The survey included 840 visitors, of whom 50% were women and 50% were men. The largest age group was the 31–40-year-olds (41.3%). The majority had a Bachelor's degree (54.6%); 62.7% were employed and 37.3% were unemployed (Table 1).

The correlation describes the strength and direction of a linear relationship between two variables. Spearman's rank correlation coefficient r_s was calculated using SPSS Statistics v21. This coefficient is appropriate for ordinal or rankable sizes. The correlation value can be between 0 and 1. Pallant (2013) provides the following guidelines for correlation magnitude:

Table 1 – Visitors' sociodemographic characteristics.

		Frequency	(%)
Gender	Male	420	50.0
	Female	420	50.0
Age	<20	22	2.6
	21–30	227	27.0
	31–40	347	41.3
	41–50	109	13.0
	51–60	64	7.6
	61–70	71	8.5
Education	High school graduate	142	16.9
	Bachelor's degree	459	54.6
	Master's degree	201	23.9
	Doctorate	38	4.6
Employment status	Employed	527	62.7
	Unemployed	313	37.3

low correlation for $0.10 < r_0 < 0.29$; mean correlation for $0.30 < r_0 < 0.49$ high correlation for $0.50 < r_0 < 1$. These guidelines apply whether or not there is a negative sign in front of the coefficient r_0 . A negative sign indicates its direction, not its strength.

Table 2 presents the results of the Spearman correlation, showing the relationship between visitors' age (y_1) and their level of education (y_2) on the one hand, and their motives for visiting NPs on the other. Motives are grouped into the following categories (a_1 – a_{13}):

- (a_1) *New experiences and meeting people with similar interests;*
- (a_2) *Active holiday (hiking, biking, mountain climbing, etc.);*
- (a_3) *Outdoor activities for the whole family (sport, recreation, adventure parks, etc.);*
- (a_4) *Getting to know the local way of life (culture, traditions, gastronomy, etc.);*
- (a_5) *Camping & picnicking;*
- (a_6) *Wildlife watching, birdwatching & butterfly watching;*
- (a_7) *Enjoying viewpoints and landscapes;*
- (a_8) *Study and observation of protected plant species;*
- (a_9) *Foraging for medicinal herbs, forest fruits or mushrooms;*
- (a_{10}) *Environmental events and workshops;*
- (a_{11}) *Educational eco-tours of the specific features of NPs, accompanied by expert guides;*
- (a_{12}) *Cultural and historical heritage;*
- (a_{13}) *Passive holiday in preserved nature.*

The correlation between age of visitors (y_1) and most of the variables observed is weak. More precisely, there is only a slight influence (i.e. correlation) between visitor age on the one hand, and the variables

(a_1)–(a_5) (statistically significant level: $p > 0.05$). The results of the bivariate correlation test show the same for (a_8), (a_{11}) and (a_{12}). A weak correlation, $p < 0.05$, exists with respect to variables (a_6), (a_7), (a_9), (a_{10}) and (a_{13}). The only exception is (a_7), which shows that the most significant motive for older people (aged 61 to 70) to visit NPs is *Enjoying viewpoints and landscapes*. The relationship between visitors' educational level (y_2) and all observed variables (a_1)–(a_{13}) is also weak, and there are no statistically significant differences except for the variable (a_{13}), *Passive holiday in preserved nature*, ($p < 0.05$). The value of the Spearman coefficient is only slightly more pronounced – i.e. $r_0 > 0.10$. There is little correlation between visitors' level of education and variables (a_5) and (a_7). The level of significance for educational level in relation to variable (a_{11}) is less than 0.05, indicating that *educational eco-tours of the specific nature of the NPs, accompanied by expert guides* is the most important motive for those with a Master's or doctorate to visit the NPs. The negative sign in front of the coefficient value (a_{13}) explains that these visitors had higher expectations of educational trips generally.

For the purpose of clarifying the statistical back layer, for each field the strongest correlation in (y_1)–(a_{13}) was identified, i.e. the correlation between visitor age and the variable (a_{13}) *Passive holiday in preserved nature*. The values of the Spearman's correlation coefficients are shown in Table 3; in this case, $r_0 = -0.249$. The negative sign indicates that there is a correlation between visitor age and the variable (a_2) *Active holiday (hiking, biking, mountain climbing, etc.)*, and that this is the most significant motive for visitors up to 30 years of age. However, of the total number of respondents, age is correlated with the variable (a_{13}) in only 6% of cases. This percentage is obtained by squaring the Spearman's coefficient.

It is concluded that there are no statistically significant differences in motives for visiting NPs in relation to age. In this study, results show that visitors aged over 61 are not motivated by active holidays, while visitors aged 30 to 60 have little interest in passive holidays. Therefore, hypothesis H_1 is rejected. Further, hypothesis H_2 is rejected because the results of the research show that there are no statistically significant differences and that the correlations between visitors' educational level and all 13 variables (i.e. motives for visiting NPs) are very weak.

Hypothesis H_3 requires examining whether there are statistically significant differences in motives for visiting NPs in relation to employment status. The

Table 2 – Results of Spearman's Correlations for visitors' motives by Correlation Coefficient and Sig. (2-tailed): visitors' age (y_1) and educational level (y_2)

r_0 (p)	a_1	a_2	a_3	a_4	a_5	a_6	a_7	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}
y_1	-.050 (.472)	-.029 (.680)	-.038 (.589)	-.011 (.870)	.042 (.546)	-.220 (.001)	-.129 (.062)	-.051 (.465)	-.150 (.030)	-.161 (.020)	-.080 (.247)	-.099 (.152)	-.249 (.000)
y_2	.013 (.850)	.130 (.059)	.039 (.574)	.053 (.448)	.115 (.098)	.094 (.176)	.115 (.097)	.130 (.060)	.017 (.806)	.027 (.699)	-.144 (.037)	-.071 (.305)	.010 (.881)

Table 3 – Spearman's Correlation (zero-order correlation) between (y_1) and (a_{13}). **Correlation is significant at the 0.01 level (2-tailed).

Spearman's Correlation	y_1		y_1	a_{13}
		Correlation Coefficient	1.000	-.249**
		Sig. (2-tailed)		.000
	a_{13}	Correlation Coefficient	-.249**	1.000
		Sig. (2-tailed)	.000	

Table 4 – Motives for visiting national parks in relation to employment status.

Motives	a_1	a_2	a_3	a_4	a_5	a_6	a_7
Chi-Square	7.099	.410	.349	.031	1.426	.421	4.793
df	1	1	1	1	1	1	1
Asymp. Sig.	.008	.522	.555	.860	.232	.516	.029

Motives	a_8	a_9	a_{10}	a_{11}	a_{12}	a_{13}
Chi-Square	.003	.030	4.143	13.128	.053	3.258
df	1	1	1	1	1	1
Asymp. Sig.	.955	.862	.042	.000	.819	.071

most important motives of visitors who are in work are: (a_4) *Getting to know the local way of life (culture, traditions, gastronomy, etc.)*; (a_2) *Camping & picnicking*; (a_9) *Foraging for medicinal herbs, forest fruits or mushrooms*. Unemployed visitors stated the following motives: (a_1) *New experiences and meeting people of similar interests*; (a_2) *Active holiday (hiking, biking, mountain climbing, etc.)*; (a_3) *Outdoor activities for the whole family (sport, recreation, adventure parks, etc.)*.

The Kruskal-Wallis test of all variables from (a_1) to (a_{13}) in relation to employment status showed significance levels greater than 0.005 for all. It also showed that there were no statistically significant differences among motives for visiting NPs in relation to visitors' employment status. Therefore, hypothesis H_3 is rejected.

This study finds that visitors' age, educational level and employment status and their motives for visiting the NPs are negatively correlated. These results overlap with the results of some earlier studies. For instance, Mutanga et al. (2017), who conducted research in two NPs in Zimbabwe, found no significant differences in tourists' motives for visiting NPs in relation to educational level; they did, however, find that age correlated positively with some motives (recreation and knowledge-seeking, and appreciating wildlife). The findings of other researchers also indicate a correlation between age and motives for visiting protected areas: Ma et al. (2018) showed that older visitors are more motivated to visit protected areas, while Tepavčević et al. (2019) found that younger visitors are less motivated than others to visit NPs.

Hypothesis H_4 tests whether there are statistically significant differences in motives for visiting NPs relative to gender (Table 5). The results show that the most important motives for male visitors are: (a_1) *New experiences and meeting people of similar interests*;

Table 5 – Motives for visiting national parks in relation to gender (1- men; 2- women). N total = 840; N men = 420; N women = 420

Motives	Gender	Mean Rank
a_1	1	420.73
	2	415.08
a_2	1	417.58
	2	403.94
a_3	1	415.60
	2	319.93
a_4	1	428.74
	2	423.07
a_5	1	402.76
	2	418.55
a_6	1	420.01
	2	418.12
a_7	1	419.48
	2	409.77
a_8	1	420.02
	2	420.33
a_9	1	414.77
	2	416.05
a_{10}	1	414.38
	2	408.84
a_{11}	1	419.98
	2	406.14
a_{12}	1	416.52
	2	414.73
a_{13}	1	413.28
	2	399.67

(a_2) *Active holiday (hiking, biking, mountain climbing, etc.)*; (a_3) *Outdoor activities for the whole family (sport, recreation, adventure parks, etc.)*; (a_4) *Getting to know the local way of life (culture, traditions, gastronomy, etc.)*; (a_{10}) *Environmental events and workshops*; (a_{12}) *Cultural-historical heritage*, and (a_{13}) *Passive holiday in preserved nature*. On the other hand, female visitors gave the following motives: (a_2) *Camping & picnicking* and (a_9) *Foraging for medicinal herbs, forest fruits or mushrooms*. The Kruskal-Wallis test shows that there are statistically significant differences in motives for visiting NPs in relation to gender. Therefore, hypothesis H_4 is accepted. This finding is consistent with earlier observations made by Adam et al. (2019) and by Saayman and Dieske (2015), who also pointed out statistically significant differences in motives for visiting NPs in Africa in relation to their gender – namely that females are more motivated than males to visit the NPs. However, these results contrast with those of Mutanga et al. (2017), who found no statistically significant differences in motives for visiting NPs in Zimbabwe in relation to gender.

The focus of this study is not on the NPs of Serbia *individually*. However, it is worth noting that there are differences in visitors' motives, conditioned by numerous factors specific to individual NPs – primarily altitude, terrain configuration, richness of flora and fauna, cultural and historical heritage, quality of infrastructure and tourism superstructure. The main motives for visiting Šara Mountain NP are *Active holiday*

(*biking, biking, mountain climbing, etc.*) and *Wildlife watching, birdwatching & butterfly watching*, whereas for Fruška Gora NP they are *Enjoying viewpoints and landscapes* and *Getting to know the local way of life (culture, traditions, gastronomy, etc.)*. Visitors to Kopaonik NP are motivated by *Active holiday (biking, biking, mountain climbing, etc.)*, *New experiences and meeting people of similar interests* and *Foraging for medicinal herbs, forest fruits or mushrooms*. Tara NP is most visited for *Outdoor activities for the whole family (sport, recreation, adventure parks)*, *Wildlife watching, birdwatching & butterfly watching* and *Camping & picnicking*, while Đerdap NP attracts those motivated by *Passive holiday in preserved nature* and *Environmental events and workshops*.

Conclusion

NPs are protected areas of exceptional natural and cultural value, for which individuals, in addition to the state, should feel responsible. A preserved environment, diverse landscapes, endemic species, and a range of activities that can be practised there make NPs very attractive for visits.

In this study, conducted in the NPs of Serbia, the correlations between visitors' motives and their sociodemographic characteristics were examined. The most significant sociodemographic characteristics (gender, age, educational level and employment status) were identified using Spearman's Correlation and the Kruskal-Wallis test. Visitors aged over 61 identify the main motive for their visit to NPs as *Enjoying viewpoints and landscape*. However, there is no statistically significant correlation between visitor age and the other variables examined (H_1). There is also no statistically significant correlation between educational level and motives for visiting NPs in Serbia (H_2), or between employment status and motives (H_3). In contrast, there is a statistically significant correlation between motives for visiting NPs and gender, i.e. there are differences in the way men and women spend their time in NPs. Therefore, hypothesis H4 is confirmed.

The results of the research have scientific and practical values. There being no similar research on this topic in Serbia, the study makes a contribution to scientific research by integrating results from all NPs in Serbia concerning the motivation for visiting the parks. The practical contribution lies in the possibility of the results being used by others: managers of other NPs, tourism service providers, travel agencies, guides, public institutions that implement tourism development plans, as well as creators of tourism development strategies in protected areas.

On the other hand, the main limitations of the research relate to the period in which the survey was conducted. Future research on the motivations to visit Serbia's NPs should be conducted throughout the year, in order to gain a better insight into factors that depend on the season (i.e. tourist season / off-season; summer / winter), and activities that can be practised,

which may be the main motive of the visit. Further, the questionnaire can be expanded to cover satisfaction with the tourist offers available, and respect for the principles of sustainable development and environmental protection.

References

- Adam, I., C.A. Adongo & F.E. Amuquandoh 2019. A structural decomposition analysis of eco-visitors' motivations, satisfaction and post-purchase behavior. *Journal of Ecotourism* 18(1): 60–81.
- AL-Tokhais, A. & B. Thapa 2019. Stakeholder Perspectives Towards National Parks and Protected Areas in Saudi Arabia. *Sustainability* 11(8): 2323.
- Amuquandoh, F.E. 2017. Tourists' motivations for visiting Kakum National Park, Ghana. *Ghana Journal of Geography* 9(1): 152–168.
- Azara, I., E. Michopoulou, F. Niccolini, B.D. Taff & A. Clarke 2018. *Tourism, Health, Wellbeing and Protected Areas* CABI.
- Chen, G., J. Bao & S.S. Huang 2014. Segmenting Chinese Backpackers by Travel Motivations. *International Journal of Tourism Research* 16(4): 355–367.
- Cherry, C., K.M. Leong, R. Wallen & D. Buttke 2018. Risk-enhancing behaviors associated with human injuries from bison encounters at Yellowstone National Park, 2000–2015. *One Health* 6: 1–6.
- Cheung, L.T.O. & C.Y. Jim 2013. Ecotourism service preference and management in Hong Kong. *International Journal of Sustainable Development & World Ecology* 20(2): 182–194.
- Coghlan, A. & R.C. Buckley 2012. *Nature-Based Tourism*. In: Holden A. & D. Fennell (eds), *A Handbook of Tourism and the Environment*: 334–344. London.
- Eagles, P.F.J. 2009. Governance of recreation and tourism partnerships in parks and protected areas. *Journal of Sustainable Tourism* 17(2): 231–248.
- Esfandiar, K., M. Sharifi-Tehrani, S. Pratt & L. Altinay 2019. Understanding entrepreneurial intentions: A developed integrated structural model approach. *Journal of Business Research* 94: 172–182.
- Gundersen, V., M. Mehmetoglu, O.I. Vistad & O. Andersen 2015. Linking visitor motivation with attitude towards management restrictions on use in a National Park. *Journal of Outdoor Recreation and Tourism* 9: 77–86.
- Gundersen, V., O.I. Vistad, M. Panzacchi, O. Strand & B. van Moorter 2019. Large-scale segregation of tourists and wild reindeer in three Norwegian National Parks: Management implications. *Tourism Management* 75: 22–33.
- Haukeland, J.V., B. Grue & K. Veisten 2010. Turning National Parks into Tourist Attractions: Nature orientation and Quest for Facilities. *Scandinavian Journal of Hospitality and Tourism* 10(3): 248v271.
- Hibner, J., K. Taczanowska, A. Zieba, C. Brandenburg, A. Muhar & J. Balon 2018. Visitor profiling for cable car mountain destinations as a basis for pro-

- tected area management: a case study of the summer season in the Tatra Mountains at Kasprowy Wierch (Poland) and Skalná Pleso (Slovakia). *eco.mont - Journal on protected mountain areas research and management* 10(1): 24–35.
- Holden, A. & J. Sparrowhawk 2002. Understanding the motivations of ecotourists: the case of trekkers in Annapurna, Nepal. *International Journal of Tourism Research* 4(6): 435–446.
- Institute for Nature Conservation of Serbia, 2020. Available at: <http://www.zzps.rs/wp/nacionalni-parkovi/?lang=en> (accessed 28.5.2020).
- IUCN 2019. Category II: National Park. Available at: <https://www.iucn.org/theme/protectedareas/about/protected-areas-categories/category-ii-national-park> (accessed 30/06/2020).
- Kamri, T. & A. Radam 2013. Visitors' Visiting Motivation: Bako National Park, Sarawak. *Procedia-Social and Behavioral Sciences* 101: 495–505.
- Kim, S.S., M. Kim, J. Park & Y. Guo 2008. Cave tourism: Tourists' Characteristics, Motivations to Visit, and the Segmentation of Their Behavior. *Asia Pacific Journal of Tourism Research* 13(3): 299–318.
- Kruger, M. & M. Saayman 2010. Travel motivation of tourists to Kruger and Tsitsikamma National Parks: A comparative study. *African Journal of Wildlife Research* 40(1): 93–102.
- Leask, A. 2016. Visitor attraction management: A critical review of research 2009–2014. *Tourism Management* 57: 334–361.
- Lundberg, C. & P. Fredman 2012. Success factors and constraints among nature-based tourism entrepreneurs. *Current Issues in Tourism* 15(7): 649–671.
- Lundmark, L. & D.K. Müller 2010. The supply of nature-based tourism activities in Sweden. *Tourism: An International Interdisciplinary Journal* 58(4): 379–393.
- Ma, A.T.H., A.S.Y. Chow, L.T.O. Cheung, K.M.Y. & S. Liu 2018. Impacts of Tourists' Sociodemographic Characteristics on the Travel Motivation and Satisfaction: The Case of Protected Areas in South China. *Sustainability* 10(10): 3388.
- Magadan-Díaz, M. & J. Rivas-García 2019. Sustainable tourism in mountain protected areas of Asturias: an analysis from tourists' perceptions and profiles. *Sustainable Development of Mountain Territories* 4(42): 459–474.
- Mayer M., M. Müller, M. Woltering, J. Arnegger, J. & H. Job 2010. The economic impact of tourism in six German National Parks. *Landscape and Urban Planning* 97(2): 73–82.
- Meng, F. & M. Uysal 2008. Effects of Gender Differences on Perceptions of Destination Attributes, Motivations, and Travel Values: An Examination of a Nature-Based Resort Destination. *Journal of Sustainable Tourism* 16(4): 445–466.
- Milićević, S., N. Đorđević & Ž. Krejić 2020. Research on tourists' attitudes on the potential of Goč mountain for the development of eco-tourism. *Economics of Agriculture* 67(1): 223–238.
- Milohnić, I., I. Licul & I. Predović 2019. The Importance of Understanding the Connection Between the Characteristics and Motivation of Visitors: Empirical Analysis of a Croatian Tourist Event. *Journal of the Polytechnic of Rijeka* 7(1): 109–125.
- Moniz, A.I., T. Medeiros, O. Silva & J. Ferreira 2020. The Effects of Senior Tourists' Characteristics on Travel Motivation. In: Rocha, Á., A. Abreu, J. Vidal de Carvalho, D. Liberato, E. Alén González, P. Liberato, *Advances in Tourism, Technology and Smart Systems*: 415–425. Singapore.
- Mutanga, C.N., S. Vengesayi, O. Chikuta, N. Muboko & E. Gandiwa 2017. Travel motivation and tourist satisfaction with wildlife tourism experiences in Gonarezhou and Matusadona National Parks, Zimbabwe. *Journal of Outdoor Recreation and Tourism* 20: 1–18.
- Newsome, D. & M. Hughes 2018. The contemporary conservation reserve visitor phenomenon. *Biodiversity and Conservation* 27(2): 521–529.
- Newton, J.N., P. Newman, B.D. Taff, Y.H. Shr, C. Monz & A. D'Antonio 2018. If I can find a parking spot: A stated choice approach to Grand Teton National Park visitors' transportation preferences. *Journal of Outdoor Recreation and Tourism*. doi: 10.1016/j.jort.2018.04.001
- Pallant, J. 2013. *SPSS survival manual*. McGraw-Hill Education (UK).
- Reihanian, A., T.W. Hin, E. Kahrom, E., N.Z. Binti Mahmood & A. Bagherpour Porshokouh 2015. An examination of the effects of push and pull factors on Iranian National Parks: Boujagh National Park Iran. *Caspian Journal of Environmental Sciences* 13(3): 197–206.
- Saayman, M. & T. Dieske 2015. Segmentation by motivation of tourists to the Kgalagadi Transfrontier Park. *South African Journal of Business Management* 46(2): 77–87.
- Selvaag, S.K., Ø. Aas & V. Gundersen 2020. Linking visitors' spatial preferences to sustainable visitor management in a Norwegian National Park. *eco.mont - Journal on protected mountain areas research and management* 12(1): 27–33.
- Silva, O., T. Medeiros, A.I. Moniz, L. Tomas, S. Furtado & J. Ferreira 2020. Tourists' characteristics, travel motivation and satisfaction. In: Rocha, Á., A. Abreu, J. Vidal de Carvalho, D. Liberato, E. Alén González, P. Liberato, *Advances in Tourism, Technology and Smart Systems* 171: 427–436. Singapore.
- Taczanowska, K., L.M. González, X. García-Massó, A. Zięba, C. Brandenburg, A. Muhar & J. Toca-Herrera 2019. Nature-based Tourism or Mass Tourism in Nature? Segmentation of Mountain Protected Area Visitors Using Self-organizing Maps (SOM). *Sustainability* 11(5): 1314.
- Tepavčević, J., U. Miljanić, M. Bradnić & S. Janićević 2019. Impact of London residents' sociodemographic characteristics on the motives for visiting National Parks. *Journal of the Geographical Institute „Jovan Cvijic“ S.A.S.A* 69(2): 135–146.

Tomićević, J., I. Bjedov, D. Obratov-Petković & M. Milovanović 2011. Exploring the Park- People Relation: Collection of *Vaccinium Myrtillus* L. by Local People from Kopaonik National Park in Serbia. *Environmental Management* 48(4): 835–846.

Vespestad, M.K. & F. Lindberg 2011. Understanding nature-based tourist experiences: An ontological analysis. *Current Issues in Tourism* 14(6): 563–580.

Authors

Živana Krejić

is an Assistant Professor, at Union University-Nikola Tesla, Faculty of Business Studies and Law,

Juriša Gagarina 149a, 11070 Belgrade, Serbia. email: zkrejic@yahoo.com; ORCID ID <https://orcid.org/0000-0003-2490-5755>

Snežana Milićević

is an Associate Professor, at the University of Kragujevac, Faculty of Hotel Management and Tourism in Vrnjačka Banja, Vojvodanska 5a, Vrnjačka Banja, Serbia. email: snezana.milicevic@kg.ac.rs; ORCID ID <https://orcid.org/0000-0002-1972-9585>

Sustainable forest development in the Styrian Eisenwurzen Nature and Geopark and beyond

Oliver Gulas, Veronika Frank & Christoph Nitsch

Keywords: Nature Park, Geopark, protected area, Eisenwurzen, old-growth forests, stepping stones, connectivity

Abstract

With 62 % of its total area covered in forest, Styria is the most densely forested province in Austria. Accordingly, forests, more than any other habitat, characterise the landscape in the Styrian Eisenwurzen Nature and Geopark. The forest areas of the nature park are managed by a combination of private owners and the Styrian Provincial Forests, the Austrian Federal Forests and the City of Vienna. The near-natural areas of the nature park forests in particular are characterised by species-rich fauna and flora, which include specially protected species. However, the forests of the nature park do not simply provide habitats for a large number of protected animal and plant species. Due to their location – embedded between the Dürrenstein wilderness area, the Kalkalpen National Park and the Gesäuse National Park – they also function as important stepping-stone habitats for many forest-bound species.

Profile

Protected area

Nature Park & Geopark

Eisenwurzen

Mountain range

Alps, Austria

Introduction

What is a Nature Park in Austria?

The core of any Nature Park (NaP) is always a protected landscape (e.g. a Natura 2000 site), and it can also be shaped by centuries of farming or forestry activity. This means that a NaP is not simply an area with an intact landscape; it can also include alpine or orchard meadows, for example. In addition, these landscapes can have high biodiversity. The protection and promotion of biological diversity are particular concerns of the NaPs in Austria. Austria's 47 NaPs protect a variety of landscapes, which are characterized by their natural and cultural heritage and a wide range of possibilities to experience nature. The total area of all Austrian NaPs is around 500 000 ha (6% of Austria's total area).

The main objective of NaPs is landscape protection in connection with their sustainable use. The Parks have four main remits (VNÖ 2021):

- Environmental protection.
- Education.
- Regional development.
- Tourism.

Jointly, these all play an important role in strengthening the NaP itself: involving local communities and visitors enhances their perception and acceptance of the Park while also helping to protect the Park's unique landscapes for future generations.

What is a Geopark?

Every UNESCO Global Geopark has unique features, and offers visitors landscapes and sites of international geological significance to enjoy. The main goals of geoparks are protection, education and sustainable development as a base for sustainable tourism



Figure 1 – Typical Landscape of the Styrian Eisenwurzen Nature and Geopark © Stefan Leitner – Gesaense – Mit Unterstützung von Bund, Land und EU (LEADER)

(Pásková 2012; Dowling 2013; Dowling & Newsome 2006).

A geopark is not only about geology. According to the Global Geoparks Network (2020), one role of a park's management is to use geological heritage in connection with the area's natural and cultural heritage to increase awareness and understanding of key issues facing society in the context of the dynamic planet we all live on (e.g. climate change, or reducing the impact of natural disasters). In addition, local people's involvement in a geopark strengthens their identification with the region, while joint sustainable tourism projects, working with other local people (e.g. as a Geopark ranger), or partner networks targeting local food production, all help to raise awareness of the park and its aims. Through regional development, the geoparks

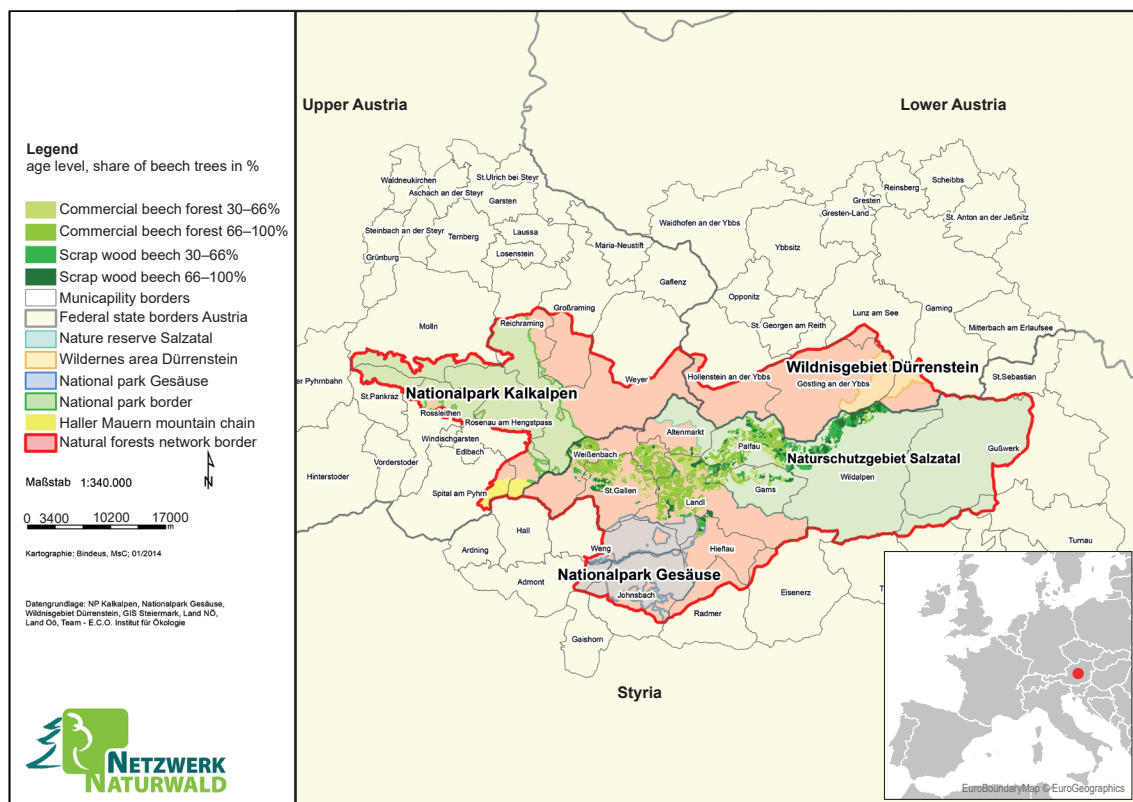


Figure 2 – Map of the Natural Forests Network project area. © E.C.O.

are creating innovative local enterprises, new jobs and high-quality training courses (Dowling & Newsome 2006), and offer sustainable geotourism (i.e. tourism focused on actively discovering Earth's heritage).

In 2004, 17 European and 8 Chinese Geoparks came together to form the Global Geoparks Network. Today, this network has 161 members in 44 countries, which “have become an increasingly important tool for UNESCO to engage Member States and their communities in the Earth Sciences and geological heritage. During the 38th session of UNESCO's General Conference in 2015, the 195 Member States of UNESCO ratified the creation of a new label, the UNESCO Global Geoparks” (Global Geoparks Network 2017).



Figure 3 – Mountain and forest area of the Styrian Eisenwurzen Nature and Geopark © Stefan Leitner – Gesäuse – Mit Unterstützung von Bund, Land und EU (LEADER)

The basic characteristics of the Styrian Eisenwurzen Nature and Geopark

The Styrian Eisenwurzen UNESCO Global Geopark is located in the northern part of Upper Styria, in the heart of Austria, where the three federal states of Lower Austria, Upper Austria and Styria meet. The Nature and Geopark covers an area of 586 km², encompassing the municipalities of Altenmarkt, Landl, St. Gallen and Wildalpen (Figure 2).

Forest-covered mountains, cultivated landscapes in broad valleys, villages on river terraces and deeply incised riverbeds surrounded by the limestone mountains of the Hochschwab and the Gesäuse are characteristic of the region (see Figure 1, 3 & 5). Given the area's natural and climatic conditions, grassland agriculture with dairy farming and forest management are predominant. Meadows, fields and orchards are characteristic of the cultivated valley landscapes. Forests are found only at locations which are unsuitable for agricultural use, such as steep slopes. The forest is the main habitat type in the Nature and Geopark.

The Past. The history of the Styrian Eisenwurzen

The area surrounding the Styrian Erzberg mine is called Eisenwurzen. Originally, the name was limited to the location of the iron ore deposit. However, in the 18th century, it spread to include all areas processing iron. Smaller ore deposits were discovered during the same century, as at Arzberg near Wildalpen, which

is also part of the Nature and Geopark. Along with the iron, charcoal and hydropower provided the basis for numerous hammer mills in the region. So-called *lords in charge of hammer mills* (*Hammerherren*), charcoal burners and raftsmen had a huge influence on the region during the golden age of the Eisenwurzen, in the 15th and 16th centuries, when the ore from the Styrian Erzberg mine was processed into valuable high-quality products. From 1860 onwards, this essentially small-scale industry came to a standstill, unable to compete with the larger-scale manufacturing that industrialization enabled elsewhere, and because of extensive deforestation and the resulting enormous rise in the price of charcoal as an important raw material.

In 1624, the main union, the Innerberger Hauptgewerkschaft, was founded, which secured and controlled the economy of the entire iron industry and iron marketing in the empire. The Innerberger Hauptgewerkschaft, as a trades union, existed until 1881 and was a predecessor of the *Österreichisch-Alpine Montangesellschaft* company, and thus also of Voestalpine AG, which exists today.

Water as a means of transport has a long tradition

Timber drifting, the floating of loose timber, was common, and the oldest and cheapest form of transport on long stretches of river. Dams were built in the upper reaches of the river and rakes in the lower reaches to catch the logs. Between 1567 and 1570, the well-known Tyrolean hydraulic engineer Hans Gasteiger built the largest timber rake in the Monarchy in Großreifling, which was in operation until it was destroyed by a flood in 1862. Tying the timber (for timber rafting), common from the end of the 19th century, enabled up to 15 m³ (on the Salza) and 700 m³ (on the Danube) of round and sawn timber to be floated downstream at the same time, depending on the character of the river and the type of construction for which the timber was destined. The waterways lost importance as transport routes from 1873 onwards with the expansion of the Crown Prince Rudolf Railway and the import of Silesian hard coal for iron smelting, the expansion of the network of paths and roads, and the construction of hydroelectric power stations. Today, kayakers, rafters and other white-water sports enthusiasts spend their leisure time on the Enns and the Salza and enjoy the natural river landscapes.

In Großreifling, reminders of the region's significant past can be seen in the historic ensemble of buildings that comprises the *Alter Kasten*, the *Neuer Kasten* (a warehouse, then later a manor house), the Innerberger *Getreidespeicher* (grain silo) of 1771, together with the Austrian Forestry Museum Silvanum and the *Nikolauskirche* (Church of St. Nicholas, the patron saint of rafters, shipmen and sailors), *Zimmerhütte – Kohlwaage* (a huge scale for weighing large quantities of coal), and the remains of the *Gasteiger Rechen* (wooden rake / dam) in the Enns (Figure 4).



Figure 4 – Model of a timber raft in the Austrian Forestry Museum © Stefan Leitner – Gesäuse – Mit Unterstützung von Bund, Land und EU (LEADER)



Figure 5 – Natural surroundings of the Nature Park municipality Wildalpen © Stefan Leitner – Gesäuse – Mit Unterstützung von Bund, Land und EU (LEADER)

The future. The wild heart of Austria

Austria's *wild heart* is located in the centre of the country, where the borders of three provinces (Upper Austria, Lower Austria and Styria) meet. For historical reasons and because the region is relatively remote from the provinces' urban agglomerations, it has remained fairly natural and relatively unfragmented. The altitude ranges from about 350 m to more than 2500 m.

Quite extensive areas of natural mixed forests are found here, as is Austria's last remaining primeval forest (about 400 ha in Wilderness Area Dürrenstein). Patches of untouched forest are also located in Kalkalpen National Park, which is the largest protected forested area in Austria. The dominant type of forest is beech mixed with fir, spruce, maple, larch and other species in different proportions, depending on the site, altitude etc. The outstanding forests in the Northern Limestone Alps were recognized as Austria's one and only UNESCO natural World Heritage Site in 2017, as a European heritage site of ancient beech forests.

Because of the outstanding natural assets, it is not surprising that there are numerous protected areas (PAs) in this region. The protection status ranges from NaPs up to a strictly protected wilderness area (IUCN category Ia). Both Kalkalpen National Park and Gesäuse National Park are PAs in IUCN category



Figure 6 – Recognition label for the Netzwerk Naturwald © Christian Scheucher

II. Additionally, there are several nature reserves, established by the federal laws of the three provinces.

2012 saw the start of cooperation between the three international PAs (Kalkalpen National Park, Gesäuse National Park and Wilderness Area Dürrenstein) to create a network of natural forests (Netzwerk Naturwald 2021), aimed at protecting and enhancing ecological connectivity (Figure 6). The approach and the first steps to establish a functional network of stepping stones beyond provincial borders was visionary and future-orientated (see Figure 7); it also had a posi-

tive impact in the nomination process as a UNESCO world heritage site of ancient beech forests. Since the award by UNESCO, the ecological connectivity between the component parts and beyond has become a national and even international task. The natural world heritage of ancient and primeval beech forests of the Carpathians and other regions of Europe includes areas in Albania, Belgium, Bulgaria, Croatia, Germany, Italy, Romania, Slovakia, Slovenia, Spain and Ukraine. More information is available at: www.weltnaturerbe-buchenwaelder.de.

The project itself: Netzwerk Naturwald – connecting habitats – finding ways together

In 2020, the Styrian Eisenwurzen Nature and Geopark became the newest member of the network of natural forests. The NaP has the benefit of lying between the three high PAs – the two National Parks and the wilderness area. It can therefore help to improve the connectivity of the three PAs. For long-term preservation of biodiversity, breeding between populations of wild animals and plants is necessary. The project will ensure this interchange, via inter-connecting habitats.

Both inhabitants and visitors to the ancient cultural landscape will also benefit from the planned merging of biotopes, by finding ways of working together.

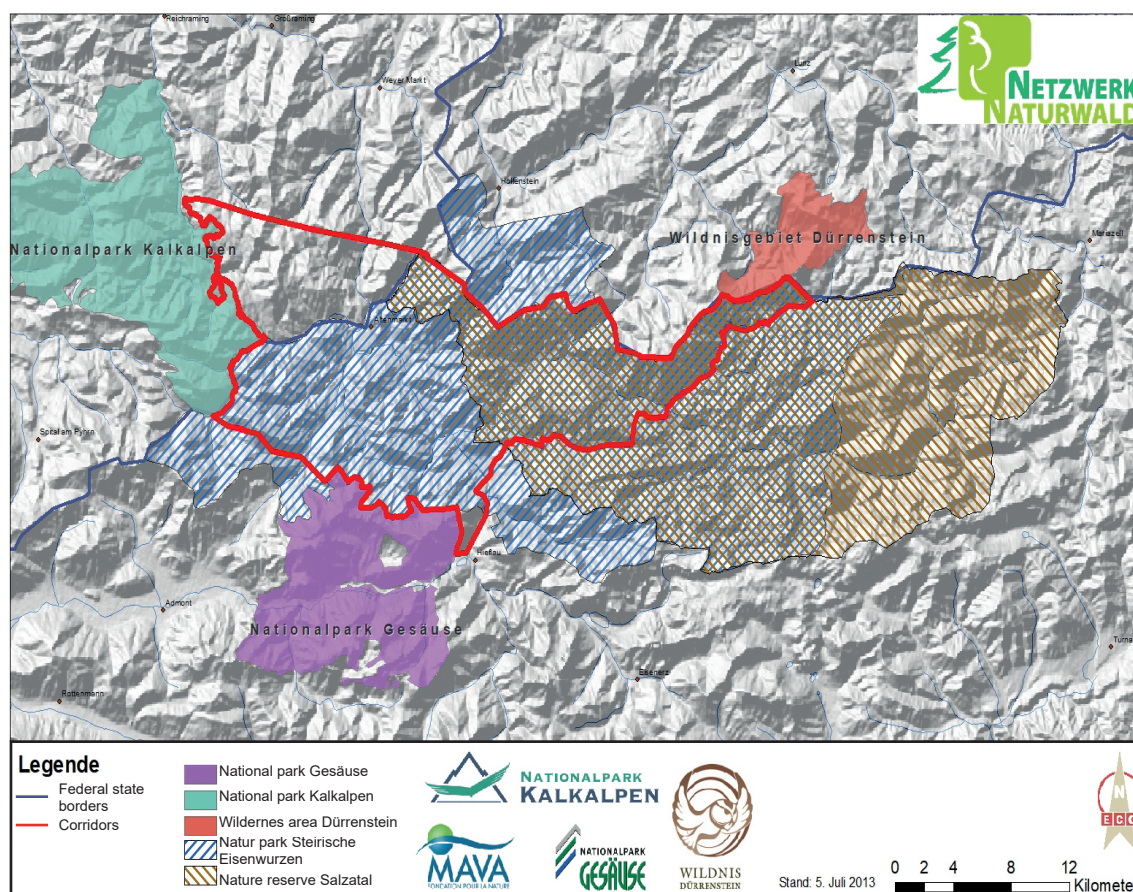


Figure 7 – Map of the connectivity corridor within the project area. Priority areas under nature conservation law © E.C.O.

The objectives of the project are to:

- develop and implement strategies for merging biotopes;
- initiate a cooperation committee;
- increase awareness of the region's natural jewels;
- make clear the opportunities for regional development;
- realize concrete pilot projects.

Within the three PAs, natural dynamic processes are still assured. However, the PAs are not large enough individually for many animals and plants to survive there in the long term. For the preservation of biodiversity, the possibility of migrating and mixing genetically with other populations is essential. Forest-dwelling animals need a functional network of natural forests to migrate between different habitats. Unfortunately, this network is not reliable everywhere, as human settlements, agriculture, roads and so on act as barriers for many species. In addition, some of the remaining forests are threatened by intense logging, which makes them unliveable for many species. Within the project area, there are outstanding natural forests in which the habitats are separated only by short distances. This provides a great opportunity for nature and for the region. By connecting the existing habitats, it is possible to create an outstanding compound of biotopes for Central Europe.

Synergies between the PAs and the history of the cultural area of Eisenwurzen (the latter being important in shaping some of the natural characteristics of the region) provide a unique potential.

The contribution of the Nature and Geopark

The Styrian Eisenwurzen connects the PAs. Geographically in the middle of them, the NaP offers the possibility of improving sustainable, close-to-nature, forest management, of re-connecting fragments of old-growth forest preserved in National Parks and Wilderness Area, as well as of integrating Natura 2000 sites into the area. It allows the strengthening of existing stepping stones and the establishment of new ones, to create ecological corridors. The NaP offers both natural old-growth beech forests and sustainably managed forests, which are managed to allow their co-existence to continue into the future. These characteristics and measures allow the region to contribute significantly to the targets of the 2030 biodiversity strategy, to re-establish green infrastructure, and to provide ecosystem services such as water purification, air quality, space for recreation, and climate mitigation and adaptation. Future activities will help to preserve the high quantity and variety of alpine forest habitats for generations to come (Figure 8). The area's outstanding ecological value will be the foundation for sustainable regional development within a green economy. The region will function as a green belt and lung in the middle of Europe.



Figure 8 – Nature and forest © Thomas Sattler

The project region is shaped by the history of the Eisenwurzen cultural area, and its use by humans for more than 800 years. Even today, the region as a whole forms a single cultural and economic space. It touches three provinces, and 25 PAs that together have a total area of more than 200 000 ha. This natural environment is unique in the Alpine region and beyond, as demonstrated by earlier EU-funded projects such as Interreg greenAlps or Interreg ALPBIONET2030 – for background information, see: www.jecami.eu. These EU-financed projects focused especially on the PAs, but not on the corridors between them. The NaP and the Styrian Eisenwurzen UNESCO Global Geopark connect these three PAs. The main objective is to enhance ecological permeability by providing sustainable connections between natural habitats – extensions of the ecological corridor between the PAs. This will be achieved by identifying the habitats of old-growth forests and protecting them, as well as by improving the ecological functionality of commercially managed forests. The measures will enable genetic exchange between isolated populations and ensure high long-term biodiversity. By involving various stakeholders and regional areas, different conservation and protection levels are targeted (including banning logging entirely in some areas). Management of the area as a whole thus includes various contractual models (for example, for the creation of stepping-stone biotopes, or for limiting the use of heavy plant), as is appropriate within a partly commercial forestry setting that also includes private landowners.

Future objectives within possible projects or joint activities:

1. Awareness raising at international, national and regional levels of the importance of old-growth forests, their contribution to biodiversity, and their provision of ecosystem services
2. Developing principals for nature-orientated forest management; agreeing and setting up contractual and funding models for nature conservation measures in forests
3. Screening for old-growth forests; selecting stepping-stone biotopes; identifying degraded forest stands for conversion to more natural forest habitats along the corridors of the ecological network

4. Implementing protection of old-growth forest; conversion of degraded secondary forest stands; adapting forest management in accordance with the principles of nature-orientated forest management in the NaP.

References

BMNT 2018. *Wie steht es um unseren Wald? Die Ergebnisse der Österreichischen Waldinventur des BFW*.

Dowling, R.K. 2013. Global Geotourism – An Emerging Form of Sustainable Tourism. *Czech Journal of Tourism* 2(2): 59–79. DOI: 10.2478/cjot-2013-0004

Dowling, R.K. & D. Newsome (eds.) 2006. *Geotourism*. Butterworth-Heinemann, Oxford.

Global Geoparks Network 2017. About GGN. Available at: <http://www.globalgeopark.org/aboutGGN/6398.htm> (accessed 02/03/2021)

Global Geoparks Network 2020. What is a UNESCO Global Geopark? Available at: <http://www.globalgeopark.org/aboutGGN/6398.htm> (accessed 02/06/2020)

Gulas, O. & H. Kollman 2016. Der Natur und Geopark Steirische Eisenwurzen. In: Hejl, E., H. Ibetberger & H. Steyrer (eds.), *UNESCO Geoparke in Österreich. Natur- und Kulturerlebnisführer der Universität Salzburg*: 129–165.

Hafner, F. 1979. *Steiermarks Wald in Geschichte und Gegenwart*. Wien.

Netzwerk Naturwald 2021. About the network and the benefits. Available at: <https://www.netzwerk-naturwald.at/index.php/en-GB/> (accessed 02/02/2021)

Nitsch, C. 2019. 6.1 Northern Limestone Alps. In: Plassmann, G., Y. Kohler, C. Walzer, J. Kahlen, C. Bei-

glböck, K. Svadlenak-Gomez et al., Albionet2030. Integrative Alpine wildlife and habitat management for the next generation: 70–71. Available at: <https://www.alpine-space.eu/projects/alpbionet2030/en/project-results> (accessed 01/03/2021)

Pásková, M. 2012. Environmetalistika cestovního ruchu (Tourism Environmentalism). *Czech Journal of Tourism* 1(2): 77–113.

VNÖ 2021. Was ist ein Naturpark. Graz: Verband Naturparke Österreichs. Available at: <https://www.naturparke.at/vnoe/verband-der-naturparke-oesterreichs/was-ist-ein-naturpark/> (accessed 02/10/2017)

UNESCO 2020. What is a UNESCO Global Geopark? Available at: <http://www.unesco.org/new/en/natural-sciences/environment/earth-sciences/unesco-global-geoparks/frequently-asked-questions/what-is-a-unesco-global-geopark/> (accessed 02/06/2020)

Authors

Oliver Gulas

Styrian Eisenwurzen Nature and Geopark, Austria. E-mail: oliver.gulas@eisenwurzen.com, www.eisenwurzen.com

Veronika Frank

Austrian Forestry Museum, Großreifling, Landl, Austria. E-mail: tourismus@landl.gv.at, www.forstmuseum.at

Christoph Nitsch

Kalkalpen National Park, Molln, Upper Austria, Austria. E-mail: christoph.nitsch@kalkalpen.at, www.kalkalpen.at



Let's partner up! From resistance to collaboration: A strategy for regional development, or how to create partnerships between nature conservation and local companies – a success story

Marco Schiefer & Eva Maria Vorwagner

Keywords: *partnership, regional development, protected areas, national park, nature park, nature conservation, ambassadors in regional development*

Abstract

In the years following the foundation of the Styrian Eisenwurzen Nature Park (in 1996) and Gesäuse National Park (in 2002), both nature conservation organizations faced heavy resistance from the local population and actors in the local economy. Today things look different: the so-called Gesäuse Partners are building a strong network that brings the parties together. Our experiences can be used practically by the managers of protected areas.

Profile

Protected area

Styrian Eisenwurzen

Nature Park and Gesäuse National Park

Mountain range

Alps, Austria

What is in it for nature protection institutions, and what are the benefits for the local economy? This success story highlights the benefits for both sides.

In the northern part of Styria, Austria, lies the Gesäuse tourism region, see Figure 1. Harsh limestone summits in contrast to gentle mountain crests, whooshing wild waters and gently flowing streams, hostile buttes and fertile meadows – cultivated and natural landscapes are characteristic features of this area. Also known as the *wild heart of Austria*, this region is rich in biodiversity. The existence of both Gesäuse National Park (IUCN category II) and the Styrian Eisenwurzen Nature and Geopark (IUCN category IV) hint at the natural richness of the Gesäuse region. While the lack of tourist infrastructure such as cable cars was considered a disadvantage in the past 80–100 years, it is now the region's unique selling point.

Fast forward: The (tourism) situation today

As authentic nature experiences are becoming increasingly important, the Gesäuse tourism region is attracting increased interest and tourist numbers. For Admont, the largest community in the Gesäuse region, this growth is quantifiable: overnight stays increased by about 25% in 2014–2019 (Statistik Austria 2021; Tourism Association Gesäuse 2021). The foundation of the Styrian Eisenwurzen Nature Park in 1996 and Gesäuse National Park in 2002 led to sustainable change for the entire region – presenting the Gesäuse as an ideal place for authentic cultural and nature-based experiences. As part of both nature conserva-

tion initiatives, a partner network was created, comprising about 100 companies which cooperate with the nature conservation institutions and the tourism association. The network was originally introduced in order to help improve the economic situation and as a multiplier for the nature-conservation ideals of Gesäuse National Park and the Styrian Eisenwurzen Nature and Geopark. Similar networks in regions with protected areas around Europe served as role models for the project. Our project differed from other networks from the beginning, however, by focusing on various economic sectors, not only on tourism.

2017 marked a turning point in the region's networking systems when the two existing networks (one involving a National Park, the other a Nature Park) were merged to form the Gesäuse Partner network. Currently, there are more than 100 members (and their number continues to grow) from various sectors, including accommodation (such as guesthouses, inns, family-owned hotels), food producers (bakeries, beekeepers), mountain guides and craftworkers. This heterogeneity is one of the defined goals of the network. The members are divided into five sectors (gastronomy; craft and trade; art and culture; outdoors; speciality products), each of which elects a chairperson, who represents them in the so-called *Partnerrat* (partners' council) for two years. Twice a year, the chairs, project managers and the CEOs of Gesäuse National Park, the Styrian Eisenwurzen Nature and Geopark, and Gesäuse Tourism Association meet to discuss recent difficulties, future development strategies and new memberships. Applicants and their fit into the network, or the planning of common activities such as excursions or company visits, for example, are subjects

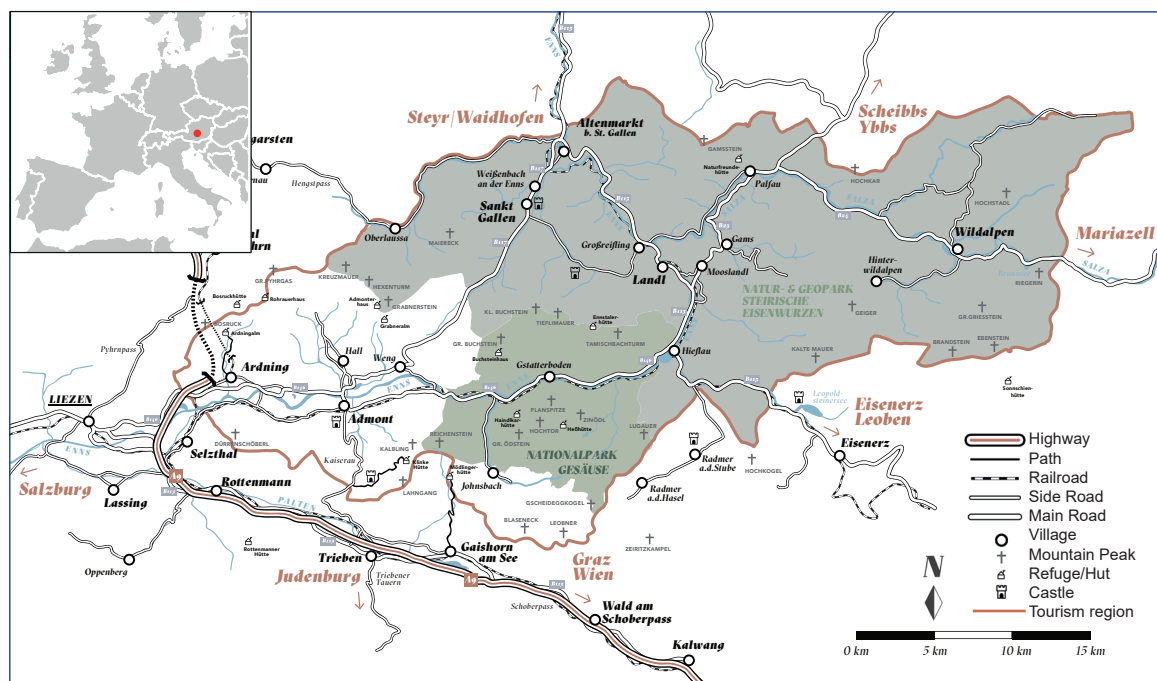


Figure 1 – Location of the Gesäuse National Park and the Styrian Eisenwurzen Nature Park. Data: GIS Steiermark <https://gis.stmk.gv.at/wgportal/atlasmobile/map/Basiskarten/Basiskarte> Digitaler Atlas, own design. Inlay: EuroBoundaryMap © EuroGeographics.

of lively discussion. The aim is to allow close cooperation while avoiding red tape as far as possible, leading to added value for both sides – the partners and the institutions.

Rewind: The starting point for Gesäuse National Park

Let's travel back in time, to the early years of Gesäuse National Park. The park was officially recognized in 2002 by the IUCN. In the beginning, there were two major problems which had to be resolved. Firstly, the relatively high resistance of the local inhabitants towards establishing the Gesäuse National Park. Similar projects in relatively close proximity geographically to the GNP (for protected landscapes and National Parks in the Schladminger Tauern, Dachstein and Totes Gebirge) had failed because of the inhabitants' opposition to them. Secondly, the local economy in the Gesäuse area was relatively weak. The National Park project in the Gesäuse region was supported predominantly by policymakers, who saw an opportunity for improving the regional economy, especially through tourism. As in other regions where nature conservation projects were discussed, this one sparked controversy. The main reasons for the negative reactions of the local population were mistrust and a fear of a top-down approach. Some opponents were afraid that the National Park would be a prestige project for policymakers at federal and state levels which would fail to ask for locals' opinions. The local people involved (mostly farmers, woodworkers, foresters, hunters and rangers) opted instead for land-

scape protection within IUCN category IV. Under this model (category IV), their activities would not be so heavily affected by the creation of the protected area, making it their preferred outcome. In the end, policymakers at federal, state and local levels enforced their own wishes, and the Gesäuse National Park was established as an IUCN type-II protected area. (On the history of the National Park, see Gesäuse National Park 2021; Gahbauer 2014.)

Rewind: The starting point for Styrian Eisenwurzen Nature Park and the road to UNESCO World Heritage Site status

The Styrian Eisenwurzen Nature and Geopark was founded by seven municipalities in 1996, originally with the intention of strengthening local structures for regional development. The Styrian Eisenwurzen Nature Park is shaped by a diverse natural and cultural landscape but also by old industry – iron ore mining, near the Styrian Erzberg. After the decline of the industry in the 20th century and increasing tertiarization, the region was faced with depopulation. One answer to help create a brighter outlook for regional development was the foundation of the Styrian Eisenwurzen Nature Park and its partner network in 1996. A Nature Park, as a protected landscape that owes its existence to the interaction of man and nature, is a perfect base for cooperation between regional partners from agriculture, gastronomy and tourism. In 2002, the Styrian Eisenwurzen Nature Park was awarded the title of European Geopark; in 2004 it became a member of the Global Geopark Network under the auspices of

UNESCO and was awarded UNESCO World Heritage Site status.

The partnership today

After the creation of both the Gesäuse National Park and Styrian Eisenwurzen Nature and Geopark, questions arose regarding the involvement of local companies. How could the perception of nature conservation be changed? What could be done to promote the regional economy? The strategy was to establish a network that enables collaboration between the local companies themselves and the institutions that manage protected areas. Today, we are in a fortunate position: collaboration with our partners offers positive and sustainable future prospects for them and the local population, and the number of partnerships has been increasing over the last couple of years.

So, how can one become a Gesäuse Partner? The two parks and the regional tourism association are ready to cooperate with other potential partners who share their philosophy of nature conservation. Prospective partners have therefore to demonstrate that they implement environmental protection and sustainability measures, and the following requirements, set by the partners' council, have to be fulfilled to be accepted as a partner:

- Applicants have to be located in the Gesäuse tourism region, as the ultimate aim is to generate income for the region and the local population.
- Regionality has to be *lived* (i. e. products for processing and transformation should be local, preference should be given to local suppliers, and local structures should be taken into account).
- A strong interest in cooperating with the other partner companies, the institutions and within the network itself is required.
- Partners should see their membership as a possibility for increasing productivity and not as a burden.

Why should one collaborate with the Gesäuse Partners, or: what are the benefits for companies?

First of all: being a partner was, is, and will continue to be exclusive. Exclusive, that is, for those who truly want to collaborate with the regional nature organizations, for the partners themselves, and for those who have an inner belief that regional development should be a bottom-up process and that collaboration can be a key factor for a region worth living in. Every application is reviewed by the partners' council to guarantee suitability for the network. Of course, the potential benefits of marketing that focuses on regionality, sustainability and nature conservation does play a part in applications to become a Gesäuse Partner. The visibility and the marketing impulse for both sides – partners and institutions – has been increasing in recent years. Most local products are sold within the region,



Figure 2 – Gesäuse Partner logo (archive).

but some individual products, services and / or partners also have supra-regional visibility. In this manner, the external visibility of the nature conservation organizations themselves is increased. This in turn might generate better acceptance of the idea of nature conservation itself amongst local people. Marketing strategies for companies in the network can be bundled, and the visibility for the partners generally is increasing due to the careful use of their corporate identity as *Gesäuse Partners* (through their logo, see Figure 2, presence in print media and shared values). A network is more visible than a small local company. But access to marketing is not the only reason to become a Gesäuse Partner. There is considerable cooperation in the network, with events, meetings and excursions, all of which have their impact on networking, too. In addition, many partners now purchase products from each other, because trust is growing and thanks to a realization that it is not always necessary to look outside the immediate area for goods. The local economy is thus becoming more circular and larger, with the circulation of partners' products increasingly hugely. The status of *Gesäuse Partner* is seen as a seal of quality, meaning that a company is fulfilling high standards in ecology and sustainability contexts. Cross-selling of products or services is the consequence: companies promote each other, e.g. with special corners in grocery stores or inns. This, in the long run, increases the visibility for locals and visitors, not only of the Gesäuse Partners themselves but also of the nature protection institutions.

Putting things in a nutshell and a take-home message: Why should nature conservation organizations "invest" in regional development?

The most obvious advantage: mutual promotion. Local economies profit from the assistance and guidance of experts. They receive in-depth information on nature conservation and the Gesäuse area, which they then pass on to visitors. The mission is to make the partners-spokespersons for nature protection and multipliers for the educational mandate of these institutions. Simultaneously, the common front enhances the positive perception of the area by guests. The network's advertising platform multiplies the advertising presence and gives all members a voice in re-

gional development strategies. The partners and the organizations are working for a better future for the region – *together*. In our case, the partnerships also actively contributed to overcoming the initial scepticism regarding nature conservation ideas, and so local support for the ideals of protected areas was increased. The partners also contribute to added value for local produce, and are therefore strengthening the economy. Partners from different areas of business get to know each other better in the network and can cooperate. They have found a framework in the partner network in which they can interact with and trust each other, stimulating a local market for locally produced goods and services. This helps create a local economy in which word-of-mouth serves as recommendation and in which people actively seek to buy local goods and support local services.

Problems that need to be solved in the future include the increasing number of different interests that occur in the network. While this might not be a problem at first sight, the motivations of the *founding members* for becoming part of the network may be very different indeed from those of new members. Increasingly, we see the potential for marketing as being the prime (or even only) reason for wanting membership of the network. Without doubt, marketing is one of the main missions of the network, but support for nature conservation must also be in the foreground. And of course, wherever people and companies interact with each other, there will be those who are highly motivated, while others will not often be seen at meetings or events. To balance the demands of networking without losing sight of the economic reality is a challenge for the future. Networks at first sight do not generate income; they are seen as *nice to have* adjuncts, but not as a must.

References

Gahbauer, Ch. 2014. *The National Park Gesäuse Partnership: From resistance to cooperation*. Master Thesis Postgraduate Studies Environmental Studies. University of Graz. Department of Geography and Regional Science. Graz.

Gesäuse National Park 2021. *Nationalpark Magazin IM GSEIS* 1-36. 2003-2021. Weng im Gesäuse. Available at: <https://nationalpark-gesaeuse.at/service/downloads/> (accessed 12/02/2021)

Statistik Austria 2021. Ein Blick auf die Gemeinde Admont. Available at: <https://www.statistik.at/blick-gem/G0803/g61253.pdf> (accessed 12/02/2021)

Authors

Marco Schiefer

works as project manager for the department of communication and regional development, Gesäuse National Park, an IUCN category II protected area. Gesäuse National Park, Admont, Austria. Email: m.schiefer@nationalpark-gesaeuse.at

Eva Maria Vorwagner

is a project manager and biodiversity expert for the Styrian Eisenwurzen Nature Park (IUCN category IV), which is also a UNESCO Global Geopark and UNESCO World Heritage site. Styrian Eisenwurzen Nature and Geopark, St. Gallen, Austria. Email: em.vorwagner@eisenwurzen.com

The Gesäuse Partners network is managed by the Styrian Eisenwurzen Nature Park and the Gesäuse National Park, as nature conservation institutions, in addition to the Gesäuse Tourism Association.

The participatory process for a regional spatial development concept in the UNESCO Biosphere Reserve Großes Walsertal

Christine Klenovec

Keywords: participation, acceptance, sustainable development, regional development concept

Abstract

Commissioned to work on a regional development concept for the UNESCO Biosphere Reserve Großes Walsertal (A), we needed to combine the overall concept for the biosphere reserve with the requirements of the spatial planning for the area. We adopted a participatory process to ensure high acceptance by the population. This article gives an overview of the process to create a regional development concept with plenty of participation.

Profile

Protected area

Biosphere Reserve

Großes Walsertal

Mountain range

Alps, Austria

Starting point

In 2018 the federal province of Vorarlberg commissioned the biosphere reserve (BR) region of Großes Walsertal to work out local spatial development plans (as an obligatory task) and a regional spatial development concept (as a desirable add-on). Such a regional spatial development concept is an enormous challenge in terms of regional cooperation far beyond the interests of individual municipalities. In the case of the BR Großes Walsertal, with six municipalities and a population of approximately 3 400, this also means living up to its model role as UNESCO BR region.

In the same year, an opportunity arose to set up a REGIO management: the related agreed targets for 2020 included the statutory set-up of a REGIO office and the creation of a regional spatial development concept for the Großes Walsertal.

The Großes Walsertal became a UNESCO BR in the year 2000. The model role for the BR region was worked out in a participatory process following the UNESCO guidelines. It forms a binding development framework that is regularly evaluated and elaborated (Biosphärenparkleitbild 2019). The degree of participation is a kind of guarantee for a successful BR region. Preconditions for acceptance, identification and commitment from the population is a sufficient awareness of the value of goods to be protected, of livelihood basics and potentials, and handling it carefully (Aktuelle Projekte 2021). Therefore the only feasible way to create a regional spatial development concept was a participatory process.



Figure 1 – BR Großes Walsertal, the village of Fontanella with a view into the valley with the typical shape of a scattered settlement. © C. Klenovec

Concrete goal: a regional spatial development concept with a high degree of participation

Planner Markus Berchtold, who accompanied the process, sums up the goals of spatial development: *“The goals defined in the regional spatial development concept (regREK) serve the six BR municipalities as a joint and coordinating guiding principle for their local spatial development plans. The spatial planning development efforts concentrate on the village centres and the existing hamlets and on the successful use of existing buildings and infrastructure. This requires the citizens to make continuous great private efforts to maintain the scattered settlement structure typical for the region. The concept adheres to the motto of the UNESCO BRs, Living and*

working in harmony with nature, and with the principles of the UNESCO BR model. The spatial planning strives to organize the BR region Großes Walsertal as a whole, with a view to benefiting the public. All affected interests are weighed up in such a way that they best serve the welfare of the whole valley. The planning spares private property as much as possible. The regREK does not describe a final state but the direction that development should take from today's perspective."

The aim was to provide an external expert to accompany the regional spatial development concept and to create it within a tight schedule. Those in charge were convinced that this would make it easier for all the people involved to stay with the project, even if their active period would be challenging. In fact, it became clear that the working group members involved were sometimes overwhelmed. So the quick creation of regional and local spatial development concepts was positive in leveraging synergies, but it was also a burden in that individual actors suffered multiple demands on their time.

It was necessary to harmonize issues with the federal province of Vorarlberg throughout and to design participation attractively. One challenge was creating sufficient opportunities for involvement at different levels to address and involve the population in a number of ways. This ranged from the general populace to representatives of the municipalities and political bodies to interest groups and individual actors. Different people wish to participate in different degrees, from just receiving information to interactive single information events to regular closer cooperation in working groups or conceptually in the process design.

Participation in the process

Creating a regional spatial development concept cannot primarily be defined as something the region wants, rather it is commissioned by the federal province of Vorarlberg. The result of this task, however, provides an additional valuable development framework for the region.

In spring 2018, a tender was called to find the desired external expert to accompany the project. It went to planners *heimaten® – Innovation & Identität im Raum*. In summer 2018, a one-day meeting was held with the REGIO board, made up of the six mayors, the BR management and a few selected actors, to work out a process concept with a broad participation design.

The regional monthly magazine *talschaft* and the BR homepage reported regularly about individual steps as the project progressed and about options for participation. No targeted invitations were sent out for the themed working groups. Instead, in an effort to allow anyone interested to participate, several calls to participate were sent out, including one at a public kick-off event at Blons middle school, which included a talk and a discussion. The working groups started in autumn 2018, with expert support by the planners. At the same time, a steering group met regularly.

In an effort to give young people a voice, the BR management initiated a pupils project with the fourth-year classes of Blons middle school. It should find out how 14-year-olds, on the cusp of becoming adults, view spatial planning and to identify their needs. After all, they are the target group who will be in their mid-twenties at the end of the regREK planning period in about ten years' time, directly facing spatial planning issues like housing design, job search, local provision or leisure design. The pupils approached the topic across subjects and presented it at the planning workshop with an added photo exhibition. Their presentation was taken up in the process. Even St. Gerold primary school picked up the topic of spatial planning for a small project.

The next, much valued, communication milestone for the population at large was the second planning workshop in spring 2019. The integration of new participation formats like a systemic spatial constellation was much appreciated. An additional event, a talk and debate with, among others, professor Martin Coy, representing a long-standing research cooperation between the University of Innsbruck and the BR region, brought in a view of spatial planning and sustainable development beyond the valley itself.

The very successful final milestone was a regional meeting of municipal representatives in autumn 2019 to jointly adopt the regional spatial development concept, which was passed by 61 of 62 councillors. A summary of the results was published in *talschaft* magazine and sent to every household. A more detailed version is available to anyone interested on the BR homepage (Regional Räumliches Entwicklungskonzept 2021).

Regina Rusch, who accompanied the process as REGIO manager until the end of 2020, sees a definite added value in the regional approach: *"The spatial development process Großes Walsertal BR allowed regional actors to create a joint regional understanding of spatial development across municipal boundaries and to enhance cooperation between municipalities in the many conversations that took place. In the implementation of the planned measures we must now strive to underline the unique feature of our region as a model of sustainability and to continue on this trail-blazing path with courage."*

Limiting factors for participation

Possible limiting factors for a high degree of active participation include a tight schedule, substantive requirements or a clear commission with a concrete result expected, limited individual resources of time with the actors, but also possible conflicts of interest. The external planner often had a mediating role, in this case sometimes not fulfilled with sufficient diplomacy, which led to some additional need for clarification between actors from the region and the federal province.

It is important to define, from the word go, clear rules of engagement and boundaries of what is feasible, so as to avoid unrealistic expectations by the

people involved. If there are any conflicts of interest, the lowest common denomination needs to be found. In this process, examples would be debates about planned expansions of commercial areas near the core zone or the planned expansion of a skiing area. Here too, it is important to come together, to assess and balance interests and to uphold the region as a BR.

Lessons learned

Future similar projects would do well to strive for an even wider range of people involved (e.g. women, older people, etc.). To this end, other or additional formats may be needed, for instance, options for digital involvement, irrespective of defined periods of presence or population surveys.

The newer formats in particular, such as the planning workshop or the systemic spatial constellation, were very well received and taken up. They served to create deeper trust, provided options for ongoing adjustment outside the steering and working groups and also involved wider sections of the population. In sum, applying new participatory formats earns positive appreciation and responses.

The external experts neutralized debates in the working groups, which helped to constructively define the lowest common denominator in conflicts of interest, albeit with compromises for individual interests. The UNESCO criteria for living and working in harmony with nature are not always at the forefront for all actors, especially if individual interests exist. Here it is the task of the BR management to remind people, if needed, to raise awareness, to identify potential and defects, and to demand compliance with the BR criteria. Often such consensus-oriented conversations are enough to improve the outcome. On the issue of a possible expansion of the skiing area, for instance, it led to the feasibility study being enhanced to include stronger adherence to the BR model. In severe cases of conflicting interests, it will certainly need the support and clear requirements of the administration, because the BR management must never hamper but rather accompany a process.

A particularly successful aspect in the process was getting marginal groups involved, in this case the young people. Feedback confirmed that the young people themselves really enjoyed the participation, and in turn their presentation at the planning workshop was much appreciated.

The very tight schedule with clear goals set by the planner was both good and bad: It allowed working efficiently and in a targeted fashion, involving many people and serving a defined commission. However, such clear requirements possibly leave rather little room for open unprejudiced discussion.

Conclusion – participation is always worth it

In sum, we can call the participatory process an example of best practice. The population was offered many and varied options for participation and took them up.

Participation always means extra effort and resources, on the part of the people in charge as much as on the part of the population. The added value of a jointly carried decision-making process is worth it as it ensures high acceptance for the implementation to come. However, participation can never be more than an option that the population must take up of their own account. Those in charge and the management need to be skilled in strengthening the readiness of the population to remain involved in the longer term, to keep it alive and to offer suitable formats. Participation remains THE big challenge for BR regions; it takes passion and the will to learn and to reflect; but only with the necessary identification and active commitment will the development of the BR be carried by the population in decisions and implementation oriented on sustainable development.

In the words of Chair Josef Türtscher: *“In adopting the regional spatial development concept Großes Walsertal, with all six municipalities, we have successfully put down a milestone for the future development of the region. This strategy paper is firmly based on the BR philosophy, which unites tradition, closeness to nature, a sense of the region, togetherness and openness to the wider world and to innovation.”*

References

- Aktuelle Projekte 2021. Akzeptanz, Identifikation und Engagement. Available at: www.grosseswalsertal.at/Biosphaerenpark/Forschung/Aktuelle_Projekte/AkIdEn (accessed 22/03/2021)
- Biosphärenparkleitbild 2019. Leitbild. Available at: www.grosseswalsertal.at/Biosphaerenpark/Biosphaerenparkkonzept/Biosphaerenparkleitbild (accessed 22/03/2021)
- Regionales Räumliches Entwicklungskonzept 2021. Available at: www.grosseswalsertal.at/Regionales_Raumliches_Entwicklungskonzept (accessed 22/03/2021)

Author

Christine Klenovec

studied ecology at the University of Vienna and completed the Masters Programme Management of Protected Areas at the University of Klagenfurt. Her profile includes further training in environmental education. Since 2006 she has worked in the management of protected areas, first as manager in Weißbach Nature Park (Salzburg); in 2014 she became manager of Großes Walsertal Biosphere Reserve.

Opportunities and challenges for transdisciplinary research in flood risk management: some critical reflections and lessons learnt for research on sustainability

Thomas Thaler, Christoph Clar, Lena Junger & Ralf Nordbeck

Keywords: disaster risk management, sustainable management, transdisciplinarity, co-design

Abstract

Mountain hazards such as floods, torrents or landslides pose a serious threat to human lives and repeatedly cause considerable damage in the Alpine region. Shrinking populations also provide a socio-political challenge for regional and local authorities. Within the ÖAW-ESS funded DemoHazAlps project, the aim is to develop a better understanding of demographic change as a key driver in transforming risk patterns. A transdisciplinary research strategy was chosen to address these challenges in the Gailtal, in the Austrian province of Carinthia. This paper describes the use of transdisciplinary research above all to integrate the knowledge of those who are affected by, and those who can affect the planning of, risk management. Transdisciplinary research has a high potential to contribute to overcoming conflicts in flood risk management triggered by, and linked to, demographic change. However, in practice there are many limitations and barriers to consider, such as the negative connotations of risk management or a pandemic. This paper provides some critical reflection on transdisciplinary research to address limitations and barriers; the lessons learnt could be applied in similar situations, for example within UNESCO biosphere reserves.

Introduction

New developments in flood risk management expand the range of perspectives and tools for both practitioners and scholars (Krueger et al. 2016; Löschner et al. 2016; Thompson et al. 2017; Clar et al. 2021). Pressure on hazard risk management has increased as a result of the impacts of climate change and changes in land use, which have necessitated new approaches, from assessing societal behaviour to increasing attention on non-structural mitigation measures (Seebauer et al. 2019; Clar et al. 2021). One of the new challenges resulting from these changes in flood risk management is the tension between the sustainable management of UNESCO biosphere reserves (BRs) and the protection of municipalities (Warner & Damm 2019). Developments in interdisciplinary research offer important inputs for our understanding of these challenges. However, the obvious links between social and natural developments and the demand for new long-term solutions also call for stronger connections between practice and science. DemoHazAlps (Demographic change and hydrological hazards: flood risk management in Alpine areas facing population decline and demographic ageing) is a research project funded under the ÖAW-Earth System Science (ESS) programme. In this project, an interdisciplinary research team analysed the links between, and mutual influences of, demographic change (ageing, outmigration, changing household structures, and pluralization of society) and the management of flood risks in the Gailtal, the (rural) valley of the Gail, in the Austrian province of Carinthia (see Infobox and Figure 1). In the course of our research, we encountered a series of challenges, above all a surprising lack of knowledge at the intersection of flood hazards, demographic

change and transdisciplinary research (Clar 2019). In addition, the coronavirus pandemic has influenced the activities of municipalities, and the research activities at universities and independent research institutes alike. Apple (2021) has shown that research activities within relatively remote areas, such as GLORIA sites, could in principle be conducted without any modifications. However, restrictions due to the pandemic have hindered the planning of transdisciplinary research activities, which are crucial, methodologically, within this field (Kratzer 2018a, b; von Lindern et al. 2019; Ammering et al. 2020). Based on these experiences, we try to identify other areas (notably in the management of BRs) in which our approach could be relevant. The paper describes the attempt to apply a transdisciplinary perspective within this complex framework, above all to integrate the knowledge of those affected *by* risk management planning and of those who can influence it directly.

Transdisciplinary research in the management of the environment

It is here that the concept of transdisciplinarity comes into play. Transdisciplinarity can be defined as the joint generation of knowledge by different academic disciplines, practitioners and / or non-scientific actors, with the goal of solving societal or *real-world* problems (Jahn et al. 2012; Klein et al. 2001). Among other things, it implies the integration of stakeholders not simply as spectators and commentators but as participants and co-producers of strategies, measures, policy developments, etc. (Seebauer et al. 2019; Clar forthcoming). Transdisciplinary research became particularly popular in the late 1990s and at the beginning of the 2000s. Many research teams developed

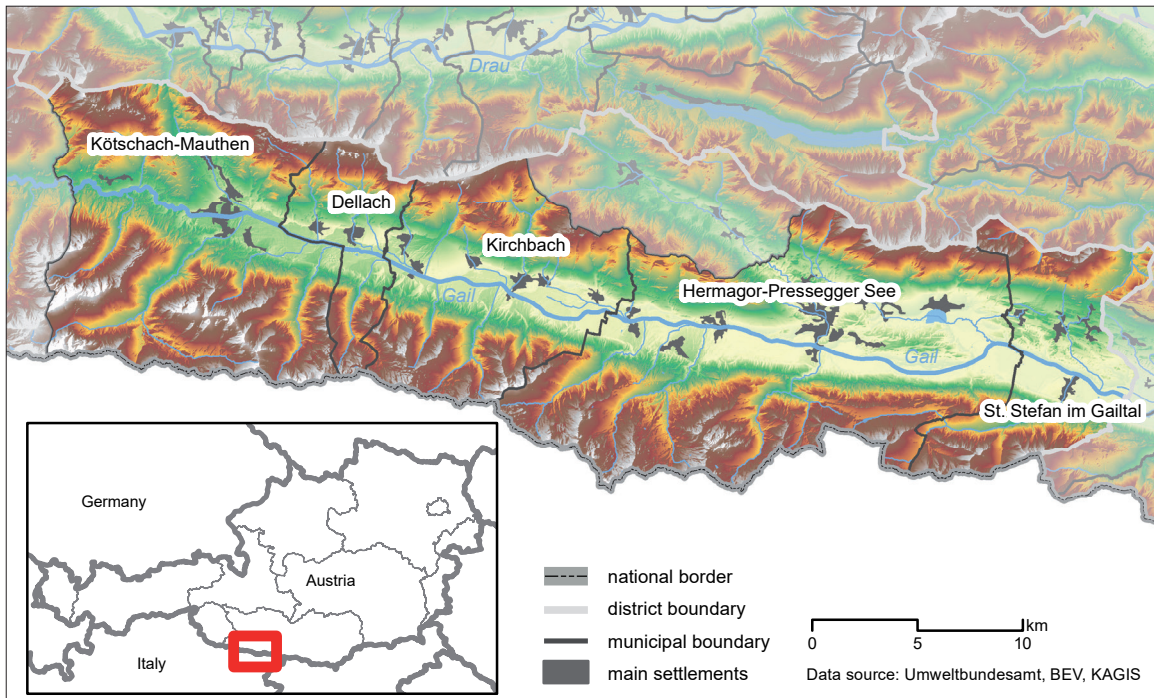


Figure 1 – Location of the Gailtal.

transdisciplinary approaches that were supposed to improve the understanding of sustainable management concepts, and contribute to their development, including through the reduction of conflicts in politically sensitive situations like the creation of large protected areas (Meesen et al. 2015). These developments were encouraged significantly by research and innovation initiatives at international and national levels, such as the Horizon 2020 programme of the European Union, the Sustainable Development Goals (SDGs), UNESCO's Man and the Biosphere (MAB) programme, or the Earth System Sciences Programme, led by the Austrian Academy of Sciences (ÖAW-ESS) for the Austrian Federal Ministry of Education, Science and Research. These programmes foresee the close integration of multiple stakeholders in research projects. Transdisciplinary research often comes into play when there are several stakeholders affected by a similar situation, who at the same time differ from each other in their views and values (Daniels & Walker 2001). Although there is no universally accepted framework for integrating transdisciplinary knowledge, terms like *participatory research*, *public participation* and *transdisciplinary* describe interdisciplinary research that aims to integrate academic and non-academic data in the production of knowledge (Vilsmaier 2010; Hoffmann et al. 2017). This approach actively includes stakeholders from various sectors (Angelstam et al. 2013). Although the different perspectives on research problems promise new insights, they also create new challenges, such as a significant increase in the number of actors to be integrated in the study design, or far greater complexity in reaching a consensus regarding the general principles of a particular research project (Stauffacher

et al. 2008; Vilsmaier 2010). Different stakeholders use different approaches to problem solving and use different communication channels. Indeed, it is crucial to understand differences regarding the interests of diverse stakeholders, as well as their connections to different levels of government (regional, national, international) (Angelstam et al. 2013). Key challenges are to make different stakeholders' knowledge relevant to specific decisions (Pielke et al. 2010), and to integrate the range of stakeholders into the process of developing innovative and transformative solutions in policy planning (Angelstam et al. 2013). For example, in water resource management, transdisciplinary research allows better understanding of human–water relations, and thereby the creation of appropriate intervention strategies (Krueger et al. 2016). However, experience and so-called *success* or *positive-outcome* studies demonstrate that the implementation of transdisciplinary approaches is more likely to be successful

Infobox – The Gailtal in Carinthia (Austria)

The district of Hermagor is located in southwestern Carinthia, bordering Italy to the south and the province of Tyrol to the west. The district is sparsely populated and very peripherally located. The population density in the district of Hermagor is 23 per km². The district was highly affected by various extreme flood events, as in 1965/66 and 2018. In addition, there are poor supra-regional transport links. There are a large number of protected areas across the valley, some of them in the floodplains. The implementation of protected areas created land-use conflicts very similar to those caused by the implementation of flood risk management strategies in the district.

when the municipality concerned gains from associated interventions. More conflict-laden thematic areas, like the creation of protected areas, sustainable management of mineral resources or water quality, often harness transdisciplinary research projects (Scholz & Steiner 2015; Krueger et al. 2016). The main question is how to use and implement transdisciplinary research processes in cases that are associated with negative developments (such as diminishing populations in rural areas), or where relatively few people stand to lose much (such as flood risk management in areas that are becoming depopulated). Flood risk management and shrinking of municipalities are generally difficult issues for policy makers, stakeholders and citizens within the regions concerned. In particular, population decline is often seen as having strongly negative consequences for municipalities, such as less income from local taxes or the closure of social infrastructure (e.g. social housing, public libraries, schools or public transport) (Clar et al. 2021). As we experienced in DemoHazAlps, the situation is even worse when both challenges (depopulation and managing flood risks) are addressed within one single project.

Transdisciplinary research in DemoHazAlps during the coronavirus pandemic

Due to the structure of current research funding, it was impossible to develop a *truly transdisciplinary* project, which would have included the joint development of the research project from the ground up (including integrating stakeholders in drawing up the project proposal), the identification of vulnerabilities, the refinement of research questions, and the design of the research approach, etc. (Scherhauer & Grüneis 2014). However, integrating stakeholders at all relevant governmental levels (federal, provincial, regional, local) early in the research process enabled us to focus in on and clarify the actual problem(s) and phenomena we were dealing with, the research questions, and the possible outcomes of our research (i.e. adaptation strategies at local level), in addition to scientific publications.

Our first step entailed consultations with national and regional decision-makers to discuss potential participants at regional level. Within this step, we co-developed a framework that would allow us to integrate the knowledge of practitioners (e.g. regional experts in flood risk management, land use planning, emergency management) within our research process. We also defined common research questions and problems, and identified major challenges – for example, the development of a common understanding of the problem and a common language, the integration of stakeholders' knowledge into scientific outputs (which requires additional effort), and above all communication as equals. Later, we recruited stakeholders at local level. It became apparent that we needed to address two main challenges: first of all, on the part of the public administration there had been strong scepti-

cism towards *negative* issues such as floods, as well as prejudices and stereotypes; second, there were also misunderstandings between practitioners and scholars within our project, and misconceptions.

The second step foresaw interactions with local policy makers and stakeholders. Our procedure at the local level was similar to the one we conducted at the regional level, where most policy makers and stakeholders were keen to participate and offered significant commitment. However, at the local level we encountered surprisingly strong reservations, with serious consequences for our case study. After initial interest in DemoHazAlps, the largest municipality within the selected region, Hermagor-Presssegger See, declined to collaborate – because, according to the Mayor, both topics were “*too negative*”. Similar concerns and objections have been observed in the creation or enlargement of protected areas, such as the former BR Gurgler Kamm (Austria), or rejection of the Parc Adula national park (Switzerland) (Michel 2019). Protected areas usually face socio-demographic changes similar to those seen in the DemoHazAlps case study (Rumpolt et al. 2016), and local decision-makers and citizens are confronted by similar concerns to those of the Mayor of Hermagor Presssegger – a fall in revenue from taxes, and closure of social infrastructure (housing, libraries and so on).

As suggested in informal talks, the key concern was the possibility of negative consequences following our research. For instance, the municipality might face exclusion from flood risk management schemes because of socio-demographic developments, such as population decline or ageing. A smaller number of households in at-risk zones would influence the decision-making process by lowering the cost-benefit ratio, which is central within the decision-making process regarding whether to protect a municipality. While this is of course a serious concern, it seems unlikely in this instance to have had any impact on current policies. Moreover, the maintenance costs of flood protection schemes are a serious issue. Fewer citizens would mean reduced income from taxes for the local authority, which might create financial difficulties when it comes to ensuring that the municipality can meet the costs. The loss of collaboration with the large municipality, Hermagor-Presssegger See, had a negative impact on our research activities within the region.

A second challenge for our collaboration with stakeholders has obviously been the coronavirus pandemic, which influenced our activities within the study sites to a very high degree. During the first lockdown, due to team members' childcare obligations, meetings had to be scheduled for late evening or very early morning. Most stakeholders had other far more immediate concerns than discussing the interrelations of flood risk management and socio-demographic change. In addition, infrastructural and technical restrictions (no computer or mobile devices, difficulties with the internet connection), lack of technical knowledge, or not

being acquainted with various ways of communication caused further complications. Finally, the target municipalities exhibited significant concern regarding face-to-face interactions. However, transdisciplinary research includes and often actually demands personal interactions and communication, which has been impossible during the current pandemic. Similarly, it has been impossible to organize face-to-face workshops or significant public lectures and debates. Therefore, the interaction focussed on exchanges via *classic* communication tools, such as fact sheets, contributions in local newspapers, or telephone conversations with policy makers and citizens. Stepping up the effort in this regard should fill at least some of the gaps opened up due to the present unique situation, but it can never fully replace what had been planned in terms of transdisciplinary collaboration.

Conclusion – some self-reflections

Interactions, in a transdisciplinary sense, have been severely limited because of the impossibilities outlined above. This has delayed the research and hampered some activities such as organizing workshops, while public lectures have been postponed until after the project deadline. However, our results show the benefits of an early integration of the stakeholders in the process; they also support the assumption that controversial, conflicting stories with negative connotations may be a serious barrier for comprehensive transdisciplinary research. We argue that transdisciplinary research has great potential for improving natural hazard management, not only in the production of knowledge but also in the development of solutions to *real-world problems*. There nevertheless remain substantial limitations and concerns which must be considered right from the outset of any research project dealing with flood risk management in a politically sensitive policy area like demographic change. Our research questions (on the impact of demographic change on flood risk management policy) and experiences of transdisciplinary research (the restrictions on it and the concrete recommendations which we made for the transdisciplinary research concerned) within this *unhappy* story could be applied to research on BRs (notably the tension between sustainable management of UNESCO biosphere reserves and the protection of municipalities) mentioned at the beginning of this article. Accordingly, we argue that our findings can be transferred to BR management and other policy areas. The UNESCO MAB Programme and its World Network of Biosphere Reserves foresees strong interactions with, and inclusion of, inhabitants, visitors and researchers in BR activities, from research to negotiations concerning land use management (see for example Austrian MAB-Nationalkomitee 2016, 2017, 2019, or UNESCO MAB 2017). Here, our insights could be helpful. We are convinced that our main conclusion – that research activities which are embedded within, and closely connected

to, their specific regional and local socio-political contexts have a much greater chance of becoming a success story and reaching acceptance among the different stakeholders – could be applied to other complex situations in which both contentious and very different issues are addressed at the same time.

Acknowledgements

The research project Demographic Change and Hydrological Hazards: Flood Risk Management in Alpine Areas Facing Population Decline and Demographic Ageing (DemoHazAlps) that led to this paper was funded by the Austrian Academy of Sciences (ÖAW) within the research programme Earth System Sciences (ESS). Open access funding provided by BOKU Vienna Open Access Publishing Fund

References

- Ammering, U., B. Macher, M. Mannheim, Y. Lese-wa, A. Kratzer, T. Töpfer & N. Weixlbaumer 2020. *Experimental networks for sustainability. Urban biosphere reserves as engines of transformation*. Projektendbericht. Wien: Akademie der Wissenschaften.
- Angelstam, P., K. Andersson, M. Annerstedt, R. Axelsson, M. Elbakidze, P. Garrido, K.P. Grahm, I. Jönsson, S. Pedersen, P. Schlyter, E. Skärbäck, M. Smith & I. Stjernquist 2013. Solving problems in social–ecological systems: Definition, practice and barriers of transdisciplinary research. *Ambio* 42: 254–265. doi: 10.1007/s13280-012-0372-4
- Apple, M.E. 2021. On the impact of the COVID-19 pandemic on alpine research projects in Montana. *eco. mont – Journal on protected mountain areas research and management* 13(1): 67–70. doi: 10.1553/eco.mont-13-1s67
- Austrian MAB-Nationalkomitee 2016. Kriterien für Biosphärenparks in Österreich. Available at: <http://www.biosphaerenparks.at/index.php/de/nationale-kriterien> (accessed: 18/02/2021)
- Austrian MAB-Nationalkomitee 2017: Positionspapier zur Nutzung von erneuerbaren Energien in österreichischen Biosphärenparks. Available at: <http://www.biosphaerenparks.at/index.php/de/nationale-kriterien> (accessed: 18/02/2021)
- Austrian MAB-Nationalkomitee 2019. Leitfaden zur Umsetzung des Lima-Aktionsplans 2016-2025 in österreichischen Biosphärenparks. <http://www.biosphaerenparks.at/index.php/de/nationale-kriterien> (accessed: 18/02/2021)
- Clar, C. 2019. How demographic developments determine the management of hydrometeorological hazard risks in rural communities: The linkages between demographic and natural hazards research. *WTREs Water* 6(6): e1378. doi: 10.1002/wat2.1378
- Clar, C. (forthcoming). Bringing *the political* back in: Call for a critical interdisciplinary perspective on urban sustainable development. In: Kogler, R. & A. Hamedinger (eds.), *Interdisziplinäre Stadtforschung. Themen und*

Perspektiven. Bielefeld: Reihe Urban Studies, Transcript.

Clar, C., L. Löschner, R. Nordbeck, T. Fischer & T. Thaler 2021. Population dynamics and natural hazard risk management: conceptual and practical linkages for the case of Austrian policy making. *Natural Hazards* 105: 1765–1796. doi: 10.1007/s11069-020-04376-z

Daniels, S.E. & G.B. Walker 2001. *Working through environmental conflict. The collaborative learning approach*. Westport, CT.

Hoffmann, S., C. Pohl & J.G. Hering 2017. Methods and procedures of transdisciplinary knowledge integration: empirical insights from four thematic synthesis processes. *Ecology and Society* 22(1): 27. doi: 10.5751/es-08955-220127

Jahn, T., M. Bergmann & F. Keil 2012. Transdisciplinarity. *Ecological Economics* 79: 1–10. doi: 10.1016/j.ecolecon.2012.04.017

Klein, J.T., R. Häberli, R.W. Scholz, W. Grossenbacher-Mansuy, A. Bill & M. Welti 2001. *Transdisciplinarity: joint problem solving among science, technology, and society. An effective way for managing complexity*. Basel.

Kratzer, A. 2018a. Biosphere reserves as model regions for sustainability transitions? Insights into the peripheral mountain area Grosses Walsertal (Austria). *Applied Geography* 90: 321–330. doi: 10.1016/j.apgeog.2017.04.003

Kratzer, A. 2018b. Biosphere reserves research: a bibliometric analysis. *eco.mont – Journal on protected mountain areas research and management* 10(2): 36–49. doi: 10.1553/eco.mont-10-2s36

Krueger, T., C. Maynard, G. Carr, A. Bruns, E.N. Mueller & S. Lane 2016. A transdisciplinary account of water research. *WIREs Water* 3(3): 369–389. doi: 10.1002/wat.2.1132

Löschner, L., R. Nordbeck, P. Scherhauser & W. Seher 2016. Scientist-stakeholder workshops: A collaborative approach for integrating science and decision-making in Austrian flood-prone municipalities. *Environmental Science & Policy* 55(2): 345–352. doi: 10.1016/j.envsci.2015.08.003

Meessen, H., J. Svajda, T. Kohler, V. Fabriciusová, D. Galváněk, M. Bural, M. Káčerová & J. Kadlečík 2015. Protected areas in the Slovak Carpathians as a contested resource between metropolitan and mountain stakeholders. *Journal of alpine research – Revue de géographie alpine* 103-3. doi: 10.4000/rga.3055.

Michel, A.H. 2019. How conceptions of equity and justice shape national park negotiations: The case of Parc Adula, Switzerland. *eco.mont – Journal on protected mountain areas research and management* 11(1): 25–31. doi: 10.1553/eco.mont-11-1s25.

Pielke, R.A. 2010. Expert advice and the vast sea of knowledge. In: Bogner, A., K. Kastenhofer & H. Torgersen, *Inter- und Transdisziplinarität im Wandel? Neue Perspektiven auf problem-orientierte Forschung und Politikberatung*. Baden-Baden: 169–187.

Rumpolt, P.A., A. Kratzer, M. Coy & N. Weixlbaumer 2016. *Regional economic and perceptual analysis in an UNESCO biosphere reserve. Future strategies for re-*

gional development in the BR Großes Walsertal against the background of demographic change: What comes next? Projektendbericht. Wien: Österreichische Akademie der Wissenschaften.

Scherhauser, P. & H. Grüneis 2014. Herausforderungen und Grenzen partizipativer Projektarbeit – Zwei Beispiele aus der transdisziplinären Klimawandelanpassungsforschung und erste Lösungsansätze. *Umweltpsychologie* 18: 189–210.

Scholz, R.W. & G. Steiner 2015. The real type and ideal type of transdisciplinary processes: part II – what constraints and obstacles do we meet in practice? *Sustainability Science* 10: 653–671. doi: 10.1007/s11625-015-0327-3

Seebauer, S., S. Ortner, P. Babicky & T. Thaler 2019. Bottom-up citizen initiatives as emergent actors in flood risk management: Mapping roles, relations and limitations. *Journal of Flood Risk Management* 12: e12468.

Stauffacher, M., T. Flüeler, P. Krütli & R.W. Scholz 2008. Analytic and dynamic approach to collaboration: A transdisciplinary case study on sustainable landscape development in a swiss prealpine region. *Systemic Practice and Action Research* 21(6): 409–422. doi: 10.1007/s11213-008-9107-7

Thompson, M.A., S. Owen, J.M. Lindsay, G.S. Leonard & S.J. Cronin 2017. Scientist and stakeholder perspectives of transdisciplinary research: Early attitudes, expectations, and tensions. *Environmental Science & Policy* 74: 30–39. doi: 10.1016/j.envsci.2017.04.006

UNESCO MAB 2017. *MAB Strategy (2015–2025) Lima Action Plan (2016–2025) Lima Declaration Network of Biosphere Reserves (2016–2025). A new roadmap for the Man and the Biosphere (MAB) programme and its world network of biosphere reserves*. Paris: UNESCO.

Vilsmaier, U. 2010. Transdisciplinarity and protected areas: A matter of research horizon. *eco.mont – Journal on protected mountain areas research and management* 2(2): 37–43. doi: 10.1553/eco.mont-2-2s37

von Lindern, E., R. Knoth & X. Junge 2019. *Akzeptanz, Identifikation und Engagement: Ansichten und Mitwirkung der Bevölkerung in UNESCO Biosphärenreservaten (AkIdEn)*. Bern & Wien: Forum Landschaft, Alpen, Parks – Akademie der Naturwissenschaften Schweiz (SCNAT) & Österreichisches Nationalkomitee für das UNESCO-Programm “Man and the Biosphere”.

Warner, B. & C. Damm 2019. Relocation of dikes: Governance challenges in the biosphere reserve “River Landscape Elbe-Brandenburg”. In: Hartmann, T., L. Slavíková & S. McCarthy (eds.), *Nature-based flood risk management on private land*. Cham: 171–180.

Authors

Thomas Thaler¹

holds a PhD in Environmental Science and is currently working as a post-doc researcher at the Institute

of Mountain Risk Engineering at the University of Natural Resources and Life Sciences.

Christoph Clar^{1,2}

holds a PhD in Political Science and is currently working as a post-doc researcher at both the Institute of Forest, Environmental and Natural Resources Policy and the Institute of Mountain Risk Engineering at the University of Natural Resources and Life Sciences.

Lena Junger³

holds a Master's degree in Spatial Planning and is currently working as a PhD researcher at the Institute of Spatial Planning, Environmental Planning and Land Rearrangement at the University of Natural Resources and Life Sciences.

Ralf Nordbeck²

holds a PhD in Political Science and is currently a Senior Scientist at the Institute of Forest, Environmental and Natural Resources Policy at the University of Natural Resources and Life Sciences.

¹ Institute for Mountain Risk Engineering, University of Natural Resources and Life Sciences, Vienna

² Institute of Forest, Environmental and Natural Resource Policy, University of Natural Resources and Life Sciences, Vienna

³ Institute of Spatial Planning, Environmental Planning and Land Rearrangement, University of Natural Resources and Life Sciences, Vienna

„Spessart“ field project of Weihenstephan-Triesdorf University of Applied Sciences reaches final stage of the 2020 EU-Natura 2000 Award

Bernd Stöcklein, Christoph Moning & Volker Zahner

Keywords: Field study project Natura 2000, European Natura 2000 Award, communal forests, working norms LWF, Natura 2000 sites, special support programme Bavaria, nature conservation contract programme in forests (VNP Wald)

Abstract

For the first time, a field project run by Weihenstephan-Triesdorf University of Applied Sciences has reached the finals of the 2020 European Natura 2000 award. Just as special as the project's presence among the finalists in the *Communication* category has been the initial concept of the *Spessart* project. This field study was designed in close cooperation with specialist and municipal authorities, and local inhabitants, and was conducted in sites of communal and city forests in the Main-Spessart district. Over a period of 17 years, student groups focused on three overarching survey parameters, which were in accordance with the working instructions of the Bavarian State Institute of Forestry: Presence of Natura 2000 habitats, habitat structures, and Fauna (with a particular focus on value-adding bird species and bats). The evaluations of each parameter were carried out separately and then combined into an overall evaluation. Following the data analysis and evaluation phase, recommendations for optimizations and subsidies were made. The final results were presented to interested local people, authorities and the press. This information could inform and support grant and subsidy applications for nature and forest conservation efforts.

Profile

Protected area

Natura 2000 habitats

Mountain range

Low Mountain Range

Spessart

Country

Germany

Introduction

For the first time, a field project of Weihenstephan-Triesdorf University of Applied Sciences (HSWT) has reached the finals of the 2020 European Natura 2000 award, which is designed to reward excellence in the management of Natura 2000 sites. It recognizes best practice in their management and conservation achievements, highlighting the benefits of the network for local economies, and increasing public awareness about Europe's valuable natural heritage (EC 2019).

Just as special as the *Spessart* project's reaching the finals in the *Communication* category of the award is the initial concept of the project itself. Natura 2000 *Spessart* seeks to connect research and people for the benefit of nature. It is conceived as an external field study project (i.e. outside Weihenstephan), and functions in close cooperation with specialist authorities, municipal authorities and local people. Over the last 17 years, week-long study projects run jointly by the Department of Forestry and the Department of Landscape Architecture at HSWT (Germany) have been conducted in selected sites of communal and city forests in the Main-Spessart district (Figure 1). The only exceptions were the selection of two sites in neighbouring areas: in 2011 in the city of Karbach, and in 2018 in the Steigerwald, part of the Gräfholtz-Kehrenberg nature reserve near Bad Windsheim. Some trial sites are designated nature conservation areas, Naturwaldreservat (*natural forest reserves*), and/or Natura 2000 sites. The Spessart is Germany's largest mixed deciduous forest complex, situated in the low mountain region, along

the Lower Main river, between Würzburg and Aschaffenburg (see Figure 1).

The sites investigated cover between 50 ha and 200 ha and are under communal ownership. The district managers of the local forests selected the sites in agreement with the municipalities. The HSWT students analysed the sites in accordance with the working norms of the Bavarian State Institute of Forestry (LFW) for Natura 2000 sites (Müller-Kroehling et al. 2004), focusing on three particular, overarching, survey parameters. These parameters remained the same for the duration (over 17 years) of the joint project.

1. Presence of Natura 2000 habitats (according to the relevant bioindicators for the identification of plant/vegetation)

The Natura 2000 habitat types present in the study areas were determined based on plant indicator species, including forest tree species (see Figure 2).

2. Habitat structures, such as biotope trees and coarse woody debris/deadwood

The number of biotope trees (trees with cavities, etc.) as well as the occurrence of standing and lying dead wood was determined separately for coniferous and deciduous trees. Measurements were in numbers/square metre and were made along transect lines. The length of the transect lines was in direct proportion to the area of the entire sampling site (see Figure 3).

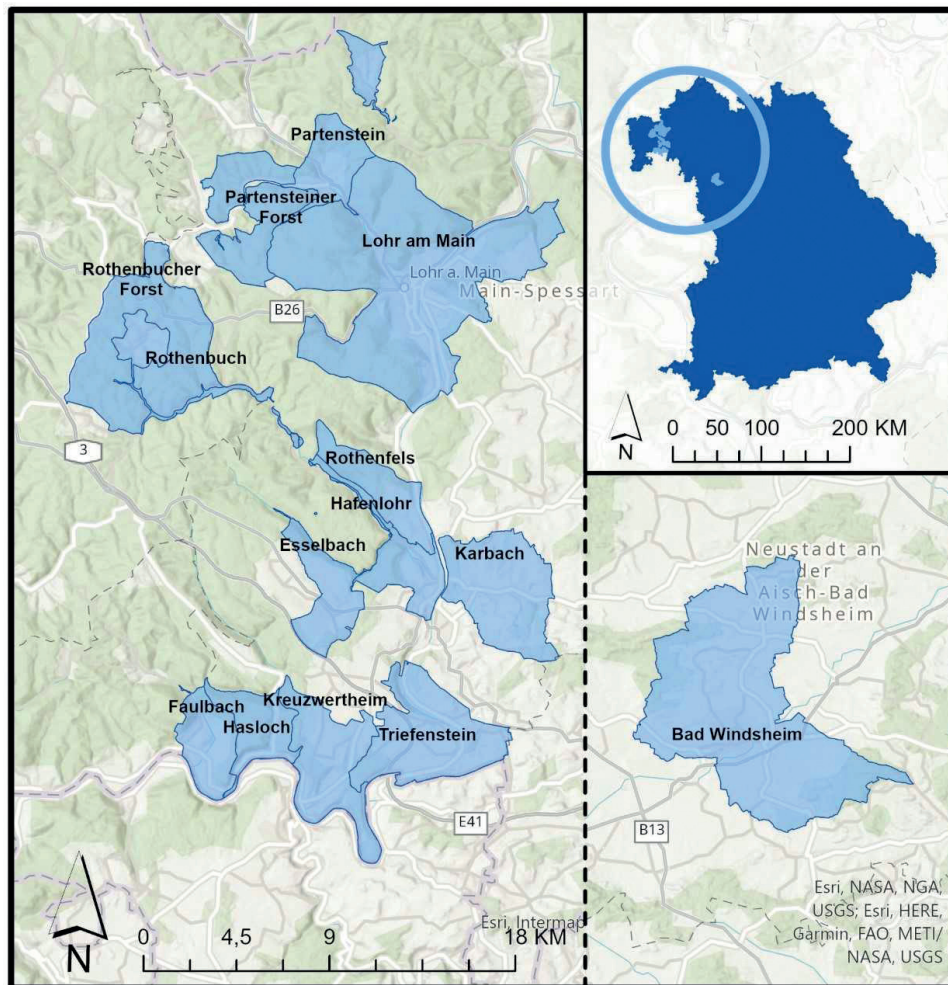


Figure 1 – Overview of the municipalities with trial sites in Spessart, Lower Franconia, within the district of Main-Spessart, and in Bad Windsheim, Middle Franconia, within the district of Neustadt / Aisch-Bad Windsheim, North Bavaria, over the project duration 2003–2019. The inset (top right) shows the location of the trial sites within Bavaria.

3. Fauna (with a particular focus on the populations of value-adding bird species and bats)

Using recordings of bird calls (especially for Col-lared Flycatcher, Middle Spotted Woodpecker and Black Woodpecker; see Figure 5), the students mapped

the occurrence and distribution of valuable bird species according to the Natura 2000 habitat types. Each Natura 2000 habitat type was investigated along an individual transect line (Figure 4). They also conducted random bat-detector studies to determine the range of bat species present.

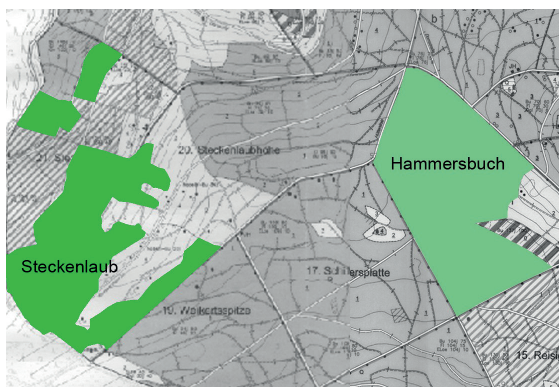


Figure 2 – Sites for the survey of flora/biotopes in the municipal forest of Lohr. © Bayerische Vermessungsverwaltung – www.geodaten.bayern.de



Figure 3 – Woodrush-beech forest within the municipal forest of Rothenbuch. © Bernd Stöcklein

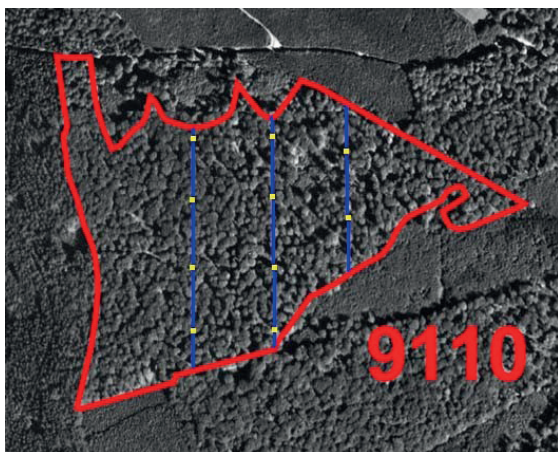


Figure 4 – Location of the transects for monitoring valuable bird species in the natural forest reserve Harfe (Rothenbuch). © Bayerische Vermessungsverwaltung – www.geodaten.bayern.de

The students documented the results of the surveys digitally, following the required approach and methods, and then evaluated the survey parameters separately. The state of preservation of the areas investigated was evaluated on a three-level scale (A – C): A = excellent condition; B = good condition, and C = average to poor condition.

The students carried out evaluations of each parameter separately and then combined them into an overall evaluation. Following the data analysis and evaluation phase, they developed recommendations for optimizations and subsidies, as part of the contractual Bavarian nature conservation policy (nature conservation contract programme in forests *VNP Wald*, Bavarian State Ministry of the Environment and Consumer Protection 2019; see Table 1). The basic principle is that according to Natura 2000 any deterioration of the current condition must be avoided.

At this stage, it did not matter whether the trial sites were situated within the Higher Spessart Natura 2000 site or not. To inform the municipalities concerned, selected preliminary results along the three survey pa-

Table 1 – Contractual Bavarian nature conservation policy (special support programme *VNP Wald*). Bavarian State Ministry of the Environment and Consumer Protection 2019).

The special support programme for forest <i>VNP Wald</i> enables compensation payments
Sample of relevant subsidy options
Conservation of old and biotope trees (directive 2.1.1.2)
Maintenance of coarse woody debris/deadwood (directive 2.1.1.3)
Waiver of use (in lieu of sustainable use) (directive 2.1.1.1)
Creation or maintenance of open spaces in forests (directive 2.1.4.1)
Eligibility criteria
Share of biotope trees
Share of coarse woody debris/deadwood
Diameter breast height (DBH)

rameters were presented in the context of a *go-and-see* field trip to the sites. These results were prepared by the district foresters and the supervising professors during internship weeks, with professors and students demonstrating the methods applied (e.g. acoustic surveys to sample avian communities and territories) along a predefined walking tour. Furthermore, approaches to determine biotope types were also illustrated, e.g. by showcasing the types of plants surveyed and the individual habitat structures identified, such as coarse woody debris and value-adding structures of biotope trees (such as nesting holes and tree cavities). Leveraging such tangible examples had at least four major advantages. First of all, it made it possible to effectively inform all interested parties about Natura 2000 sites as important places of European natural heritage (i.e. what they sheltered by way of species and habitats, as well as specific landforms). Second, it made it possible to assess the effectiveness of the state's financial support for conservation. Third, it vividly illustrated the approaches used in the survey and evaluation phase. Finally, it enabled the discussion of the recommendations for the forest areas that had been drawn from the study. This format ensured that all suggestions, preferences and requests by the mu-



Figure 5 – *Dendrocoptes medius* (left); *Ficedula albicollis* (right). © Christoph Moning

municipalities and their inhabitants could be included in the final recommendations. These recommendations were used by the responsible authorities (e.g. LFW / local conservation authority) as up-to-date data for the municipality's application for funding for the nature conservation contract in forests (VNP Wald).

After completing the inventory surveys during the field project week, the students worked in groups, under the supervision of their professors, discussing the results in preparation for a final public presentation, which the students delivered to an audience of interested local citizens, authorities and the press. The final results provided the municipalities with detailed and up-to-date inventories and recommendations, including: restricting the collection of firewood by local people to locations outside the trial areas, which would increase significantly the amount within the trial areas for the populations of insects and other fauna; municipalities should therefore set aside other areas for the collection of wood; preservation of biotope trees; the re-routing of hiking trails to avoid species sensitive to disturbance (e.g. Black Stork). Local nature conservation authorities and the office for food, agriculture and forestry used the information to inform and support grant applications for nature and forest conservation efforts, as well as to provide decision support. The students particularly appreciated experiencing at first hand the importance of their work, as it acted as the basis for further implementations of concrete measures. Specifically, the Bavarian government granted subsidies of € 800 000 for the Spessart region, based on the evaluations conducted by the students. These subsidies were given to communities specifically to support nature conservation in their community forests. (Municipalities traditionally own large forest tracts in the Spessart region.) The students' work also supported local foresters in drawing up management plans for the communities. Finally, the VNP Wald generated funds that were used to subsidize municipal projects based on the Natura 2000 programme.

Initiated by HSWT, the project reached the Finals of the 2020 EU-Natura 2000 awards, in the Communications category. (The winner in the Communications category was the French project, *Eau la la!!! Eco-tips for sea and shore!*.) The results demonstrated widespread public support for conservation initiatives generally, as finalists were voted for, EU-wide, by the public. In Spessart specifically, the awards attracted broad interest from all municipalities with forest areas, drawing attention to the objective new data. The results of the studies were seen not as a limitation for management,

but as feeding into change for sustainable development, with subsidies from the Bavarian State Ministry of the Environment and Consumer Production being made available for the municipalities.

References

Bavarian State Ministry of the Environment and Consumer Protection 2019. Bayerisches Vertragsnaturschutzprogramm Wald (VNP Wald). Available at: https://www.stmuv.bayern.de/themen/naturschutz/naturschutzfoerderung/vertragsnaturschutzprogramm_wald/index.htm (accessed 03.12.2020)

EC [European Community] 2019. European Natura 2000 Award. Available at: https://ec.europa.eu/environment/nature/natura2000/awards/the-award/index_en.htm (accessed 03.12.2020)

Müller-Kroehling, S., M. Fischer, H.-J. Gulder, H. Walentowski & C. Kölling 2004. Arbeitsanweisung zur Fertigung von Managementplänen für Waldflächen in Natura 2000-Gebieten. Landesanstalt für Wald und Forstwirtschaft. Freising. Available at: <https://www.lwf.bayern.de/mam/cms04/biodiversitaet/dateien/arbeitsanweisung.pdf> (accessed 03.12.2020)

VNP-Wald 2020. Bayerisches Vertragsnaturschutzprogramm Wald. Available at: https://www.stmuv.bayern.de/themen/naturschutz/naturschutzfoerderung/vertragsnaturschutzprogramm_wald/index.htm (accessed 03.12.2020)

Authors

Bernd Stöcklein

was Professor of Zoology and Animal Ecology at the Department of Landscape Architecture of Weihenstephan-Triesdorf University of Applied Sciences, a post from which he retired in 2016. E-mail: bernd.stoecklein@hswt.de

Christoph Moning

is Professor of Zoology and Animal Ecology at the Department of Landscape Architecture of Weihenstephan-Triesdorf University of Applied Sciences. E-mail: christoph.moning@hswt.de

Volker Zahner

is Professor of Zoology and Wildlife Ecology at the Department of Forest Ecology and Management of Weihenstephan-Triesdorf University of Applied Sciences. E-mail: volker.zahner@hswt.de

Mediating mind-sets: the Cerro Khapía Landscape Reserve in the Peruvian Andes

Domenico Branca, Andreas Haller, Boris Blanco-Gallegos & Vicente Alanoca-Arocutipa

Keywords: land use, conflict, ontology, worldview, Aymara

Abstract

The creation of protected mountain areas is often preceded by conflicts over access and use of natural resources. The case of the Cerro Khapía in the Peruvian Andes, however, points to mountains as not just *nature* but also *culture*. More than a decade ago, different ontologies and opposing views on mountains led to protests of the Aymara people against the exploitation of Cerro Khapía by a Canadian mining company, mainly because the mountain is the local Aymara's *apu* or tutelary god. Today, Cerro Khapía is temporarily protected as a Reserved Zone and on track to become a permanently protected area. Moreover, it is a case in point of the importance of questioning one's own ontological viewpoint and mediating different mind-sets.

Profile

Protected area

Cerro Khapía Reserved

Zone

Mountain range

Peruvian Andes

Introduction

Socio-environmental conflicts usually do not fit into common imaginaries of peaceful protected mountain areas, wild sites of *harmony* between nature and culture. However, across the globe, both conflicts and conservation are often closely interwoven processes (e.g., Badola & Hussain 2003; Braun et al. 2018; Haller & Córdova-Aguilar 2018; Thomas & Middleton 2003). Since the 1990s, an exponential increase in socio-environmental conflicts has been observed on a global level, especially in the Global South. For instance, there are currently 683 active conflicts in South America according to the Atlas of Environmental Justice (EJA), 96 of them in Peru alone. Since 2010, the Department of Puno, mainly situated in the high Andes, has occupied top positions in the “*ranking of regions with the highest number of social conflicts*” (Angulo 2015: 18; see Pinto Herrera 2013). These conflicts are usually related to the (planned) extraction of raw materials for export (Gudynas 2009), one of the most important sources of income for the Peruvian economy. The establishment of protected areas in former sites of socio-ecological conflicts can be a strategy to solve problems that originate from conflicting understandings of nature and culture (see Gade 1999).

The case of the *Zona Reservada Reserva Paisajística del Cerro Khapía* (Reserved Zone of the Cerro Khapía Landscape Reserve), is a perfect case in point. It concerns a socio-environmental conflict popularly known in Peru as the *aymarazo* (Quiñones 2013). This protest began a decade ago, in April 2011, against exploratory operations in the area of Kelluyo and Huaculani districts, for which the state had granted a con-

cession¹ (Zevallos-Yana 2020) to the Canadian mining company Bear Creek, already active in other regions of Peru, on 29 November 2007 (Supreme Decree no. 083-2007-EM; Anonymous 2007) for the extraction of silver. There was local opposition from the beginning, but it intensified from 2011 when the company was about to start operations in the area (Pinto Herrera 2013). A large part of the local population and several grassroots organizations pointed out the risk of environmental contamination and demanded: (1) a retraction of the mining concession; and (2) the protection of the Cerro Khapía, a tutelary mountain or *apu* threatened by the mining concession (Eschenhagen & Baca 2014).

Our aim is to show how the creation of the Reserved Zone of the Cerro Khapía Landscape Reserve in 2011 (Supreme Decree no. 008-2011-MINAM; Anonymous 2011a) is the result of an ontological struggle (Blaser 2019) by local indigenous communities and, therefore, its designation is a relevant precedent for the recognition of other worldviews all over the globe; worldviews that do not conceptualize land primarily as a resource to be exploited (de la Cadena 2015; Escobar 2015). From a methodological point of view, this report presents outcomes of a long-term ethnographic research, started in 2013 in the Andean region of Puno, Peru. Data were collected through a set of heterogeneous techniques, ranging from participant observation at events (e.g., protests), to in-depth interviews with key actors, to the analysis of newspaper articles and grey literature.

¹ The mining concession (*concesión minera*) is issued by the state at the request of the applicant, and the state, as administrator of the natural resources, grants the applicant certain rights and obligations for the use of the natural resources; however, it must be made clear that the mining concession does not grant its holder ownership of the land or surface property (Zevallos-Yana 2020: 61; translation by the authors).

Cerro Khapía: a mountain between conflict and conservation

Located on the Peruvian Altiplano or Collao plateau ($16^{\circ}19'52''\text{S}$ and $69^{\circ}08'32''\text{O}$, approx. 3800 m a.s.l.), in the southern part of the Province of Chucuito, the Cerro Khapía Landscape Reserve covers an area of 18 313.79 hectares. According to Pulgar Vidal's (1946) model, it is situated in the Suni altitudinal zone and belongs to the catchment area of Lake Titicaca. The area also features wetlands from which some rivers originate. Cerro Khapía is the highest mountain in the south of the Department of Puno, stretching from the Suni over the entire Puna region, reaching the boundary with the Janca altitudinal zone at 4800 m.a.s.l. Hence, it stands out impressively from the generally flat Collao plateau.

The mountain increasingly attracts visitors keen on trekking or mountaineering and enjoying the Andean landscape (Figure 1). At the top of Cerro Khapía, there is a lagoon called Warawarani, possibly the crater of the now inactive volcano. There are various forms of endemic fauna and, regarding the flora, there are relicts of queñual trees (*Polylepis* spp.). Finally, the (transitional) protected area category Reserved Zone of Peru's Servicio Nacional de Áreas Naturales Protegidas (SERNANP) recognizes the right of the neighbouring farming communities to own and use the water resources in accordance with local cultural practices. From an ethno-linguistic point of view, most of the local population is Aymara-speaking, engaged in agriculture and small-scale trade for their livelihood (Alanoca-Arocutipa 2013; Branca 2017). This is why Cerro Khapía is not only an important natural landmark: for the indigenous population of the Department of Puno, it is an *apu*, that is, a sacred mountain with which these people have a relationship of reciprocity and even kinship. For instance, in 2016 a new species of beetle was discovered in the area and called *Trechisibus apukhapiensis* sp.n., after the Khapía's *apu* (Ruiz-Tapiador & Delgado 2016), underlining the connection between *nature* and *culture*. In this sense, strictly separating natural and cultural dimensions of the mountain is not an option for the local communities. From the Aymara point of view, the *natural*, in the sense of non-indigenous *modern* ontology, is neither inert nor static, but alive and integrated through socio-economic, political and cultural relations with human and non-human beings. Recognizing these facts, the area was declared a Reserved Zone by the Peruvian State on 28 May 2011, amid severe conflicts between different social actors: the state, the Canadian transnational company Bear Creek, and the farming communities of the area.

Reasons for the conflict

On 10 May 2011, farming communities in the south of Puno began an indefinite strike against the



Figure 1 – The Cerro Khapía Landscape Reserve. © Boris Blanco-Gallegos (2021)

exploration of an area in the district of Kelluyo for the extraction of silver by the Canadian transnational Bear Creek corporation, which, according to the protesters, would contaminate the natural resources of the area. The strike, led by the Front for the Defence of Environmental Resources in the Southern Zone of Puno, led by Walter Aduviri, paralyzed the entire south of the department and interrupted communications with neighbouring Bolivia. The strike won the protesters a first victory, with the archaeological cultural landscape of Cerro Khapía being declared a National Cultural Heritage Site on 20 May 2011 (Vice-Ministerial Resolution no. 589-2011-VMPCIC-MC; Anonymous 2011b). Despite this, the protesters aimed at the retraction of all concessions and, for this reason, they continued the strike. On 23 May, more than 5000 residents from the south arrived in Puno, demanding the termination of the Santa Ana mining project and the development of agricultural projects in its place. On the afternoon of 26 May, the city of Puno was the scene of heavy clashes between the police and various groups of demonstrators from the south of the region. There was violence and attacks on bank branches, state-owned vehicles and, in Puno, the premises of the tax offices (SUNAT) and the National Comptroller's Office (Contraloría General de la República). Similar disturbances also occurred in the town of Desaguadero, where the customs office was set on fire. In the days that followed, the protest subsided, but echoes range through the following years, also with the anti-mining protests still strong in the region. Bear Creek, therefore, never began operations on the Santa Ana concession because of the opposition of the local population. For this reason, between 2014 and 2017, the company appealed to international arbitration under the Canada-Peru Free Trade Agreement, which was heard at the International Centre for Settlement of Investment Disputes (ICSID) in Washington D.C. The Tribunal found in favour of

Table 1 – Timeline of events that led to the renouncement of the Santa Ana mining concession by Bear Creek.

Date	Event	Remark
29 November 2007	Mining concession granted to Bear Creek	Supreme Decree no. 083-2007-EM (Anonymous 2007)
10 May 2011	Beginning of peasant protests against mining activities	
20 May 2011	Declaration of the archaeological cultural landscape at Cerro Khapía as a National Cultural Heritage	Vice-Ministerial Resolution no. 589-2011-VMPCIC-MC (Anonymous 2011b)
28 May 2011	Declaration of the whole Cerro Khapía as a Reserved Zone	Supreme Decree no. 008-2011-MINAM (Anonymous 2011a)
13 November 2018	Retraction of mining concessions by Bear Creek	

the corporation, which was awarded a compensation of approximately USD 30.4 million (Bear Creek s.a.). In 2018 several organizations presented a manifesto in defence of territories and natural resources and against the unjust criminalization of social protest and the collusion of the state with foreign capital (Anonymous 2018a). On 13 November 2018, the Bear Creek Mining Corporation retracted the mining concessions of the Santa Ana project and the Peruvian Geological Mining and Metallurgical Institute communicated that all concessions of the former Santa Ana project were terminated (Anonymous 2018b; Anonymous 2019; see Table 1).

Mountains in Aymara ontology

The local population's claims had to do with the retraction of any concessions, one of which would have affected the Cerro Khapía. To understand the scope of the conflict, it is useful to compare the perspective of former President García, specifically on the issue of the Cerro Khapía, and the Aymara anti-mining point of view.

“[We have to] defeat the absurd, pantheistic ideologies that believe that the walls are gods and the air is god, in short, to go back to those primitive formulas of religiosity where they say ‘Don’t touch that hill because it’s an apu and it’s full of the millenarian spirit of I don’t know what’, right? Well, if it comes to that, then let’s not do anything, not even mining. [...] We go back to, let’s say, this primitive animism, right? [...] If it is an environmental sanctuary, fine, but if it is a sanctuary because the souls of the ancestors are there, well... For me, the ancestors are surely in heaven, they are not there, and let those who now get their livelihood from an investment in those hills” (García 2011; translation by the authors).

García did not contemplate the possibility that the main demands of those opposing the mining company's operations included not just the total retraction of the concessions but also the demand to cancel the rights of another company, Patagonia SA, in the Cerro Khapía area (Quiñones 2013; Pinto Herrera 2013). Anti-mining positions usually underline the risk of environmental impacts, such as water and soil contamination, endangering the habitability of the site for people, plants and animals (Salas Carreño 2017; Sault 2018). Yet, to Aymara people the destruction of the mountain means not only the destruction of *nature*, but a complex and painful destruction of an ontological world.

While for García the souls of the dead live in paradise, the Aymara concept is different. Despite colonial attempts to impose the Christian tripartition of hell, purgatory, and paradise, whose closest translation into Aymara is *manqha*, *aka* and *alaxa pacha*, the transferability of these notions to indigenous Aymara contexts is difficult. *Pacha* is a polysemous term that in Aymara can include the dimensions of time and space: *nayra pacha* (literally, time / space eyes) can be translated as *past*, according to the idea of what the speaker knows and can legitimately refer to as having seen / experienced or heard from a reliable source. Similarly, *aka pachana*, formed from the adverb of place *aka*, here, by the root *pacha-* and the suffix *-na* indicating a state in place, defines space. *Alaxa pacha*, literally, the space / place above, is assimilated to the Christian idea of heaven and thus of paradise. But there is more than one *pacha*. For example, the *jallu pacha*, time / space of rain, indicates both the rainy period, roughly from November to April, and the space from which the rain originates, rain that infiltrates the earth allowing the cycle to continue.

Yet the earth is also the burial place of the deceased who, after a complex and articulated ritual of separation from humanity as a condition (Ventura et al. 2018), which lasts three years, are recomposed again in the elements of the landscape (Branca 2018), becoming, for example, *uywiri* – from *uywaña*, to raise, plus the suffix *-ri* denoting the agent performing the action, *spirits* generally benevolent in comparison to the *achachilas* and *avichas*, literally *grandfathers* and *grandmothers*, whose relationship with humanity is closely connected to forms of reciprocity functional to maintaining the *pacha* in a state of equilibrium. Marisol de la Cadena wrote: “to runakuna, [...] tirakuna are their names. More clearly, no separation exists between Ausangate [a Cusco *apu*] the word and Ausangate the earth-being; no *meaning* mediates between the name and the *being*” (de la Cadena 2015: 25). While for García the tutelary mountains or *apus* are primitive beliefs, for thousands of individuals they are a fundamental component of individual and group relations (Salas Carreño 2017). With the *apus* it is necessary to maintain a relationship of reciprocity and shared care, through a series of ritual practices that affect everyday life (Figure 2). Whenever it comes to the use of *nature* in the central Andes, *culture* should not be considered its opposite, and groups of different mind-sets might require careful mediation.

Outlook: landscape reserves and/or Andean cosmo vision?

Although existing now for more than a decade, the protected area categorization of the Cerro Khapía Landscape Reserve is still only transitional. As SER-NANP (s.a.; translation by the authors) states,

“[t]he establishment process [of a protected area] may go through a transitional Reserved Zone. Reserved Zones are those areas that meet the conditions to be considered as Natural Protected Areas, but require complementary studies to determine, among others, the area covered and the category that corresponds to them as such, as well as the viability of their management. In this sense, it is important to point out that unlike the definitive Natural Protected Areas, the Reserved Zones are not established in perpetuity[.]”

In the present case, the intention to categorize the Cerro Khapía as an official Landscape Reserve in future is expressed by its current name. In this context, however, one might reflect on the usefulness of applying the notion of *landscape* to a site of importance from an Andean worldview. While in present European thought the urban Renaissance idea of landscapes as aesthetic *painted environment* still prevails (alongside a naturalistic notion that defines landscapes as ecosystems), Andean indigenous perspectives conceptualize the environment more as *mother* (*pacha mama*), selected mountain environments as gods or *apus*. Furthermore, Sarmiento (2017) rightfully highlights the various forms of a *sincretismo paisajista* or landscape syncretism, amalgamating nature and culture in a framework that draws on different religions and both Iberian and Andean worldviews. Therefore planners, policy makers, and protected area managers should constantly question existing categories like *landscape*, such a simple and seemingly widely understood term, which, however, means very different things to very different people. Using the same words does not automatically mean speaking the same *language*. To carry out an appropriate categorization, especially for local mountain communities, the process of finding the right protected area category could take place within a participatory and transdisciplinary ontological setting (Haller & Branca 2020; Sarmiento 2020). Such an approach could help to mediate between mindsets and avoid more socio-environmental conflicts, making common imaginaries of peaceful protected mountain areas a reality.

Acknowledgment

Domenico Branca would like to thank the research project Ecofrictions of Anthropocene. Sustainability and Herigitisation in the Processes of Industrial Reconversion of the Italian Ministry of Education and Research (PRIN 2015-20155TYKCM-SH5, unit PI Dr. Franco Lai) for funding part of this research.



Figure 3 – The Aymara farming community of Choquechaca near the Cerro Khapía. © Boris Blanco-Gallegos (2021)

References

- Alanoca-Arocutipa, V. 2013. *Conflictos aimaras*. Puno.
- Angulo, M. 2015. Periodismo regional y conflictos sociales. Análisis de las opiniones de los diarios *Correo y Los Andes* de Puno (Perú) durante el conflicto social del ‘Aimarazo’ (2011). *Campos* 5 (1-2): 13–37. Bogotá. Doi: 10.15332/s2339-3688.2017.0001.01
- Anonymous 2007. Autorizan a empresa minera a realizar actividades dentro de los cincuenta kilómetros de zona de frontera: Decreto Supremo N° 083-2007-EM. *El Peruano* 29 November: 358511–358512. Lima.
- Anonymous 2011a. Decreto Supremo que declara Zona Reservada “Reserva Paisajística Cerro Khapía” y dicta disposiciones para la protección de los recursos hídricos en las cabeceras de cuenca del Cerro Khapía: Decreto Supremo N° 008-2011-MINAM. *El Peruano* 28 May: 443372–4463373. Lima.
- Anonymous 2011b. Declaran patrimonio cultural de la Nación a monumento arqueológico prehispánico ubicado en el departamento de Puno: Resolución Viceministerial N° 589-2011-VMPCIC-MC. *El Peruano* 20 May: 442834–442835. Lima.
- Anonymous 2018a. *Presentan manifiesto público que rechaza criminalización de la protesta*. Available at: <http://web.archive.org/web/20180911182938/https://www.servindi.org/actualidad-noticias/10/09/2018/presentan-manifiesto-publico-en-rechazo-la-criminalizacion-de-la> (accessed 16/04/2021)
- Anonymous 2018b. *Puno: Bear Creek renuncia a las concesiones mineras del proyecto Santa Ana*. Available at: <http://web.archive.org/web/20190112052036/https://www.servindi.org/actualidad-noticias/11/01/2019/bear-creek-renuncia-las-concesiones-mineras-del-proyecto-santa-ana> (accessed 16/04/2021)
- Anonymous 2019. *Bear Creek renuncia al proyecto minero Santa Ana*. Available at: <http://web.archive.org/web/20210309155624/https://mineriaenergia.com/>

bear-creek-renuncia-al-proyecto-minero-santa-ana/ (accessed 16/04/2021)

Badola, R. & S.A. Hussain 2003. Conflict in Paradise: Women and Protected Areas in the Indian Himalayas. *Mountain Research and Development* 23(3): 234–237. Doi: 10.1659/0276-4741(2003)023[0234:CIP]2.0.CO;2

Bear Creek. s.a. *Santa Ana*. Available at: <http://web.archive.org/web/20201205153411/https://www.bearcreekmining.com/projects/santa-ana/> (accessed 16/04/2021)

Blaser, M. 2019. Reflexiones sobre la ontología política de los conflictos medioambientales. *América Crítica* 3(2): 63–79. Doi: 10.13125/americanacritica/3991

Branca, D. 2017. *Identidad aymara en el Perú. Nación, vivencia y narración*. Lima.

Branca, D. 2018. Identidad, alteridad y el Día de los Muertos en el Altiplano aymara de Puno, Perú. *Anales de Antropología* 52(2): 141–155. Doi: 10.22201/ia.24486221e.2018.2.63354

Braun, V., G. Bendler, A. Haller & K. Heinrich 2018. Timelines of Tension: Trajectories of Protected-Area Creation in the Austrian Alps. *Journal of Alpine Research | Revue de Géographie Alpine* 106(4): 1–20. Doi: 10.4000/rga.4711

De la Cadena, M. 2015. *Earth Beings: Ecologies of Practice across Andean Worlds*. Durham & London.

Escobar, A. 2015. Territorios de diferencia: La ontología política de los “derechos al territorio”. *Cuadernos de Antropología Social* 41: 25–38. Buenos Aires.

Eschenhagen, M.L. & H. Baca 2014. Comunidades aymaras y la gran minería. Una mirada a los argumentos detrás del conflicto socioambiental en Puno, Perú. In: Göbel, B. & A. Ulloa (eds.), *Extractivismo minero en Colombia y en América Latina*. 75–105. Berlin & Bogotá.

Gade, D. 1999. *Nature and Culture in the Andes*. Madison.

García, A. 2011. *Alan García contra las ideologías absurdas panteístas*. Available at: <https://youtu.be/2Vf4WfS5t08> (accessed 01/20/2019).

Gudynas, E. 2009. Diez tesis urgentes sobre el nuevo extractivismo. Contextos y demandas bajo el progresismo sudamericano actual. In: Schuldt, J., A. Acosta, A. Barandiarán et al. (eds.), *Extractivismo, política y sociedad*. 379–410. Quito.

Haller, A. & H. Córdova-Aguilar 2018. Urbanization and the advent of regional conservation: Huanacayo and the Cordillera Huaytapallana, Peru. *eco.mont - Journal on protected mountain research and management* 10(2): 37–56. Doi: 10.1553/eco.mont-10-2s59

Haller, A. & D. Branca 2020. Montología: una perspectiva de montaña hacia la investigación transdisciplinaria y el desarrollo sustentable. *Revista de Investigaciones Altoandinas* 22(4): 313–322. Doi: 10.18271/ria.2020.193

McDonnell, E. 2015. The Co-Constitution of Neoliberalism, Extractive Industries, and Indigeneity: Anti-mining protests in Puno, Peru. *The Extractive*

Industries and Society 2(1): 112–123. Doi: 10.1016/j.exis.2014.10.002

Pinto Herrera, H. 2013. Conflicto minero en Santa Ana (Puno). *Investigaciones Sociales* 17(31): 207–220. Doi: 10.15381/is.v17i31.7909

Pulgar Vidal, J. 1946. *Historia y geografía del Perú. Las ocho regiones naturales del Perú*. Lima.

Quiñones, P. 2013. Concesiones, participación y conflicto en Puno. El caso del proyecto minero Santa Ana. *Los límites de la expansión minera en el Perú*. 15–70. Lima.

Ruiz-Tapiador, I. & P. Delgado 2016. *Trechisibus apukbapiensis* sp. n. (Coleoptera: Carabidae, Trechinae) from southeastern Andean mountains of Peru. *Baltic Journal of Coleopterology* 16(2): 97–104.

Salas Carreño, G. 2017. Mining and the living materiality of mountains in Andean societies. *Journal of Material Culture* 22(2): 133–150. Doi: 10.1177/1359183516679439

Sarmiento, F. 2017. Transformación sincrética del paisaje rural en los Andes: una aplicación sinóptica de las geografías andinas de Axel Borsdorf. In: Sánchez, R., R. Hidalgo & F. Arenas (eds.), *Re-conociendo las geografías de América Latina y el Caribe*. 35–54. Santiago de Chile.

Sarmiento, F. 2020. Montology manifesto: echoes towards a transdisciplinary science of mountains. *Journal of Mountain Science* 17: 2512–2527. Doi: 10.1007/s11629-019-5536-2

Sault, N. 2018. Condors, waters, and mining: Heeding voices from Andean communities. *Ethnobiology Letters* 9(1): 13–29.

SERNANP. s.a. *¿Cómo se establece un ANP?* Available at: https://web.archive.org/web/20210304134041/https://www.sernanp.gob.pe/como_se_establecen (accessed 01/20/2019)

Thomas, L. & J. Middleton 2003. *Guidelines for Management Planning of Protected Areas*. Gland, Switzerland and Cambridge, UK.

Ventura, M., J.L. Mateo & M. Clua 2018. La humanidad: Antropología de un concepto. In: Ventura, M., J.L. Mateo & M. Clua (eds.), *Humanidad. Categoría o condición. Un viaje antropológico*. 13–37. Barcelona.

Zevallos-Yana, J.F. 2020. Concesiones mineras, comunidades campesinas y conflictos sociales en la región de Puno. *Revista de Derecho de la Universidad Nacional del Altiplano* 5(1): 54–70. Doi: 10.47712/rd.2020.v5i1.55

Authors

Domenico Branca

received his PhD in Social Anthropology from the Autonomous University of Barcelona (Spain) and is currently a postdoctoral researcher at the Institute for Interdisciplinary Mountain Research of the Austrian Academy of Sciences in Innsbruck. His research focuses on the study of ethnic identities and urban and

mountain anthropology and geography in the Peruvian Andes.

Andreas Haller

received his PhD in Geography from the University of Innsbruck (Austria) and is currently a postdoctoral researcher and principal investigator at the Institute for Interdisciplinary Mountain Research of the Austrian Academy of Sciences. His research interests include rural-urban interaction, urbanization, and land-use change in mountain environments.

Boris Blanco-Gallegos

received his BA in Anthropology from the Universidad Nacional del Altiplano de Puno (Peru). He is a

researcher and former member of the Institute for the Studies of Andean Cultures (IDECA) in Puno (Peru). His main research is on the study of environmental social sciences and ethnoecology in the Peruvian Andes.

Vicente Alanoca-Arocutipa

received his PhD in History of Latin America from the Pablo de Olavide University of Seville (Spain) and is currently Professor of Anthropology at the Universidad Nacional del Altiplano de Puno (Peru). His main research interests are on the study of indigenous movements, critical thought, and environmental issues in the Peruvian Andes.

Current status and future prospects of Lhalu wetland on the Tibetan Plateau

Hui Wang, Dong Xie, Wen Xiong, Wei Tang, Zhigang Wu, Keyan Xiao & Qiang Wang

Keywords: urban wetland, biodiversity conservation, human settlement, ecological restoration

Abstract

Lhalu wetland, located in the northwest of Lhasa city, Tibet, is the highest and largest urban natural wetland in the world. Due to its specific climate and the unique plateau ecosystem, it is a hotspot of endemic and endangered species. Lhalu wetland is an important wetland for Lhasa city for its biodiversity and for enhancing human well-being. However, due to global warming, over-exploitation and the presence of non-native species, it has suffered serious ecosystem damage and biodiversity loss. To protect biodiversity and the functioning of the ecosystem, new measures are needed, and current measures should be better enforced. This study is important for biodiversity conservation and the management of Lhalu wetland in the Qinghai-Tibet plateau.

Profile

Protected area

Lhalu wetland

Mountain range

Himalaya, China

Introduction

Wetland ecosystems cover only 1.5% of the Earth's surface, but provide about 40% of the value of all ecosystem services in the world (Zedler 2003). However, globally, wetland areas have decreased rapidly (Davidson 2014), notably in China, where the last thirty years have seen their massive reduction (Mao et al. 2018). The Qinghai-Tibet plateau has the most densely distributed wetland areas in China (Xu et al. 2019). However, some wetlands have experienced degradation caused by multiple factors (Meng et al. 2017). This has been the case for Lhalu wetland, which is the highest and largest urban natural wetland in the world (Chen et al. 2018), where degradation has been rapid. In this study, for better protection of highland wetlands generally, we provide an overview of the status, threats and conservation recommendations for Lhalu wetland.

Study area

Lhalu Wetland (29°39'46.3"–29°41'05.5" N, 91°03'48.5"–91°06'51.4" E; average elevation 3645 m; total area 6.6 km²) is located in the northwest of Lhasa city, the capital of Tibet, China (Figure 1). It is a swampy wetland of peat and reeds, located in a temperate, semi-arid, monsoon climate zone in the southern Tibetan Plateau. The average annual precipitation is 439.8 mm, and most rain falls between July and September. Temperatures are low, ranging from 16°C (extreme 30°C) in June or July, to –1.6°C (extreme –16.5°C) in January (average temperature 7.5°C). The principal rivers are the Lhasa and the Liusha, which are fed mainly by rainwater and alpine snow-melt.

Method

We gathered biodiversity information from diverse sources, searching for the combination of words *bio-*

diversity and *Lhalu wetland* in the Web of Science (ISI, <http://www.isiknowledge.com>) and the China National Knowledge Infrastructure (<http://www.cnki.net>). We also looked for biodiversity information in various Chinese publications, such as the *Comprehensive investigation report on Lhalu wetland nature reserve* (LEPA 2004). Threatened and endangered species were identified according to the red list categories of the International Union for Conservation of Nature (IUCN, www.iucnlist.org) and the China Species Red List (Wang & Xie 2004).

Biodiversity

In terms of flora, previous surveys indicated the presence of 85 vascular plant species belonging to 30 families distributed in the marsh. At the family level, Gramineae were the most dominant, with 20 species, followed by Cyperaceae, with 13. Other families contributed fewer than five species each (Li et al. 2008); some non-native species, such as *Amaranthus tricolor* and *Oxalis corymbosa*, have invaded Lhalu wetland. The wetland supports rich and endemic animal resources: 62 bird species belonging to 24 families of 13 orders; 10 fish species belonging to 4 families of 3 orders; 4 amphibian species belonging to 2 families of 1 order; 255 species of protozoa belonging to 79 families of 5 orders. Seven bird species are identified as protected species in China, where there are two levels of protection. These are *Grus nigricollis* and *Gypaetus barbatus* (classified at the higher protection level), and *Mihus korschun*, *Accipiter nisus*, *Buteo buteo*, *Falco peregrinus* and *Falco tinnunculus* (classified at the second level of protection). *Anser indicus* and *Tadorna ferruginea* are listed as protected species in the Tibet Autonomous Region (Ba et al. 2009).

Current degradation status of Lhalu wetland

For a long time, Lhalu wetland was considered wasteland by local residents (Yeh 2009). The area of the wetland decreased sharply in the years 1950–2000 (Table 1). It then remained constant until 2005, thanks to the creation of the Lhalu National Nature Reserve. Although the total area of Lhalu wetland has not decreased any further in the last ten years, the wetland ecosystem has become degraded. Firstly, the water levels in the wetland continued to fall. In the 1950s, the wetland was entirely covered by standing water thanks to the continuous flow of the Liusha river throughout the year. Now, the proportion of water-covered area to total area has significantly decreased (Li 2005). Some areas of wetland ecosystem have converted to meadow and eventually to sandy land (Zhang et al. 2013). Secondly, the plant community structure, species composition and diversity of Lhalu wetland have changed dramatically in the past seventy years. The height of the grasses has decreased from 2 m to less than 1 m in the past seventy years, and the yield of grass fell from 12 690 kg/ha in the 1960s to 945 kg/ha in the 2000s, and now to 63 kg/ha (Chen et al. 2018). Forty years ago, the typical vegetation was reed (*Phragmites australis*); in the 2000s, the area was dominated by *Carex* spp., *Kobresia* spp., and *Juncus* spp. (Laduo et al. 2009). The number of plant species increased significantly from 53 in 1985 (mostly hydrophytes, such as *Hippuris vulgaris* and *Potamogeton distinctus*) to 85 in 2008 (mostly mesophytes, such as species of Gramineae and Cyperaceae).

Threats to Lhalu wetland

Global warming

The Qinghai-Tibet Plateau is one of the most sensitive regions to global warming (Lu & Liu 2010). Over the past sixty years, the annual average temperature of Lhalu wetland has increased gradually (Tang et al. 2019). Especially since 1995, there have been significant increases in Lhasa city in the winter temperature and the annual average temperature (Zhao et al. 2015). The highest recorded summer temperature was in excess of 30°C in 2019, far exceeding the hottest temperature record of 25°C in 2009. Higher temperatures

Table 1 – Changes in the city (Lhasa) and Lhalu wetland areas in the past sixty years

Year	Area of Lhasa (km ²)	Area of Lhalu wetland (km ²)
1951	3.16	12
1952–1959	4.26	11.2
1960–1969	14.43	10.5
1970–1979	21.90	10.5
1981–1989	43.40	9.6
1990–2000	54	6.2
2001–2010	62.88	6.6
2011–2019	77.9	6.6

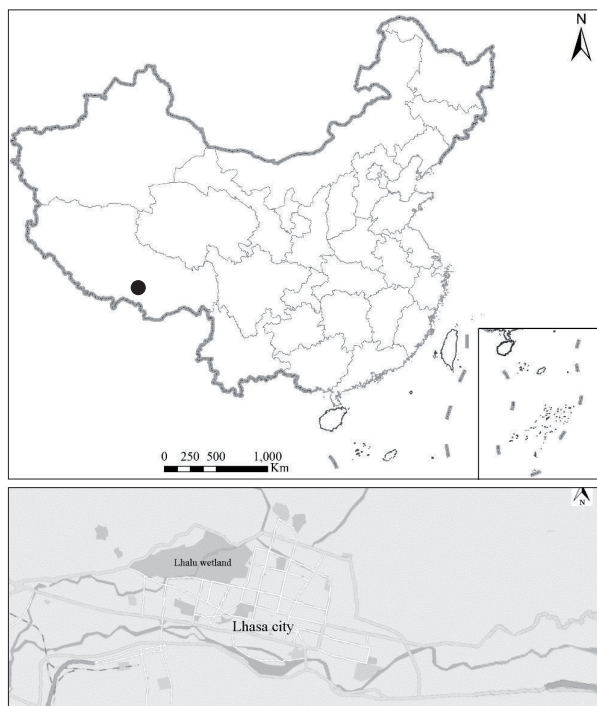


Figure 1 – Lhasa city and Lhalu wetland.

lead to increased evapotranspiration, and the water level of Lhalu wetland has generally been decreasing since the 1960s (Hua et al. 2007).

Human disturbance

Human disturbance is the most important cause of degradation of Lhalu wetland. Before the 1960s, the wetland supported high biodiversity, with dozens of different species per square kilometre. From 1964, drainage canals and roads were built in the wetland, and in the 1970s farms and infrastructure built around the wetland caused the peat gradually to degrade. In the mid-1980s, stones and gravel blocked the incoming water and quicksand from the Niangergou and Duodigou rivers, causing desertification in the north of the wetland at a rate of 1 to 1.5 acres per year. In the 1990s, the construction of the main canal greatly changed the hydrological conditions of the wetland. Because the canal can only be drained and not irrigated, 70% of the water in Lhalu wetland was discharged directly into the River Lhasa. In 2000, over 5 000 farm animals were being raised in the wetland, at one point reaching 7 000, and more than 1 000 farmers were cutting hay there. Finally, since 2000, a further large area of Lhalu wetland has become seriously desertified and natural vegetation has been reduced significantly (Zong et al. 2005).

Non-native species

Non-native species are one of the main threats for aquatic biodiversity (Mack et al. 2000). China is now the country with highest number of non-native aquatic species in the world, and consequently has suffered great ecological and economic damage (Xiong et al. 2015, 2017; Wang et al. 2016). Despite that, the num-

ber of non-native species in Tibet is lower than in other administrative regions (Bai et al. 2013). Recently, many non-native aquatic species were introduced into the Qinghai-Tibet Plateau (Chen & Chen 2010; Liu et al. 2015; Xiong et al. 2015; Sui et al. 2016). Some, such as *Rana catesbeiana*, *Trachemys scripta elegans*, *Pseudorasbora parva*, *Carassius auratus*, *Misgurnus anguillicaudatus*, *Silurus asotus*, *Cyprinus carpio*, *Micropercops swinhonis* and *Paramisgurnus dabryanus*, have established dense populations in Lhalu wetland, where the populations of many native species, such as *Ptychobarbus dipogon*, *Schizopygopsis young-husbandi* and *Triplophysa orientalis*, have declined sharply due to the invasion of these non-native species (Liu et al. 2015).

Measures and prospects for ecological restoration

Restoring hydrology and vegetation is the first priority in the ecological restoration of wetlands (Cui et al. 2009). In order to restore water levels in Lhalu wetland, the north canal was built in the 2000s. Now, the north canal is the main water supply channel of the wetland, where the water remains 0.5–1.5 m deep throughout the year. The number of hydrophytes has recovered to 30 species, which are now found in 95% of the total area of wetland (figures for 2019). The restoration of the area's hydrology has benefited the restoration of the vegetation.

After the establishment of the Lhalu wetland National Natural Reserve, human interference decreased greatly. In 2000, the Lhasa Municipal Government issued the Administrative Measures for the Lhalu Wetland Nature Reserve, compiled the *General Plan for the Lalulu Wetland Nature Reserve*, and established the Lhalu Wetland Reserve Management Station. In the 2000s, a fence of about 11 km long was constructed around the wetland. Thereafter, livestock grazing, peat exploitation, hunting and other human activities were banned in Lhalu wetland. Now, biodiversity in the wetland has rebounded sharply, with many endemic and protected species returning to the area.

Ecological monitoring is an important tool for the protection of endangered species and wetland restoration (Martin et al. 2007). Now, new technology and methods, such as remote sensing, automatic cameras and environmental DNA, are widely used for monitoring and protecting endangered species in the wetland (Klemas 2013). This ecological monitoring helps to improve the recovery of protected species, as well as to control the invasion of non-native species.

Acknowledgements

This research was supported by the Second Tibetan Plateau Scientific Expedition and Research programme (STEP), Grant No. 2019 QZKK0304, 2019 QZKK0501, and the National Natural Science Foundation of China (NO. 31600189 and 31900374). We

are grateful to Professor Yifeng Chen, Dekui He, Dr Xiaoyun Sui, Yintao Jia, Xiu Feng and Ren Zhu who provided help in field investigation and valuable suggestions to improve this study. We are also grateful to the anonymous referees for their helpful comments on earlier versions of this paper.

References

- Bai, F., R. Chisholm, W.G. Sang & M. Dong 2013. Spatial risk assessment of alien invasive plants in China. *Environmental Science & Technology* 47(14): 7624–7632.
- Chen, T., W. Lang, E. Chan & C.H. Philipp 2018. Lhasa: urbanising China in the frontier regions. *Cities* 74: 343–353.
- Cui, B., Q. Yang, Z. Yang & K. Zhang 2009. Evaluating the ecological performance of wetland restoration in the Yellow River Delta, China. *Ecological Engineering* 35: 1090–1103.
- Davidson, N.C. 2014. How much wetland has the world lost? Long-term and recent trends in global wetland area. *Marine and Freshwater Research* 65(10): 934–941.
- Hua, G.C., C.Y. Huang, Y.L. Li & Y.-Z. Zhang 2007. Ecological protection and restoration of lalulu wetland in Lasa city. *Water Resources Protection* 23(7): 93–96. [In Chinese]
- Klemas, V. 2013. Using Remote Sensing to Select and Monitor Wetland Restoration Sites: An Overview. *Journal of Coastal Research* 29(4): 958–970.
- Laduo, B. J. & P. Basang 2009. The relationship between composition and distribution of vegetation and environmental factors in Lhalu Dhamra, Lhasa. *Journal of Tibet University (Natural Science Edition)* 24(1): 15–20. [In Chinese]
- LEPA (Lhasa Environmental Protection Agency). 2004. *Comprehensive investigation report on Lhalu wetland nature reserve*. Lhasa.
- Li, C. 2005. Research on the variation characteristics of eco-environment and propagation resources in Lalulu wetland. *Journal of Natural Resources* 20(1): 145–151. [In Chinese]
- Li, C., K.S. Zhou, & H. Li 2008. Species diversity and structure of main plant communities in Lalulu wetland. *Acta Botanica Boreali-Occidentalia Sinica* 28(12): 2514–2520. [In Chinese]
- Liu, C.L., Y.F. Chen, J.D. Olden & H. Dekui 2015. Phenotypic shifts in life history traits influence invasion success of goldfish in the Yarlung Tsangpo River, Tibet. *Transactions of the American Fisheries Society* 144(3): 602–609.
- Lu, H. & G. Liu 2010. Trends in temperature and precipitation of Tibetan Plateau, 1961–2015. *Climate Research* 43: 179–190.
- Mack, R.N., D. Simberloff, W.M. Lonsdale, H. Evans, M. Clout & F.A. Bazzaz 2000. Biotic invasions: causes, epidemiology, global consequences, and control. *Ecological Application* 10: 689–710.
- Mao, D.H., Z.M. Wang, J.G. Wu, B.F. Wu, Y. Zeng, K.S. Song, K.P. Yi & L. Luo 2018. China's wetlands

loss to urban expansion. *Land Degradation and Development* 29: 2644–2657.

Martin, J., W.M. Kitchens & J.E. Hines 2007. Importance of well-designed monitoring programs for the conservation of endangered species: Case study of the snail kite. *Conservation Biology* 21: 472–481.

Meng, W.Q., M.X. He, B.B. Hu, X.Q. Mo, H.Y. Li, B.Q. Liu & Z.L. Wang 2017. Status of wetlands in China: A review of extent, degradation, issues and recommendations for improvement. *Ocean & Coastal Management* 146: 50–59.

Sui, X.Y., X.A. Zhang, Y.T. Jia, Y. Chen & D. Hui 2016. Predicting fish invasions in the Yarlung zangbo River of the Qinghai-Tibet Plateau, China. *American Fisheries Society Symposium* 84: 139–167.

Tang, B., G.B. Xiao & L. Wu 2019. Variation characteristics of air temperature in Lhasa city in recent 54 years. *Journal of Chengdu University of Information Technology* 34(1): 72–76. [In Chinese]

Wang, H., Q. Wang, P.A. Bowler & W. Xiong 2016. Invasive aquatic plants in China. *Aquatic Invasions* 11(1): 1–9.

Wang, S. & Y. Xie. 2004. *China Species Red List* (Volume 1): Red List. Higher Education Press, Beijing.

Xiong, W., C.Y. Shen, Z.X. Wu, H. S. Lu & Y.R. Yan 2017. A brief overview of known introductions of non-native marine and coastal species into China. *Aquatic Invasions* 12(1): 109–115.

Xiong, W., X.Y. Sui, S.H. Liang & Y. Chen 2015. Non-native freshwater fish species in China. *Reviews in Fish Biology and Fisheries* 25: 651–687.

Xu, W.H., X.Y. Fan, J.G. Ma, S.L. Pimm, L.Q. Kong, Y. Zeng, X.S. Li, Y. Xiao, H. Zheng, J.G. Liu, B.F. Wu, L. An, L. Zhang, X.K. Wang & Z.Y. Ouyang 2019. Hidden loss of wetlands in China. *Current Biology* 29: 3065–3071.

Zedler, J. 2003. Wetlands at your service: reducing impacts of agriculture at the watershed scale. *Frontiers in Ecology and the Environment* 1(2): 65–72.

Zhang, C., X.X. Zhang, G. Zhu & F. Liu 2013. Lahu wetland area change trend and cause of formation analysis. *Water Conservancy Science and Technology and Economy* 19(2): 35–36. [In Chinese]

Zhao, J.B., X.X. Wang & X.F. Zhang 2015. Characteristics of temperature changes in Lhasa from year 1980 to 2012 and its environmental significance. *Journal of Tibet University* 30(2): 33–39. [In Chinese]

Zong, H., C.S. Wang, C.Y. Huang et al. 2005. Research on ecological characteristics and ecological degradation of Tibetan Lhalu wetland. *Journal of Southwest University for Nationalities (Natural Science Edition)* 31(1): 72–78. [In Chinese]

Authors

Wang Hui¹

is a lecturer in Forestry at Huazhong Agricultural University. She has a PhD in Ecology from Wuhan

University. Her research interests relate to biological conservation in forest ecosystems. E-mail: wanghui@mail.hzau.edu.cn

Xie Dong²

is an associate professor at Nanjing Forestry University. He has a PhD in Ecology. His research interests relate to biological conservation in wetland ecosystems. E-mail: xiedong0123@gmail.com

Xiong Wen^{3*}

is a lecturer at Guangdong Ocean University. He has a PhD in botany. His research focuses on biological invasion and biodiversity conservation in vulnerable habitats. E-mail: chinaxiongwen@gmail.com

Tang Wei^{4*}

is a Senior Engineer at the Institute of Hydrobiology, Chinese Academy of Sciences. He has a Master's degree. His research focuses on the conservation of water resources. E-mail: tangwei@ihb.ac.cn

Wu Zhigang⁴

is a Research Associate Professor at the Institute of Hydrobiology, Chinese Academy of Sciences. He has a PhD in Ecology. His research focuses on plant ecology, evolution and systematics. E-mail: wuzg@ihb.ac.cn

Xiao Keyan⁵

is a director at Hubei Xiuhu Botanical Garden. He has a PhD in Botany. His research focuses on the conservation of plant biodiversity. E-mail: xiaoky@whu.edu.cn

Wang Qiang⁶

is a Senior Engineer at East China Normal University. He has a PhD in Botany. His research focuses on the conservation of water resources. E-mail: wangq-flora@163.com

¹ College of Horticulture & Forestry Sciences / Hubei Engineering Technology Research Center for Forestry Information, Huazhong Agriculture University, Wuhan 430070, China

² Co-Innovation Center for Sustainable Forestry in Southern China, Nanjing Forestry University, Nanjing 210037, China

³ College of Fisheries, Guangdong Ocean University, Zhanjiang 524088, China

⁴ Institute of Hydrobiology, Chinese Academy of Sciences, Wuhan 430072, China

⁵ Hubei Xiuhu Botanical Garden, Wuhan 430070, China

⁶ Shanghai Key Laboratory for Urban Ecological Processes and Eco-Restoration, School of Ecological and Environmental Sciences, East China Normal University, Shanghai 200062, China

Mountain Biodiversity Day 2021 – biodiversity and pandemic

Chris Walzer & Guido Plassmann

Keywords: COVID-19, biodiversity protection, resilient environments, protected areas

Abstract

On 13 January 2021, the French Ministry of the Environment in cooperation with ALPARC, UNEP and the Permanent Secretariat of the Alpine Convention organized the virtual *Mountain Biodiversity Day*. The event gathered together experts in the field of mountain biodiversity and political representatives from mountain regions all over the world in order to stress the importance of mountain biodiversity within the Post-2020 Global Biodiversity Framework, especially in the context of the on-going pandemic and discussions on building back better. The Alpine session of the event, introduced by Guido Plassmann, was moderated by Chris Walzer and focused on the link between biodiversity and zoonoses – a major challenge for environmental policies worldwide. The topic is developed by the short text which follows.

Introduction

Against the backdrop of a relentlessly warming planet, atmospheric carbon dioxide breaching 400-ppm, and some one million species threatened with extinction over the next few decades, a new coronavirus has catapulted across the ever-evolving interfaces between humans and wild places, relentlessly spreading disease and bringing immense suffering and death to the most remote corners of our planet. This dramatic global situation is caused by a virus that previously existed on the other side of the human-wildlife interface, and the disease that it causes was unknown and still unnamed at the beginning of 2020.

This pandemic is primarily not about bat soup, pangolins or even specific viruses, but all about our interactions with nature, and our exploitation and destruction of it. It is about the interfaces – these edges of destruction – between humans, wildlife and nature in general, and the super-interfaces we create in urban centres with the commercial trade of wildlife for consumption. Along with climate change, biodiversity loss and raging inequities and injustice, COVID-19 is just another symptom of an ailing planet and has starkly reminded us of the basic fact: human, animal, plant and environmental health and well-being are all intrinsically connected.

To limit the impacts of the next spillover event, we need a holistic One Health approach, as outlined in the Berlin Principles on One Health, which the Wildlife Conservation Society elaborated with the German Federal Foreign Office just a few weeks before the start of the present pandemic. The Berlin Principles update the Manhattan Principles from 2004, which first coined the term One Health for a broader public, and reconnect the health of humans, animals and ecosystems in an economic and socio-political context.

As the world anxiously welcomes COVID-19 vaccines, we mustn't fool ourselves into complacency. A vaccine, while critically important from a public health perspective, is but a stop-gap measure in the larger context of the multitude of global crises such as cli-

mate change, biodiversity loss, global inequities and injustices that we are currently facing.

One of the most important and proven foundational solutions to these global crises are protected areas. For centuries, Indigenous Peoples and local communities have been setting aside areas that have important natural, cultural and spiritual values. In recent decades, governments have created more and larger protected areas on land and sea, and there is strong evidence that effectively designed and managed protected areas are key to the conservation of biodiversity, climate mitigation and sustaining local livelihoods.

However, many protected areas are not well managed, due to a lack of staff or insufficient legal possibilities for intervention, and often they do not represent the full diversity of ecosystems. Additionally, many protected areas are simply too small to be viable and resilient in the long term, especially under the light of climate change. Furthermore, they are frequently sited in areas that do not adequately represent the originally targeted biome and ecosystems and, moreover, fail to avoid land-use conflicts in our predominantly multi-use landscapes.

In a few words, protected areas must be located in the right places, be large and interconnected enough to sustain viable populations of key species and key functions, operate within a robust legislative framework, and have reliable, long-term funding.

The Alps

Globally, the Alps are one of the most intensively used and populated mountain ranges. The mountain range is in parts dominated by settlements, growing tourist infrastructures, and is criss-crossed by European transit routes. Protected areas are embedded in intensively used multi-use landscapes, leading to spatial and functional fragmentation. Preserving altitudinal gradients intact is key in the conservation of resilient and functional mountain landscapes. Consequently, it is not sufficient to protect the highest elevations while ignoring the rampant land-use changes across the val-

ley floors. If we want protected areas in the Alps to remain strongholds of biodiversity and long-term refuges for species, we must protect entire altitudinal gradients.

Protection also provides numerous ecosystem services, including regulating climate and air quality, providing water, energy and food, while also providing sociocultural benefits to the large urban centres adjacent to the Alpine region and beyond. It is crucial to guarantee that protected areas are connected across the Alps – ecologically and functionally – and valued appropriately by all sectors, especially by the highly urbanized belt surrounding the Alps.

For more than 20 years, ALPARC has worked together with protected areas, local and regional stakeholders, ministries and multilateral partners (such as the Alpine Convention) on the location and especially the interconnectivity of protected areas. Research institutions and NGOs constitute important additional partners that provide the necessary scientific basis which informs management, policy and legislation. The central goal is to protect Alpine biodiversity for generations to come, sustainably.

With protected areas as the backbone, a lot of work and planning, often with the help of the Alpine Space Programme (INTERREG), Germany and France, have been done for the Alpine area; methodologies and maps have been produced to connect natural spaces better and make habitat protection more efficient. Political awareness about the topic has increased. Both the Alpine Convention and the EU-SALP approach have recognized ecological connectivity linked to long-term spatial planning as one of the most promising ways to protect Alpine biodiversity and enhance resiliency.

Biodiversity protection – a crucial investment for the future

To say, in July 2021, that emerging zoonotic pathogens, climate change and biodiversity loss have significant implications for both public health and economic stability is perhaps the most tremendous understatement of this still-young century. Returning to zoonotic-origin pathogen spillovers: the costs of many individual recent major outbreaks, of SARS, MERS and Ebola for example, are estimated in the tens of billions of Euros. However, when all is tallied, the economic devastation caused by COVID-19 will certainly be orders of magnitude greater: in the tens of trillions of Euros. The ongoing and future costs of climate change and biodiversity loss appear simply unimaginable.

Multilateralism based on increased global collaboration and solidarity constitutes the basis for a future healthy planet. To successfully address and prevent future pandemics and secure our health and wellbeing, we need tight trans-sectoral cooperation between governments, robustly funded multilateral institutions,

and strengthened collaborations with conservation NGOs who work on the spillover and conservation frontlines. Similarly, and equally importantly, cross-sectoral investments in nature, climate protection and nature-based solutions must occur at regional levels. The Alpine protected areas and ALPARC constitute the largest network of nature-based solutions for climate change and biodiversity protection within the Alpine Convention. Clearly, we must stop ignoring nature right now and accept once and for all that nature is not and should never be considered a cheap externality in our unconstrained patterns of production and consumption. It is painfully apparent that addressing the complex interactions of human, animal and environmental health requires environmentally inclusive, just and shared values that heed landscape- and society-level issues.

As the pandemic continues to rage across the planet, we must urgently recognize and value the foundational importance of intact and resilient environments for our health and wellbeing. *We need biodiversity conservation, climate change mitigation and health, in and across all policies and administrations, fundamentally. Existing siloed approaches are unacceptable and must become a thing of the past.*

Some recent publications

<https://www.bmu.de/publikation/alpine-nature-2030-creating-ecological-connectivity-for-generations-to-come/>

<https://www.alpine-space.eu/projects/alpbio-net2030/en/home>

<http://alparc.org/de/alpine-resources/atlas-alpbio-net2030>

<https://www.sciencedirect.com/science/article/pii/S0048969720364494>

<https://www.frontiersin.org/articles/10.3389/fvets.2020.582983/full>

Authors

Chris Walzer

Executive Director Health Wildlife Conservation Society, Bronx, NY, USA. Research Institute of Wildlife Ecology; University of Veterinary Medicine Vienna, Austria

Guido Plassmann

Director ALPARC – The Alpine Network of Protected Areas.



The ValPar.CH project – Assessing the added value of ecological infrastructure in Swiss Parks

Emmanuel Reynard, Adrienne Grêt-Regamey & Roger Keller

Keywords: Biodiversity, ecological infrastructure, ecosystem services, nature parks, values

Abstract

Ecological infrastructure (EI), which is a planned network of high-quality natural and semi-natural elements designed and managed to provide ecosystem services, has the potential to ensure rich and resilient biodiversity. Within the Action Plan for the Swiss Biodiversity Strategy of the Swiss Confederation, the pilot project known as “ValPar.CH – Values of the ecological infrastructure in Swiss parks” aims to analyse the values and benefits of EI at two levels: across Switzerland, and in four parks of national importance (Jurapark Aargau, and Gruyère Pays-d’Enhaut, Pfyn-Finges and Beverin nature parks). The aim is to contribute to reducing biodiversity erosion as currently observed. This objective is met by developing outputs for different stakeholders (scientific papers, recommendations, data, policy tools).

Introduction

Nature provides essential goods and services to humankind (MEA 2005; Díaz et al. 2015). These include food and drinking water production, microclimate regulation, and spiritual, aesthetic and recreational services. Nature’s health, however, is degrading at rates unprecedented in human history, which exacerbates biodiversity loss and leads to significant impacts on human wellbeing. Benefits provided by nature have been conceptualized as *ecosystem services* (MEA 2005; Fisher et al. 2009; Serpentini et al. 2012) and further developed into the concept of *Nature’s Contributions to People* (NCPs) (Díaz et al. 2015, 2018; Pascual et al. 2017; Kadykalo et al. 2019). NCPs can be used to describe the positive contributions (benefits) of nature to humankind but also the negative impacts (losses) people may face due to biodiversity degradation (Pascual et al. 2017). These changes are driven both by direct factors (e.g. land use and land cover, climate change, evolving technology, natural drivers) and indirect ones (e.g. demographic, economic, social-political and cultural factors). The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) has provided overwhelming evidence in its recent Global Assessment that the rate of species extinction is accelerating, with dramatic impacts on people around the world, but the report also tells us that it is not too late to make changes (IPBES 2019).

The concept of ecological infrastructure (EI) (see Grêt-Regamey et al. 2021 for a discussion) is strongly related to NCPs and is embedded in the broader concept of green infrastructure. EI is a planned network of high-quality natural and semi-natural elements designed and managed to provide ecosystem services (IPBES 2020) and to protect biodiversity (European Commission 2013). *Functioning ecological infrastructure* refers to the larger framework of the functions of ecosystems (Jax 2005); it includes not only structural elements (e.g., biotopes, protected areas) but also their connectivity (Grêt-Regamey et al. 2021). Factors influ-

encing the functioning of the ecological infrastructure include structural elements (types and quality of land use in terms of EI, size and number of patches), functional elements (connectivity) (Fahrig 2003), as well as governance factors (Angelstam et al. 2017).

The ecological infrastructure in Switzerland

The development of EI is one of the ten strategic goals of the Swiss Biodiversity Strategy (SBS) (FOEN 2012: 54–56). EI is defined by the Swiss Federal Office for the Environment (FOEN) as a network of protected areas that contribute to safeguarding the essential services of ecosystems for society and the economy. The network consists of a core and interconnecting areas, distributed throughout the country in sufficient quality and quantity, which are also linked with valuable areas in neighbouring countries, forming the basis for a rich and resilient biodiversity (OFEV 2021).

The objective of the SBS on EI is to connect both natural and artificial (semi-natural) protected areas (Swiss National Park, biotopes, game, bird and forest reserves, Ramsar and Emerald Network sites, etc.) ecologically. In particular, the SBS aims to assess “*the ecological, economic and cultural values that arise [from] or are intensified through the creation of ecological infrastructure in the parks of national importance and demonstrate the added value generated in terms of sustainable and integrated use*” (FOEN 2017: 30). A functional ecological infrastructure should be effective by 2040 in Switzerland; the cantons are responsible for its planning (OFEV 2018: 85). Parks of national importance are regarded as important elements for the operationalization of the EI in Switzerland, in particular due to their function as natural laboratories (Erne 2016). The SBS objective is addressed in the Action Plan of the SBS (FOEN 2017), which encompasses 27 measures, one of them being to plan regional connectivity for ecologically valuable habitats (measure 4.3.1). This measure is being implemented through several pilot projects that aim to “*valoris[e] the ecological infrastructure in the parks of national importance*”

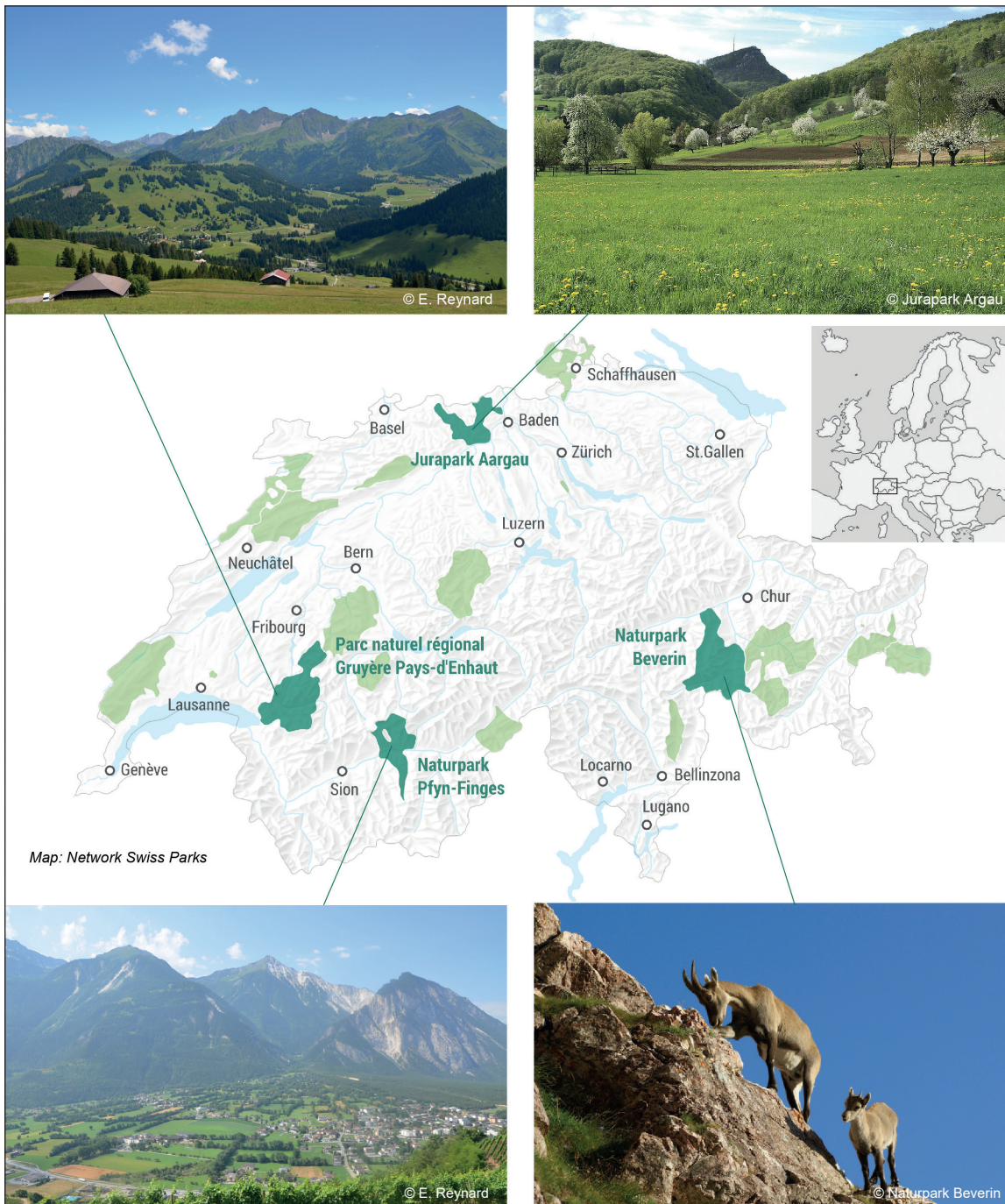


Figure 1 – Parks of national importance in Switzerland and the four parks (dark green) selected for this study.

(pilot project A1.2; FOEN 2017). From 2016 to 2019, a pilot project that involved the 16 Swiss parks and 12 cantons assessed the state of the EI in the parks and drew up various approaches to promote the EI. Several parks have published their reports (Fachgruppe Ökologische Infrastruktur 2021). Furthermore, the EI is promoted in Switzerland by the specialized Ecological Infrastructure group (*ibid.*), created in 2018 and hosted by the Swiss IUCN Committee. The group brings together various partners from the public and voluntary/non-profit sectors. Its objectives are to further the implementation of the concept of EI based on scientific criteria and its promotion to a broader public.

Finally, a research-oriented project was established in 2019 to tackle the question of the added value of the EI in Swiss parks.

The ValPar.CH project

ValPar.CH – Values of the ecological infrastructure in Swiss parks (ValPar.CH 2021) is a pilot project supported by the FOEN to analyse the values and benefits of the EI in the parks of national importance. It is being carried out between 2020 and 2023 by a team of more than 30 researchers from five Swiss universities (ETH Zurich, the Universities of Zurich, Lausanne and Ge-

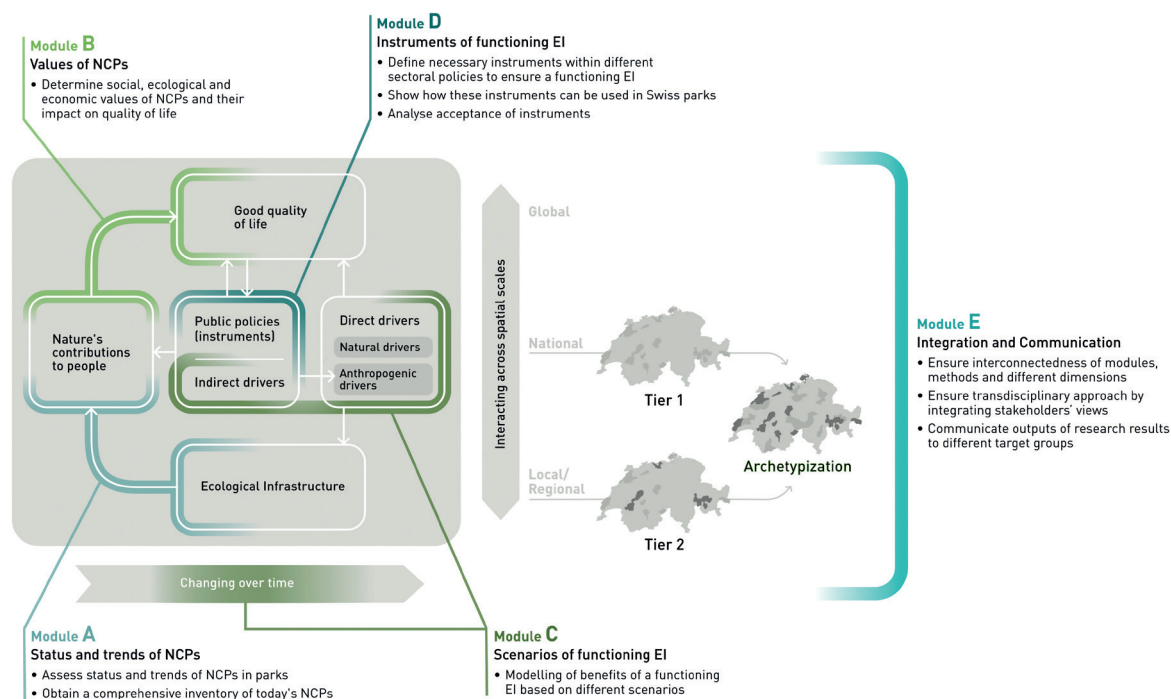


Figure 2 – Organization of the project into five modules and on two scales.

neva, and Zurich University of Applied Sciences). The project is supervised and mentored by a group from the FOEN.

The investigations are being conducted at two scales: across Switzerland, and in a selection of four Swiss parks, namely Jurapark Aargau, and Gruyère Pays-d'Enhaut, Pfyn-Finges and Beverin nature parks (Figure 1). The selection of these parks was based on geographical (natural and linguistic regions of Switzerland) and ecological criteria (coverage of the main habitat types in Switzerland), as well as data availability and the experience of the research team.

The project pursues seven main objectives:

- to determine the (added) value of a functioning ecological infrastructure for nature, the economy and society;
- to identify key areas for biodiversity and ecosystem services in parks of national importance and throughout Switzerland;
- to deepen understanding and raise awareness of the importance of ecological infrastructure as an instrument of sustainable development;
- to evaluate the willingness of the population to maintain the ecological infrastructure;
- to develop a strategy, instruments, measures and policy recommendations to improve and monitor the conditions of the ecological infrastructure in the medium term;
- to provide actor-oriented strategies for actions to maintain and strengthen the ecological infrastructure, conceptually and operationally;
- to strengthen the network of actors involved in maintaining and improving the ecological infrastructure.

The project set-up builds on the IPBES framework, which describes the interactions between nature and human societies and is organized around six major elements (Díaz et al. 2015): nature; nature's benefits to people; anthropogenic assets; institutions and governance systems, and other indirect drivers of change; direct drivers of change; and good quality of life (Figure 2). Our framework comprises five Modules:

- Module A assesses the state and trends of biodiversity and NCPs in Switzerland and in the selected parks. Quantitative maps of biodiversity and NCPs are combined with qualitative findings from Module B and ranked to identify the regions which are best suited to establishing a functioning EI in Switzerland.
- Module B assesses the value of ecological infrastructure. The objective is to carry out a pluralistic valuation (Pascual et al. 2017) and not simply a cost-benefits economic valuation. The assessment uses economics and social science methods and considers socio-economic as well as biophysical aspects of NCPs.
- Module C elaborates various land-use development pathways under different climate and socio-economic scenarios to reach a functioning ecological infrastructure at two time horizons: 2040 and 2060. Inputs for the modelling approach are the results from Modules A and B (current state of EI and NCPs). Both monetary and non-monetary aspects of the biodiversity and NCPs are taken into account.
- Module D provides information on current and new instruments to secure a functioning EI in 2040 and 2060. It evaluates their likelihood of success as well as their political feasibility and acceptance by the relevant stakeholders.

- Module E focuses on the integration of researchers from various disciplines (interdisciplinarity) and the participation of stakeholders (transdisciplinarity), as well as communications with society. In addition to the project management tasks, this module also conducts scientific investigations into the researchers' and stakeholders' implementation of inter- and transdisciplinarity within the project (Otero et al. 2020). More generally, it also investigates the plurality of values (intrinsic, instrumental, relational) of nature (Pascual et al. 2017), and how these values impact the assessment and implementation of EI and NCPs.

An innovative project for nature parks in Switzerland

Here, we detail the four main characteristics of the project that are of potential interest for Swiss Parks:

1. A nested, resource-oriented approach

Parks may be analysed as socio-ecological systems. In this project, the EI is considered as a socio-ecological system which is embedded in a park and ultimately in Switzerland. Following Ostrom's (2009) framework, we work in a nested manner, focusing on the various resource systems (e.g. water, forest, wildlife) at each level (parks, Switzerland) and identifying the various claims on the resources and how their uses are governed. Supported by a process of archetypization (i.e. a process of generalization in a series of generic types of land use), this will ensure consistency over scale and extrapolation to other parks. The cross-scale approach will also facilitate the development of a robust monitoring programme.

2. A policy-oriented project

The researchers – covering disciplines as varied as biology, economics, geography, political sciences, planning, etc. – collect and process a large amount of data at various scales (park and national levels), mobilizing various methods (quantitative and qualitative modelling, taken from natural, social and economic sciences). The main objective is to produce information from these data for particular stakeholders. In this, the ValPar.CH project tries to respond to the aim of the SBS Action Plan (FOEN 2017), which is the effective development of a functioning EI in Switzerland by 2040.

3. Inter- and transdisciplinarity at the core of the project

Interdisciplinarity and transdisciplinarity are crucial in ValPar.CH. They are implemented at two levels:

- a. Interdisciplinary cooperation between researchers: The project's organization in modules is not (mono-)disciplinary. Rather, the structure induces researchers from various disciplines to collaborate. In addition, the governance of the project is participa-

tory, with a steering group representing all the research groups. Finally, self-evaluation of the interdisciplinary processes within the project is carried out following a specific protocol (Otero et al. 2020).

- b. Transdisciplinary cooperation with stakeholders along three axes: (i) coordination with a sounding board composed of stakeholders involved in EI in Switzerland (FOEN, cantons, civil society, etc., including the Swiss Parks Network). This ensures the coordination with other projects on EI in Switzerland; (ii) cooperation with the managers of the four parks; (iii) co-production of knowledge with the parks' stakeholders (modules B, C, D).

4. The science-policy continuum

Because it is part of the SBS Action Plan (FOEN 2017) and has to answer questions formulated by the policy sector, ValPar.CH deals with the complex interactions between science and policy (van den Hove 2007). We consider that there is a continuum between science and policy (in both directions), and ValPar.CH will eventually have concrete repercussions on nature (biodiversity), territories (parks) and society. This means that the researchers have not only scientific responsibility, to produce high-quality scientific results, but also social responsibility, to meet the expectations of the policy sector and ultimately to help improve the quality of Switzerland's ecological infrastructure and its positive impact on nature and society.

Conclusions

ValPar.CH is one of the Swiss projects aimed at addressing the call by IPBES to reduce or even reverse the trend of biodiversity erosion currently observed. This objective is met by developing outputs for different stakeholders (scientific papers, recommendations, facts and figures, policy tools, etc.) and by *translating* the results not only for different stakeholder groups but also for different language regions. Finally, the project aims to contribute to the implementation of the Federal Council's SBS Action Plan, in close cooperation with other international initiatives developed by the European Union, IPBES and IUCN.

Acknowledgements

We gratefully acknowledge financial support through the Action Plan of the SBS via the Federal Office for the Environment (FOEN). We also thank our fellow members of the ValPar.CH Steering group (Norman Backhaus, Raushan Bokusheva, Antoine Guisan, Daniel Kübler, Anthony Lehmann, Gretchen Walters) and all members and associated members of the ValPar.CH project team (ValPar.CH 2021) for the fruitful, supportive and interdisciplinary collaboration. Special thanks go to the stakeholders of the four study regions – the Jurapark Aargau and Gruyère Pays-d'Enhaut, Pfyn-Finges and Beverin nature parks.

References

- Angelstam, P., G. Barnes, M. Elbakidze et al. 2017. Collaborative Learning to Unlock Investments for Functional Ecological Infrastructure: Bridging Barriers in Social-Ecological Systems in South Africa. *Ecosystem Services* 27: 291–304. doi: 10.1016/j.ecoser.2017.04.012
- Díaz, S., S. Demissew, J. Carabias et al. 2015. The IPBES conceptual framework – Connecting nature and people. *Current Opinion in Environmental Sustainability* 14: 1–16. doi: 10.1016/j.cosust.2014.11.002
- Díaz, S., U. Pascual, M. Stenseke et al. 2018. Assessing nature's contributions to people. *Science* 359: 270–272. doi: 10.1126/science.aap8826
- Erne, B. 2016. Schweizer Pärke als Pilotregionen. *Thema Umwelt* 4: 22–23.
- European Commission 2013. *Building a green infrastructure for Europe*. Luxembourg.
- Fachgruppe Ökologische Infrastruktur 2021. *Den Aufbau der Ökologischen Infrastruktur unterstützen*. Available at: <https://www.oekologische-infrastruktur.ch/> (accessed 28/02/2021)
- Fahrig, L. 2003. Effects of habitat fragmentation on biodiversity. *Annual Review of Ecology, Evolution, and Systematics* 34: 487–515. doi: 10.1146/annurev.ecolsys.34.011802.132419
- Fisher, B., R.K. Turner & P. Morling 2009. Defining and classifying ecosystem services for decision making. *Ecological Economics* 68(3): 643–653. doi: 10.1016/j.ecolecon.2008.09.014
- FOEN 2012. *Swiss Biodiversity Strategy*. Bern.
- FOEN 2017. *Action Plan for the Swiss Biodiversity Strategy*. Bern.
- Grêt-Regamey, A., S.-E. Rabe, R. Keller, M. Cracco, J. Guntern & J. Dupuis 2021. *Arbeitspapier "Operationalisierung funktionierende Ökologische Infrastruktur"*. ValPar. CH: Werte der Ökologischen Infrastruktur in Schweizer Pärken. www.valpar.ch.
- IPBES 2019. *Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Bonn. doi: 10.5281/zenodo.3553579
- IPBES 2020. *Glossary 'Ecological Infrastructure'*. Available at: <https://ipbes.net/glossary/ecological-infrastructure> (accessed 28/02/2021)
- Jax, K. 2005. Function and functioning in ecology: what does it mean. *OIKOS* 111(3): 641–648.
- Kadykalo, A.N., M.D. López-Rodríguez, J. Ainscough et al. 2019. Disentangling 'ecosystem services' and 'nature's contributions to people'. *Ecosystems and People* 15(1): 269–287. doi: 10.1080/26395916.2019.1669713
- MEA 2005. *Ecosystems and human well-being. Synthesis, Millennium Ecosystem Assessment*. New York.
- OFEV 2018. *Manuel sur les conventions-programmes 2020–2024 dans le domaine de l'environnement*. Berne.
- OFEV 2020. *Infrastructure écologique*. Available at: <https://www.bafu.admin.ch/bafu/fr/home/themes/biodiversite/info-specialistes/mesures-de-conservation-de-la-biodiversite/infrastructure-ecologique.html> (accessed 28/02/2021)
- Ostrom, E. 2009. A general framework for analyzing sustainability of social-ecological systems. *Science* 325: 419–422. doi: 10.1126/science.1172133
- Otero, I., F. Darbellay, E. Reynard et al. 2020. Designing inter- and transdisciplinary research on mountains: what place for the unexpected? *Mountain Research and Development* 40(4): D1–D20. doi: 10.1659/MRD-JOURNAL-D-20-00036.1
- Pascual, U., P. Balvanera, S. Díaz et al. 2017. Valuing nature's contributions to people: the IPBES approach. *Current Opinion in Environmental Sustainability* 26: 7–16. doi: 10.1016/j.cosust.2016.12.006
- Serpantié, G., P. Méral & C. Bidaud 2012. Des bienfaits de la nature aux services écosystémiques : éléments pour l'histoire et l'interprétation d'une idée écologique. *VertigO* 12(3): en ligne. doi: 10.4000/vertigo.12924
- ValPar.CH 2021. Available at: <https://www.valpar.ch/> (accessed 28/02/2021)
- van den Hove, S. 2007. Rationale for science-policy interfaces. *Futures* 39: 807–826.

Authors

Emmanuel Reynard – corresponding author

is a physical geographer working on systems at the interface between nature and society, such as water management, geoheritage and landscapes. Within ValPar.CH, he is a member of the project lead group and of the steering group. University of Lausanne, Institute of Geography and Sustainability and Interdisciplinary Centre for Mountain Research CIRM, Ch. de l'Institut 18, 1967 Bramois, Switzerland. E-mail: Emmanuel.reynard@unil.ch

Adrienne Grêt-Regamey

is an environmental scientist and landscape planner. Her research focuses on understanding how the interactions and/or actions of humans shape landscapes at various temporal and spatial scales, using different land-use decision models in forecasting and backcasting modes. Within ValPar.CH, she is a member of the project lead group and of the steering group. ETH Zurich, Planning of Landscape and Urban Systems PLUS, HIL H 51.3, Stefano-Franscini-Platz 5, 8093 Zürich, Switzerland. E-mail: gret@ethz.ch

Roger Keller

is a human geographer and science-policy expert focusing on services/benefits of landscape and biodiversity. Within ValPar.CH, he is project coordinator and member of the project lead group and of the steering group. University of Zurich, Institute of Geography, Unit Space, Nature and Society SNS and University Research Priority Programme on Global Change and Biodiversity URPP GCB, Winterthurerstrasse 190, 8057 Zürich, Switzerland. E-mail: roger.keller@geo.uzh.ch

Research in Austria's national parks under one roof

From endemite research to bat surveys, from plant sociological studies to grey goose monitoring, from social and economic studies to environmental education publications: The wealth of knowledge of the Austrian national parks is available on the metadata platform www.parks.at. As part of the open data initiative, work was also done on an interface to data.gv.at, where more than 1 300 entries on nature and research topics related to the national parks are now available for download. The content spectrum ranges from geodata to reports on glacier measurement projects and inventories to status reports of the national park administrations.

More information available on: www.parks.at

Wolf – a topic of tension

The wolves are back! A CIPRA project sheds light on why transparent communication, professionalisation of the shepherding profession and more networking are needed. CIPRA conducted numerous interviews with scientists, politicians, civil servants and practitioners from all Alpine countries. An additional study which took place in South Tyrol, France, Switzerland and Austria, defined potentials and challenges for a cross-border shepherds' organisation. The study and the project report are available online. Based on the results, CIPRA is now developing a project which will explore the question of how communication can succeed in the area of conflict between wolves and humans.

More information available on: www.cipra.org/knowledge-wolf

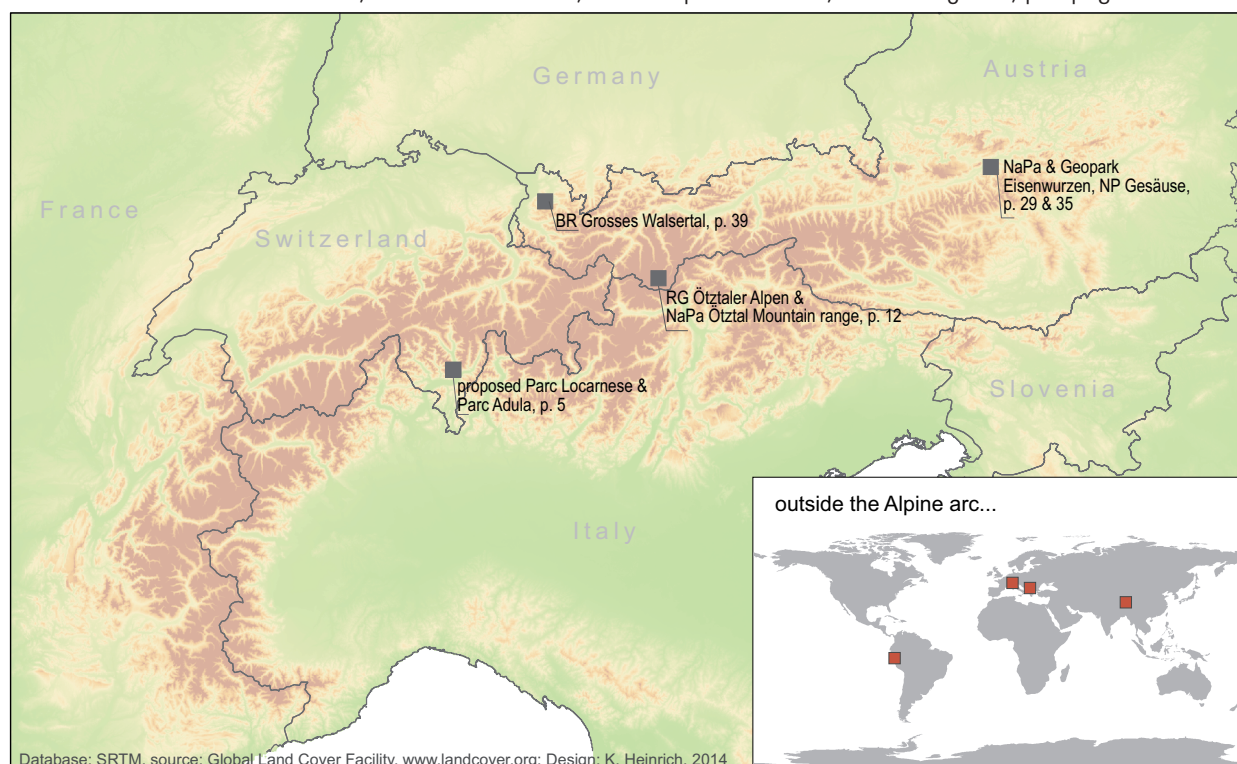
Alpine Changemakers

The *Alpine Changemaker Network*, founded by CIPRA International, is an association of organizations from education, regional development and environment, which transcends national borders, generations, institutional barriers and cultures enabling a change of perspective and expanding personal and collective agency. The network strengthens Alpine society, its resilience and cohesion, and contributes in making the Alpine region environmentally sustainable and viable as a living and economic space. The pilot project, the *Alpine Changemaker Basecamp*, which will take place in July 2021 in Valposchiavo, Switzerland, will be a temporary, experimentally oriented laboratory, framed by a mentoring programme. In July 2022, a network meeting will take place in Silandro, Italy in the Vinschgau Valley in which the *Alpine Changemakers* will present their projects and their respective progress. In addition, they will become mentors for the next generation of *Alpine Changemakers* for one day, as the second *Alpine Changemaker Basecamp* will take place there afterwards.

More information available on: www.alpinechangemaker.org

Parks discussed in this issue

Abbreviations: NP – National Park; NaPa – Nature Parc; BR – Biosphere Reserve; RG – *Ruhegebiet*; p. – page



Publishers

eco.mont – Journal on Protected Mountain Areas Research and Management is published by

- Austrian Academy of Sciences Press, Postgasse 7, 1011 Vienna (online version), ISSN 2073-106X

in cooperation with

- innsbruck university press (iup), Technikerstraße 21a, 6020 Innsbruck (print version), ISSN 2073-1558

Editors

Valerie Braun (Austrian Academy of Sciences, ÖAW), Martin Coy (University of Innsbruck) and
Günter Köck (Austrian Academy of Sciences, ÖAW)

Editorial Board

The Editorial Board is nominated in cooperation with ISCAR and ALPARC.

Serena Arduino (CIPRA International)

Carole Birk (Asters Conservatoire d'espaces naturels Haute-Savoie, France)

Massimo Bocca (Parco Regionale Mont Avic, Italy)

Cédric Dentant (Parc National des Écrins, France)

Leopold Füreder (University of Innsbruck, Austria)

Matej Gabrovec (Anton Melik Geographical Institute, Slovenia)

Guido Plassmann (Task Force Protected Areas AC / ALPARC)

Roland Psenner (Eurac Research, Italy)

Astrid Wallner (Swiss Park Research, Switzerland)

Herbert Wölger (National Park Gesäuse, Austria)

Senior consultant: Kristina Bauch, Axel Borsdorf, Thomas Scheurer and Bernd Stöcklein

Editorial Policy

The geographic focus is on Alpine and other European (or global) protected mountain areas.

Publication Policy

eco.mont – Journal on Protected Mountain Areas Research and Management publishes peer-reviewed research articles by authors who work on protected mountain areas and articles about management approaches within these areas.

eco.mont is published twice a year. We only accept previously unpublished articles (including on the internet). Manuscripts submitted for publication are blind peer-reviewed by a member of the editorial board (to ensure a good fit with the mission of the journal and the scientific quality) and independently by a peer (to guarantee the scientific quality).

Article processing fee: non-mandatory charges are levied for papers published in eco.mont to help defray production costs. Authors, especially those with institutional and grant support, are urged to take all reasonable steps to pay the charges. The article processing charge is currently EUR 400 per article.

Please submit your article through our [Open Journal System](#)

<http://ecomont.vlg.oeaw.ac.at/index.php/ecomont/login>

Subscriptions and Back Issues

- electronic: open access
- prints: EUR 50 p.a.

Copyright Rules

Please contact: valerie.braun@oeaw.ac.at

Design

Logo and basic layout of the journal developed by Sigrun Lange

Cover photograph: Christoph Moning