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Abstract

[Do not exceed 250 words]

The high spatial, climatic and cultural diversity of the Alpine region has led to particular forms of traditional governance of commons with respective commoners' organizations and rules. However, the traditional use of the commons has increasingly become subject to changes due to challenges of modern economies and different social compositions and practices. Accordingly, changing demands as well as new social and technological innovations are shaping the use of commons and their governance practices today.

In this policy brief, UNESCO Chairs of the Alpine region present traditional models of governance of commons (water, pasture, forest, biodiversity, and protected areas) in the Alpine space. We discuss the relevance of traditional governance practices and their limitations in the light of current challenges linked to sustainability. We do this by using examples of different UNESCO sites (biosphere reserves, world heritage sites, geoparks) and surrounding regions, and we ask ourselves where social and technological innovations can contribute to social decisions on how to deal with the commons.

According to the discussed examples and project results, we derive recommendations for policy makers. In this way, we would like to contribute to an international discussion on the management of common resources in general and of mountain protected areas in particular.

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Content

Acronyms

ALPARC: Alpine Network of Protected Areas

BR: UNESCO Biosphere reserve

GGP: UNESCO Global Geopark

IUCN: International Union for Conservation of Nature

MAB: UNESCO Man and Biosphere Programme

SAJA: UNESCO World Heritage 'Swiss Alps Jungfrau-Aletsch'

SDG: Sustainable Development Goals

WHS: UNESCO World Heritage Site

WNBR: World Network of Biosphere Reserves

[**Note: The following narrative, including footnotes, should not exceed 4,000 words – but without references and any annex**]

Governance of commons in mountainous regions

Referring to the definition of IUCN (2013), governance is the sum of rule and value-based "interactions among structures, processes and traditions that determine how power and responsibilities are exercised, how decisions are taken and how citizens or other stakeholders have their say."

In recent years, the activities of the Secretariat of the Alpine Convention (https://www.alpconv.org), the Eusalp Working Group (https://interreg.eu/programme/alpine-space/), and NGOs such as CIPRA (https://www.cipra.org) or ALPARC (https://alparc.org) have emphasized the importance of improving governance in the Alpine space. This is also reflected in the diverse projects of the Interreg Alpine space funding programme (e.g. AlpGov 2019, Schrapp et al. 2020). However, in these intense governance debates, traditional forms of governance, especially regarding the governance of the commons, are hardly considered in the discussion.

Since the Middle Ages, various forms of communal use of natural resources have developed in the Alpine region. In addition to lordly or state regulations, commoner's organisations for water, biodiversity, pastures or forests, for example, have developed rules that regulate the rights and obligations of the individual users. Many mechanisms, which have survived for centuries, for joint and deliberative decision-making among use right holders and resource users have been developed. The particularity of governing the commons concerns joint decentralized resource use, based on a self-organized group of resource users with common property rights, which are neither private nor public property (Ostrom, 2009). Some of these governance types have been incorporated into the legal system at later times, some are still lived tradition today and many have become obsolete. In the light of current challenges and limitations of governing resources, mainly through private or state-based property rights, the consideration and innovation of existing forms of governance of commons deserves particular attention as it permits envisaging resource governance beyond (private) markets and the state.

Therefore, current societal issues, such as climate change, natural disasters, or conservation areas, raise questions about shared decision-making regarding the commons in a new context. Which traditional knowledge in dealing with natural resources is relevant from today's perspective? How can this be "translated" into a current context? What role can technological and social innovation play in this? What future perspectives become visible and what conclusions can be drawn?

All these questions are beyond purely individual or regional decision-making. However, they can be addressed through UNESCO model regions and with the support of the large UNITWIN UNESCO Chair network.

Governance of the commons between tradition and innovation

Bravo & De Moor (2008: 156) note in their reflections on the *commons in Europe* that "Research on the commons is not only an issue for historians". Although the commons have lost much of their economic significance in the economic liberalism of the 19th century, they gain a new significance today: "Even for some very traditional commons, like the alpine pastures, the focus of today's management is no longer only a matter of producing fodder and at the same time

keeping the cattle numbers below the carrying capacity of the meadow, but also of a more general concern of landscape quality and hydrogeological stability maintenance. Similarly, forests are no longer considered only as a source of timber and other products, but are – on the way to Kyoto targets (EEA 2007) – increasingly regarded as carbon sinks, as water-capture and water conservation tools, and as leisure areas" (ibid).

Many natural or cultural heritage sites in the UNESCO Man and Biosphere Programme (MAB) enclose commons such as agricultural and pasture lands, forests, water or productive infrastructure like roads, paths, huts, permanent fences, water wells or channels. The following subchapters give an overview of different commons in the Alpine region, their historical development, and their challenges today.

Water

Over centuries, water management in the Alpine region has next to drinking water provision mainly served the purposes of bringing nutrients to the fields as a form of fertilizer, of irrigating agricultural areas in dry regions, and of traditional local power provision of kinetic energy, for example in the form of mills. For these water uses, local commoners' organizations were set up to regulate access, user rights, and infrastructure construction as well as maintenance. Larger-scale modern dams for hydropower production of regional and national importance started to come up at the beginning of the 20th century and involved larger construction consortia going beyond the local communities. With growing settlements, flood management and flood protection became more important in the 19th century and entered national legislation. Nowadays, a big challenge in Alpine regions is a fair water distribution among the competing water claims for agriculture, tourism, and electricity.

A large research project (MontanAqua) in the Southern Alps of Switzerland addressed these challenges through a transdisciplinary approach. The main goal was to find out how to advance the high diversity of private, public and commons-based forms of water governance towards the principles of justice and sustainability. It became clear, that the existing traditional water associations are already highly overlapping with the principles of justice and sustainability, but that the pressures from privately organized water users (tourism, sports, energy producers) are leading to asymmetries in the justice-oriented water distribution within and through traditional water commons, with the risk of extracting too much water and thus jeopardising essential ecological functions of the natural environment. Therefore, it was concluded that the pressures and limitations rising from private water users could only be countered effectively if traditional water organizations become part of cantonal (decentralized) water governance. Such an alliance of public and common-based water users is able to address these asymmetries to better serve the public goods of people and nature (Schneider et al., 2016).

Biodiversity and protected areas

Biodiversity has always been a central resource that was used and regulated in many ways. In the Alpine region, the use of fish and wildlife has been linked to ownership and sovereignty and strictly regulated accordingly. Historically, regulations for the extraction of this resource played an essential role, only later regulations for the reproductive handling of fish and huntable animals were added ("Hege", feeding, fish stocking, etc.). For many animals, plants or fungi, there was hardly any need for regulation. Thus, apart from exceptional cases, the use of berries, medicinal or spice plants, plants for specific uses (soap, liquor, decoration, spiritual purposes, etc.) or wild mushrooms was never subject to any special agreements or restrictions. With the increasing need for "nature conservation" and the safeguarding of biodiversity, the call for management and governance of these species has increased. However, the protection of individual species may in some cases be in conflict with traditions and customary rights. This may therefore be perceived as restriction, paternalism and expropriation. The conflict remains,

even if new forms of "contractual nature conservation", funding instruments and participatory management are developed. New ways of decision making are being designed and tested throughout the Alpine space. With the Nagoya Protocol on Access and Benefit-sharing of the Convention on Biological Diversity, this discussion has reached an international dimension that is relevant in many mountain areas worldwide.

For a stronger governance share of protected areas including UNESCO biosphere reserves among local populations several procedures have been developed mainly since the 1980s. While alpine national parks allow for a participation of locals through formal institutional bodies of the park such as diverse "councils" (scientific, planning, landowner etc.), other especially regional nature parks and sometimes biosphere reserves have created larger involvements of local populations by making them participate during the establishment procedure of the protected area (France, Austria, Switzerland). In some cases, the decision whether the park should be created or not is even taken by the population (Switzerland).

A stronger governance of commons and their resources is increasingly considered as fundamental in modern protected area management in the Alpine arch. It is nevertheless directly depending on different political systems (federal or central) in the alpine states and the understanding of local democracy and its consequences in the management and conservation of biodiversity.

Pastures and forests

The regulations for dealing with pastures and forests are complex because, in addition to precise agreements on common or individual uses of these resources, stipulations for securing and maintaining the ecosystem services are also required. For the Alpine region, such regulations for communally used pastures and forests have been documented since the Middle Ages. Even though many rules are customary rights that have never been written down, in many cases stipulations have also found their way into today's legal system. Examples of these are rights to water use ("Wasserrecht"), rights to timber procurement ("Holzbezugsrechte") or the right to temporary use of the pastures on neighbouring land ("Schneefluchtrechte"), which are recorded in the land register (Sandberger 1951). In Switzerland for example, local regulations on the use of commons are nowadays approved by cantonal authorities. Many of the contained regulations (user rights, communal work duties, etc.), have not changed much in the last decades (or centuries) and still fit into the current legal framework. Others had to be adapted due to new regulations related to direct payments (subsidies), which e.g. require a stocking rate that maintains pasture quality and biodiversity (Haller et al. 2021).

Traditional agreements on the use of the commons usually specify the nature, extent, place and time of use. These are tied to certain obligations, usually the assumption of reproductive work (fencing, pasture maintenance, erosion control, maintenance of buildings, etc.) or alternate tasks (supervision of livestock, milking, transport, etc.). Compliance with the agreements is subject to social control and corresponding sanctions. Due to the shortage of workforce in mountain agriculture, the fulfilment of many of these tasks has become more demanding today. In some regions, even a collapse of these agreements can be observed. In addition, new stakeholders (tourists, recreationists, nature lovers, etc.) are making new demands on commoners' systems (Huber, Kirchmeir 2016). Commoners' organizations such as corporations thus have to balance between external demands and local requirements. This may contribute to a diversification in income generation when corporations create new income opportunities and/or closely cooperate with other actors. Examples of such innovations are the running of woodchip heating plants, the participation in the tourism business or the inclusion of volunteers in traditional communal works (Liechti 2021; Liechti & Schneider 2021).

Examples from in and around UNESCO-sites in the Alpine arc

Alpine pastures and meadows in Salzburger Lungau & Carinthian Nockberge BR (Austria)

The Salzburger Lungau & Carinthian Nockberge Biosphere Reserve was recognized by UNESCO in 2012 after years of discussions and conflicts. A characteristic element of the reserve are extensive pastures at high altitudes ("Almen"). Of these, many are managed communally on the basis of individual statutes. Decision making is essentially based on consensus and voting on the basis of shared rights. Decision-making processes sometimes take a very long time. In the course of establishing the biosphere reserve, contracts were concluded with the individual communities ("Nachbarschaften"). In this way, the biosphere reserve can impact management practices through private-sector contracts and financial incentives.

Setting up the UNESCO World Heritage 'Swiss Alps Jungfrau-Aletsch' (Switzerland)

A similar situation was observed at the start of the political process to develop a governance structure for the UNESCO World Heritage 'Swiss Alps Jungfrau-Aletsch' (SAJA). Many conflicts regarding the delimitation of the heritage-area could be settled through strong democratic governance at the local levels of the municipalities. However, when developing the management of the officially approved SAJA area, the strong push towards economic development by local actors had to be tempered to a certain degree. In this situation, an independent multi-actor governance scheme in the form of the site's management centre showed to be key for linking the UNESCO principles to a real and comprehensive policy of sustainable regional development (Wiesmann et al., 2005)(Swiss Alpe Jungfrau-Aletsch (SAJA), 2021).

Traditional irrigation systems adjacent to Jungfrau-Aletsch WHS (Switzerland)

In order to ensure the water supply in the dry valleys of the canton of Valais, the affected population has built a widely ramified irrigation system over hundreds of years. This still shapes the valuable cultural landscape of the UNESCO World Heritage Site Swiss Alps Jungfrau-Aletsch with its variety of landscape qualities such as high biodiversity, historic buildings and attractive scenery. This traditional communal system faces major challenges today. In the course of structural change in agriculture, traditional irrigation has been replaced by sprinkler systems in many places. This results in a conflict of goals: technical simplifications make water use and work more efficient. At the same time, a valuable form of cooperation, a traditional handicraft and knowledge system and, last but not least, landscape qualities are lost - and thus part of the cultural heritage and regional identity (Bär & Liechti, 2020).

New communal work and volunteer tourism (Switzerland)

Landscape maintenance is time-consuming and nowadays often hardly manageable by local commoners' organizations. While for a long time they were able to rely on a large number of members, the annual communal works (Gemeinwerk) are associated with a growing amount of work for the remaining participants as the number of farmers decreases. At the same time, there is a growing desire among parts of the population to be active in nature. In this context, new cooperation models and partnerships - in the sense of a "modern communal work" - between local and external actors offer sustainable solutions for the benefit of people, nature and the cultural landscape (Liechti & Schneider 2021).

Based on a concrete action plan and in cooperation with the municipality and the interested communities, the SAJA Management Center is about to set up an agency platform (jungfraualetsch.ch/suonen), which is to be used as an overview page and planning tool. The platform will provide information and link local commoners' organizations and volunteers (especially individuals) for the annual maintenance of the traditional irrigation channels.

Commoners' organizations in the canton of Obwalden (Switzerland)

In the canton of Obwalden, the joint use of forests, alpine pastures and common agricultural land is widespread. Major societal developments and changes with a large impact on commoners' organizations since the 1950s were structural changes in agriculture and forestry, the diminishing profitability of agricultural and forestry products, the increasing importance of public policies in land management and the growing proportion of public support for the provision of ecological and landscape services. Based on these developments, some commoners' organizations have thus allocated new income sources by integrating themselves into new markets (e.g. real estate, energy production), which has significantly changed their income structure and contributed to diversification and resilience. However, legitimisation pressures from the outside differ between commoners' organizations that have significantly changed their economic base on the one side and those whose main economic base comprises "traditional" resources (Liechti 2021).

Transboundary management in Karawanke GGP (Austria / Slowenia)

The Karavanke, the mountain range on the border between Austria and Slovenia, is characterised by extraordinary geodiversity, biodiversity and interesting hydrogeology. As a new instrument for cross-border cooperation and governance, an EGTC (European grouping of territorial cooperation) was established in 2019. This is a (relatively young) legal entity under European company law. An EGTC is configured as a cross-border organisation and opens up new opportunities for cross-border cooperation and governance of commons.

Bufferzones of the European Beech Forest Serial WHS (Austria / Europe)

The Ancient and Primeval Beech Forests of the Carpathians and Other Regions of Europe World Heritage Site was established in 2007 and has since been progressively extended to 78 sites in 12 European countries. Some sites are located in the Alps. The core zones are subject to strict legal protection and are embedded in buffer zones, where gentle management is to be carried out at the transition to "normal" commercial forests. In the development of a guidance document for the 12 participating countries, the difficulties that arise from the different perspectives of the institutions, societies and actors involved became apparent. It is necessary to explicitly regulate the most diverse aspects of management, whereby many emotional and ad-hoc points of view have to be overcome (Kirchmeier & Kovarovics 2016).

Emerging challenges, new technologies and concepts

New expectations in commoners' organisations and changed understandings about the use of commons often lead to competing claims and conflicts over the respective resources. In water management, this includes increasing claims for water use from different users. In combination with the effects from climate change and shrinking water reservoirs, water shortage in dry periods becomes a prominent issue (Schneider et al. 2016). Alpine-wide water management strategies to protect and sustainably use the available water resources are thus necessary to protect this natural resource for future generations (Permanent Secretariat of the Alpine Convention, 2020). The deteriorating state of biodiversity increasingly demands protection for remaining ecosystems and habitats, which can create conflicts with intensive agricultural production or forest management. The high cost of labour and a decreasing number of agricultural workers leads to increasing mechanization and consequently a challenge to sustain labour-intensive, biodiversity-rich areas, like mountain forests or alpine pastures.

To address those challenges and sustainably manage commons in the alpine arc under today's economic environment, a combination of traditional knowledge with social and technological innovations needs to be explored. The use of new technologies and innovative digital solutions was accelerated by the COVID-19 crisis. The crisis has also shown that people can quickly come

together, support each other and prioritise the commons, even in peripheral mountain regions (CIPRA, 2020). In terms of economic development, the promotion of circular economy can reduce the consumption of natural resources, like water and timber, as well as the creation of emissions and waste that lead to pollution and environmental degradation. This can be achieved when local producers and service providers collaborate and retain materials, products and energy in the technological and natural circle, producing long living, repairable, modular and regionally produced products and services using local materials (like timber or agricultural resources) (CIPRA 2020). Commoners' organizations can administer themselves using modern information and communication technologies (APPS, geoinformatics, etc.) for the management of their commons and for achieving a higher diversity in the structure and number of participants. This facilitates the administration of an increasing number of stakeholder interests and may help to better anticipate user conflicts (Borrini-Feyerabend et al. 2013). The combination of technological and social innovation that supports the changed claims of alpine pastures can be shown by the example of the Swiss canton of Glarus: with a public private partnership (PPP) model herd guarding of sheep on alpine pastures is achieved using GPS collars instead of herding dogs for herd guarding. This eliminates potential risk for hikers and prevents the necessity for a permanent shepherd to look after the animals. The costs of the technology are divided between the canton, the alpine cooperative (Alpgenossenschaft) and the farmers (CIPRA, 2020).

New approaches to governance of protected areas can also be found through transdisciplinary research projects. Conflict situations between protected area administration, NGOs, and local resource users can be addressed in the form of pilot actions. Such approaches show how conflicts can be mitigated by jointly implementing ideas for sustainable land management with the active involvement of local stakeholders and protected area management. The basic steps of these pilot projects include a multi-actor assessment of the social-ecological status quo for communities around protected areas, the joint identification of local needs and common interests between the communities and the protected areas, and the implementation of identified joint projects (such as small touristic infrastructure, bike and hiking trails or maps, eco-toilet infrastructure, cultural events, historical memorials, or decentralised renewable energy facilities). An important part includes the documentation and evaluation of the projects' results, the governance process and participatory management practices and their impacts on conflict mitigation. Such approaches have the potential to stimulate equity and justice in sustainable land use and participatory conservation activities when considering the social and economic factors in surrounding communities (Meessen et al. 2015).

A strategy for the sustainable management of commons combining traditional and innovative methods should be co-designed in an iterative way with key stakeholders. Haklay (2013) shows that a participatory transdisciplinary approach, as in the case of citizen science, supports the development of products and services according to the needs of the local population and at the same time increases the approval of technological and social innovation (Borrini-Feyerabend et al. 2013). Participatory processes can be facilitated by utilizing virtual (VR) and augmented realities (AR). In this way laypersons can picture landscape changes and improve their ecological literacy and understanding of the commons. In addition, the use of VR and AR technologies can trigger discussion between different stakeholders and enable them to share their views and interests with each other and the project consortium (Schauppenlehner et al. 2020).

Recommendations and key messages

Participating UNESCO chairs, scientists and experts from Alpine space come up with these recommendations.

1. It is obvious that there were and still are manifold and different forms of governance of the commons in the Alpine region. In some cases, these are disappearing or have become obsolete. Nevertheless, they play a major role, especially because the Alpine space is facing new challenges. Circular economy, resilience to climate change or social innovation to support sustainable development need an appropriate community with corresponding processes and agreements for development and implementation. Reflection is needed on adapted forms of commoners' organizations that include new objectives, actors and technologies and thus enable social innovation.

2. Important success factors for the conservation of traditional communal systems are education and awareness raising and the associated broad social recognition of the commitment of the actors involved.

3. The diversity of collective bodies involved in landscape management is accompanied by different forms of involvement of external actors. New innovative forms of engagement should be supported and possibilities to share experiences should be provided.

4. UNESCO sites such as biosphere reserves, world heritage sites or geoparks can play a central role in the further development of governance through their links to science as well as international networks and knowledge flows. They serve as model regions for sustainable development based on their mandates.

5. Existing structures, actors and processes in and about commons need to be known, get evaluated and serve to improve participation in development processes in the Alpine space. Only a precise knowledge of the initial situation allows for a coherent further development of governance structures to improve climate resilience and sustainable development.

6. The Alpine Convention and a great number of Alpine-wide projects show the importance and the possibilities of transnational coordination and transcultural exchange. Mutual learning and exchange of experience offer a lot of innovation potential for a future governance of the commons.

7. New technologies, especially new communication technologies and media can mean new opportunities for effective governance and natural resource management, especially in the Alpine space, which is difficult in terms of transport. The free accessibility of technologies, information and data play a central role.

8. The future research needs are a structured "inventory" of governance systems in the Alpine space and a better understanding of the interplay between local, national, and Alpine-wide governance mechanisms. Mechanisms for the governance of the commons can only be further developed and adapted to current and future challenges on a good scientific basis.

9. The participating UNESCO Chairs, scientists and experts advocate to deepen the topic in in-depth alpine-wide projects. These should be developed and implemented in transdisciplinary cooperation between scientific institutions and UNESCO sites. The principles and agreements of the Alpine Convention, the Sustainable Development Goals and the central challenges in the Alpine region (resilience to climate change, circular economy and social innovation) should be the basis for this.

10. It should be examined whether and to what extent these results and considerations can be transferred to other mountain regions in the world. In any case, an exchange of experience between the mountain regions of the world should be strived for.

11. Distinct local capacity building projects and trainings on demand are essential elements for the further development of governance structures. This includes not only formal education offers, but also informal formats such as cooperation between conservation areas and universities to build a bridge between excellent international research and everyday life of citizens in the region.

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Annexes

Annex 1: Figures and photographs
Annex 2: Additional materials