



Getting a grip on negotiation processes: Addressing trade-offs in mountain biking in Austria, Germany and Switzerland

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ABSTRACT

Space for recreation is an important service provided by forests close to urban and rural areas alike. Mountain biking, as one recreational activity, is increasingly becoming widespread, which can lead to challenging trade-off situations, as some benefits from forests come at the cost of another forest benefit and vice versa. For instance, illegally constructed mountain bike trails lead to trade-offs between environmental protection and other forest utilizations such as wood production. We thus study how such trade-off situations can be negotiated to find an outcome, such as a legal mountain bike trail, which is accepted by stakeholders. In doing so, we select case studies where we expect to find similar trade-off situations that lead to the negotiation process about mountain bike trails. Specifically, we analyse the cases' negotiation processes (action situations) by applying Ostrom's Institutional Analysis and Development Framework. Our findings show the importance of collective actors, a clear delineation of responsibilities and of compensation and funding measures as well as structured workshops and collective site inspections for addressing trade-offs and for arriving at acceptable outcomes in our cases.

1. Introduction

Recreation in forests has increasingly evolved from restful and relaxing activities such as walking or hiking to more active forms such as running, mountain biking and rock-climbing (Burgin and Hardiman, 2012a, 2012b; Hardiman and Burgin, 2013). Particularly mountain biking has become increasingly important in European societies in the last decades (Pröbstl-Haider et al., 2018). This trend comes along with a demand for outdoor recreational infrastructures such as mountain bike trails (Schroff et al., 2005), which can lead to challenging trade-off situations as recreational use of the forest is only one of many demands (Wilkes-Allemann et al., 2015b; Burgin and Hardiman, 2012b). We understand trade-offs as occurring if some benefits from forest ecosystem functions and services come at the cost of another forest benefit and vice versa. Beyond recreation, today's forests are valued for their regulating ecosystem functions like absorbing CO₂, for offering habitats to animals and plants or producing wood both for material and

energy purposes (Oesten, 2016). There are thus competing interests among different actors in terms of using the forest for recreation, as a space for biodiversity, for wood production, protection against torrents and avalanches and various other non-wood forest services.

We focus on the situation of mountain biking, where competing uses can be experienced as trade-offs between different interests, as biking can have negative environmental impacts in the forest, such as vegetation loss and compositional changes as well as soil compaction, erosion and disruption of wildlife (Burgin and Hardiman, 2012b). Addressing trade-off situations often requires the interaction of diverse actors. Proper negotiation at the beginning of the interaction-process has been found to be key for reaching agreement on an infrastructure project such as mountain bike trails, as establishing mountain bike trails are often highly contested (Chavez et al., 1993; Wilkes-Allemann et al., 2015b). However, understanding how trade-off situations can be effectively negotiated remains largely an empirical question contingent on context, the related institutions and actor relations. We thus pose the following

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question: How can specific trade-off situations related to mountain biking be negotiated to arrive at outcomes that are accepted by all stakeholders? Our focus is on negotiation processes for legalizing existing or legally building new mountain bike trails. This focus allows us to understand how trade-offs situations lead to an outcome that is accepted by all stakeholders.

The challenges we find in the forest are symptomatic for the multiple societal demands on land use more generally. There is an increasing body of literature on negotiating trade-offs to meet or coordinate these multiple demands for e.g. demands for carbon sequestration, water purification and biodiversity conservation (Ellis et al., 2019; Turkelboom et al., 2018). We aim to contribute to this literature, by concentrating on some of the key characteristics that affect trade-off situations, namely on the competing interests between different actors as well as the formal and informal institutions in place to regulate resource use. Forest laws typically address multiple functions and related services, that is, they protect the forest, but also give access to the public. The question thus arises to what extent policies regulating the use and protection of forests can deal with competing interests and the emerging trade-offs. Empirically, we find challenges in implementation, as for instance, bikers riding outside the forest roads, create illegal mountain bike trails and often also illegal infrastructure, such as wooden bridges (Koemle and Morawetz, 2016). This leads to trade-offs with other forest uses, for instance wood production as well as other recreational uses such as hiking. In addressing these situations, the informal institutions, that is the values and norms in a certain context, also play an important role.

Institutional based approaches are suitable to analyse different interests and resulting conflicts and negotiation processes (e.g. Scharpf, 1991; Ostrom, 1990; Gerber et al., 2009; Gerber et al., 2020). We use the Institutional Analysis and Development (IAD) framework (Ostrom, 1990) for analysing trade-off situations because it provides relevant analytical variables related to institutions and specifically policies and regulations as well as actor interactions (Sandström et al., 2011) for studying the use of open-access resources such as forests for recreation (Ostrom, 2011). On the one hand forests for recreation feature two common characteristics of such a resource in the context of our study: non-excludability and rivalry in use (Ostrom, 2011). Non-excludability is guaranteed by free access rights (e.g. Austrian Forest Act, German Forest Law, Swiss Forest Law). Rivalry in resource use exists because highly visited forest areas face problems of overuse leading to trade-offs between benefits from the forest. On the other hand, the IAD framework is suited because it allows the analysis of situations, such as negotiation processes about trade-offs in order to establish mountain bike trails, where many stakeholders are involved and where collective choice situations are given (Clement, 2010; Ostrom, 2005). We thus use the IAD framework to frame our analysis, describe the trade-offs that become articulated in negotiation processes (called action situation in the IAD framework) accompanying the establishment of mountain bike trails. So far, the IAD framework has been widely used for the analysis of open-access resources. In the context of forests, it has been used to study forest management (Clement, 2010; Mehring et al., 2011) and forest governance (Wilkes-Allemann et al., 2015a; Wilkes-Allemann et al., 2015b; Clement and Amezaga, 2008; Coleman and Steed, 2009). However, to our knowledge, it has not been applied to analyse trade-offs between recreational use and other forest ecosystem services. Thus, our article contributes to enlarge the application of the IAD framework in the context of forest policy.

Empirically, we have selected cases from three European countries - Austria, Germany and Switzerland - to conduct an in-depth analysis of negotiation processes and study how stakeholders address different trade-offs to reach a certain outcome. We have chosen these cases due to their similarities in terms of relevant context conditions. In all three cases, forest policy faces increasing societal demands in densely populated regions. Moreover, common observations across the countries of the cases analysed in this article motivated this study, which are first

that, by law, forests are defined as an open access resource for recreational purposes. In all three countries, recreational users are granted free access to recreate in the forests (Austria – Austrian Forest Act 1975; Germany – Federal Forest Act 1975 and all forest acts of the federal states; Switzerland - Civil Code, 1907). Second, the forest owners are solely responsible for the management of forests but not for the provision of recreational infrastructure. Other stakeholders, such as municipalities or associations of recreational users, build infrastructure next to forest roads (e.g. picnic areas) and in the forest area (e.g. mountain bike trails; Wilkes-Allemann et al., 2017; Forest Europe, 2015). Third, establishing such infrastructure goes beyond the free access rights and is subject to building permits or official permits from the municipalities, and require the permission of the forest owners (Austria § 33 (3)- Austrian Forest Act 1975; Germany – Federal State Forest Act Baden-Württemberg § 37/3; Switzerland – Article 16 of the Forest Law). Finally, the national forest laws in the countries under study create tensions between forest uses and forest users, making these cases particularly relevant to study trade-offs leading to stakeholders' interactions and negotiated outcomes. In light of these tensions, we expect that the cases exhibit the following trade-off situations: 1) between different recreation activities; 2) between the forest uses for recreation activities and forest management for wood production; and 3) between the forest uses for recreation activities and environmental protection. By analysing cases with similar context conditions, we aim to identify how the cases differ or are similar in how they achieve certain outcomes. In the end, through our descriptive analysis, we aim to show which characteristics of the negotiation processes are most helpful in understanding how the cases differ or are similar.

The article is structured as follows: we first outline our research design, the material and methods before presenting our results of the three cases in section three. We then discuss the results and present main conclusions.

2. Research design, material and methods

2.1. Institutional analysis and development framework

As described above, we draw on the core IAD variables and the interlinkages between these to study trade-off situations related to forest recreation (cf. Fig. 1).

The “action situation” is the heart of the IAD framework, where individual and/or collective actors interact, have different positions and actions, and aim for an outcome (e.g. new rules) through, for instance, discussing competing interests (Ostrom, 2005, 2009, 2011; McGinnis, 2011). In our case, we define the action situation as the negotiation process addressing specific trade-off situations to achieve a certain outcome (e.g. establishing mountain bike trails). We break the action situation into the following aspects for our analysis: trade-off situations, demand for mountain-bike trails, stakeholders, responsibility for the trail, interactions and concerns of stakeholders and role of compensations and financial issues. Through the use of the IAD framework, we aim to analyse whether and how trade-offs between different uses of the forest are addressed in the action situation. We further study what role the demand for trails as well as the stakeholders have played in the action situation. We understand stakeholders as individuals or groups represented by collective actors, such as associations. An important aspect regarding the stakeholders is who takes responsibility and who initiates the process. Within the negotiation processes the stakeholders interact (e.g. through workshops) wherein the actors voice their differing concerns. A critical aspect in the negotiation process is the role of compensatory measures (e.g. environmental protection projects) and financial issues (e.g. who pays for what). The goal of the action situation is to achieve outcomes, such as new rules or policies, in our case concretised in terms of established trails with special rules for use. As these outcomes are compromises between different actors with competing interests, we analyse the differences in the process of establishing these

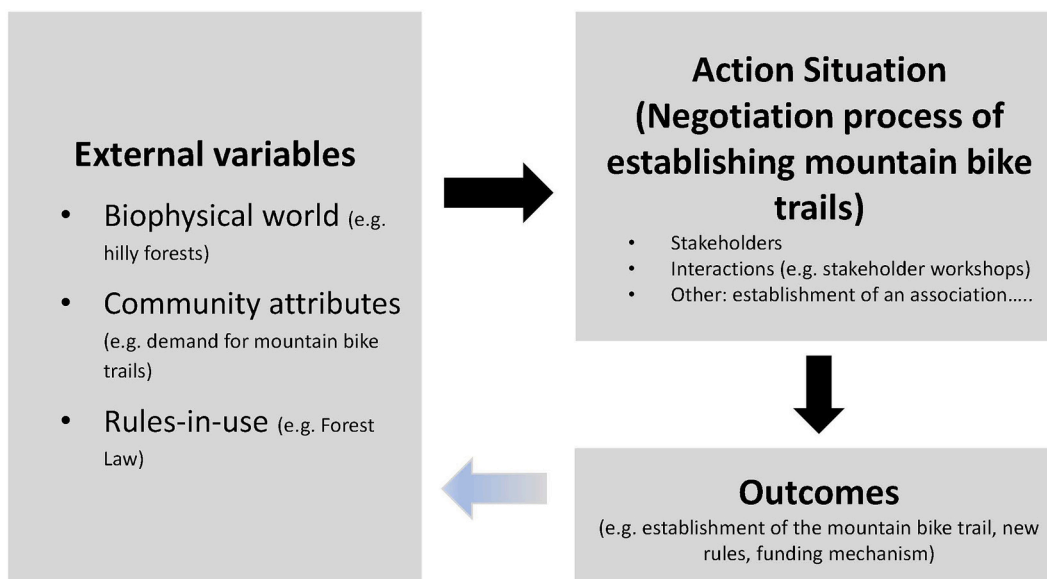


Fig. 1. Institutional Analysis and Development (IAD) Framework, Source: Compiled by the author (adapted from Ostrom, 2009: 420).

outcomes (new trails) and to what extent the outcomes prioritize different ecosystem services over others. Some of the above aspects were derived inductively while analysing the process of negotiation in our cases, which the authors found to be important to differentiate how an outcome was reached: 1) who initiates the process; 2) which interests, e.g. environmental protection, hunters, wood production were prioritized in the end; and 3) the role of compensatory measures and financial issues, in our case who pays for the mountain biking infrastructure (outcome).

Following the IAD, the action situation is framed by external variables, which are:

- 1) community attributes, the societal demands on forest use, that is, for instance, the amount of people using mountain bike trails and other recreational uses,
- 2) biophysical attributes, in terms of the terrain's (mountainous or not) suitability for mountain bike trails, and proximity to urban area; and
- 3) rules-in-use, that is the existing legislation (forest laws, civil codes, etc) framing the ability to legally establish mountain bike trails.

These variables are case specific, are usually rather stable over longer periods of time (Wilkes-Allemann et al., 2017; Ostrom, 2009) and help to understand how trade-offs situations lead to negotiated outcomes. For the purposes of our analysis, these variables are key for structuring and understanding the action situation. Prior to our in-depth analysis of the action situation across the three cases, we first ensured that the external variables are more or less similar.

2.2. Case study approach

A small N explorative case-based approach is useful for understanding the communalities and differences in the negotiation processes of establishing mountain bike trails (Yin, 2014; Gerring, 2007). A case study approach enables considering contextual and local factors influencing the negotiation process (Yin, 2014). Any difference in the negotiation process across the three cases (e.g. funding, initiator of the process) helps to understand what led to the establishment of mountain-bike trails.

In a first step, we outline the external variables for the cases. Then we move to the core of our analysis, the action situation (negotiation process for each case) before describing the outcomes. In a final step the dissimilarities and similarities of the process between the cases are

discussed.

Within the three countries of Austria, Germany and Switzerland, we have selected specific mountain bike projects, all are located in highly frequented, low mountain and urban forest areas, close to very touristic cities. These three cases feature a high probability for tensions between diverse interests and ensuing trade-off situations and thus a high relevance for starting negotiation processes, as we outline below as well as in the results, and as shown in Table 1.

The Austrian case, located in the north-eastern section of the Vienna Woods (Wienerwald), which is a widely known and popular recreation area in Vienna, comprises nine trails with a total length of 14 km. The forest where the trails are located has several owners: city of Vienna, Austrian Federal Forest Company, Klosterneuburg Monastery and private owners. What is more, the Vienna Woods is part of a Biosphere Reserve, with core zones where mountain biking could be banned. Seven of these trails are "shared trails" (to be used by hikers and bikers). There is no public transportation to reach the start of the trails. Thus, bikers have to reach the trail start by themselves.

The German case comprises five downhill trails (from 1.6. to 4.2 km length) in the proximity of Freiburg. The forest where the trails are located is under the ownership of the city of Freiburg. The trails are widely known and used by hundreds of bikers on summer weekends. While the labelled single trails and the forest roads in the municipal forest of Freiburg are shared trails, the downhill trails (also located in the municipal forest) are to be used only by mountain bikers (single use trails). For several trails, there is no public transportation for the bikers to the trailheads. For two trails, it is possible to reach the starting point by car or public transport.

The Swiss case includes one mountain bike trail only, 1.7 km long and located in forests under common citizen ownership (Bürgergemeinde¹) and private ownership in the proximity of the city of Berne. The trailhead is widely known, very popular and can easily be reached by train. To use the 'Gurtenbahn', bikers have to buy a day pass.

¹ The ownership Bürgergemeinde, very typical in the Swiss context, is defined as a collective of persons who have traditional citizen rights to the municipality of concern. Currently, the Bürgergemeinde Bern is composed by 18'000 single members and 13 guilds.

Table 1
Main characteristics of selected case studies. Source: compiled by the authors.

Region	Trail name	Length (km)	Difference in altitude (m)	Type of trail	Forest ownership
Vienna (A)	Wienerwaldtrails	14	1.400	9 trails (7-shared trails with hikers, two single trails only for bikers).	City of Vienna, Austrian Federal Forest Company, Klosterneuburg Monastery, a few small private owners
Freiburg (G)	Borderline, Canadian Trail, Badish Moon	1.6–4.2	140–433	5 Single trails only for bikers	Municipal forest
Bern (CH)	Rising, Baden to the Bone, Hubbelfuchs Gurtentrail	1.7	270	Single trail only for bikers	Bürgergemeinde (common citizen ownership) Bern and private owners

2.3. Data collection and analysis

We used a qualitative approach, both for data collection and analysis, that is, for interviews and the review of literature and documents. Data collection and analysis of the negotiation process were structured according to the IAD framework variables. Data for the external variables (biophysical and community attributes) consist of local statistics and grey literature (e.g. newspaper articles, minutes of stakeholder meetings, discussion boards and blog posts). Collecting data for the external variables was a precondition for preparing for the interviews and for the analysis of the action situation. Interviews were used to collect data concerning the action situations and outcomes. We developed an interview guide (see Annex 1) comprising of 19 open-ended questions based on the main variables of the IAD framework, thus addressing the action situation (negotiation process), stakeholders and stakeholders competing interests, as well as outcomes. Examples of questions include: who initiated the negotiation process, which stakeholders were involved in the negotiation process, how were the stakeholders involved. The same guide was applied in all three cases. The interviews were recorded and transcribed. The transcripts were analysed using qualitative content analysis to facilitate the deductive structuring of the data based on the variables of the IAD framework as well as systematically identifying in-situ variables (e.g. funding) that emerged from the data (Mayring, 2010). The interviews took approx. 1 h, each resulting in a ca. 20 to 30-page transcript, with exception of interview II in the Austrian case, which took less time and was only transcribed to a limited extent due to technical problems with the recording.

Interviewees were selected based on how knowledgeable the individuals were about the negotiation process and how important they were (the role they played, e.g. initiator) for and during the negotiation process (see Annex 2). As our goal is not to have a representation of all stakeholder positions but rather to learn about and understand the process, saturation was reached with only a few numbers of interviews with key players. To ensure that we reached saturation, we for instance conducted two additional interviews in the Austrian case, as described below.

In the Austrian case, we conducted four interviews. First, we conducted two in-depth interviews with the founders of the bike trails, who played a pivotal role in the highly consolidated negotiation process. We supplemented these with two additional interviews, to ensure that we fully grasp how the process worked: one with the responsible Head of the Austrian Federal Forest company and one with the responsible Team Leader of the Biosphere Reserve Wienerwald management (see Annex 2, Interview partners). These two additional interviewees were also involved from the beginning of the negotiations and are both the main actors responsible for their organisations (forest owners and Biosphere Reserve). Additionally, to better understand the negotiation process, we drew on the following existing studies: Sulzgruber (2016) and iNUF (2017). Sulzgruber (2016) offers a chronological scientific account of some of the events in the initial phase of the Austrian case. For the German case, seven interviews were held with members of national and local mountain bikers' associations and representatives of other affected interest organisations as well as local authorities. Due to the more fragmented nature of the negotiation process, we found that more

interviews were necessary in the German case (than the other two cases) to understand the negotiation process. In Switzerland we conducted three interviews with 1) a representative of the mountain bike association, 2) a district forester and 3) a forester at a forest enterprise.

3. Results

3.1. External variables

The external variables are similar across the cases (see Table 2). The community attributes in all cases are similar, as they show a high demand for mountain bike trails and respective infrastructure. This can be explained by the fact that the three cases are situated in highly urbanised areas. In all cases bikers were not organized in associations before the negotiation processes started.

The biophysical attributes in all cases are conducive for mountain-bike trails. They offer hilly landscapes and therefore the perfect settings for constructing attractive mountain bike trails. Additionally, the accessibility of the trails plays a crucial role, as it allows many bikers to easily reach the trails.

The rules in use are very clear in all three cases and help to explain why the recreation use of forests is considered an open access common-pool resource. The Austrian Forest Act (1975, no. 440/ amendment BGBl. I no. 56/2016) provides access with some exceptions (e.g. to camp; young stands up to 3 m height, timber stockyards) or must be indicated (e.g. logging areas). Free access is provided for walking as a recreational activity but not for biking. On Austrian forest roads, biking is not tolerated or allowed but requests authorisation by the forest owners or those responsible for the respective forest roads. In Germany, the forest law guarantees access to all pedestrians for recreation purposes in public and private forests. Bikers are allowed to use suitable forest roads and paths. According to the § 37/3 forest law of the federal state Baden-Württemberg (where our case study is located) bikers are allowed to use all paths, which are wider than two meters or designated single trails of a width less than two meters. In Switzerland, the access right originates in Alemanic law. It is enshrined in Article 699 of the Swiss Civil Code since 1907, stating that 'any person has the right to enter woodlands and meadows and to gather wild berries, fungi, and the like to the extent permitted by local custom, except where the competent authority enacts specific prohibitions in the interests of conservation' (Civil Code, 1907). This article applies to publicly and privately-owned forest areas. Subsequently, in Switzerland, biking is allowed on forest roads but not in the forest itself.

Thus, in Germany and Switzerland biking is allowed on specific forest roads but not throughout the entire forest area. In Austria biking is possible if explicitly allowed by the forest owner or the ones responsible for the forest road. However, as our cases show, not all bikers obey these rules, some tend to ride anywhere, thereby also damaging young stands (Wilkes-Allemann et al., 2017). Furthermore, bikers in all cases tend to build illegal infrastructures such as wooden bridges and jumps in the forests. In some countries, such as Switzerland, this type of infrastructure is subject to a special permit from local forest administrations (Wilkes-Allemann et al., 2017).

Table 2
External variables. Source: compiled by authors based on document analysis and empirical data.

	Vienna (Austria)	Freiburg (Germany)	Bern (Switzerland)
Community attributes	High demand for MTB trails and other outdoor related recreation opportunities. MTB users were at the beginning of the process not organized.	High demand for MTB trails and other outdoor related recreation opportunities. Touristic and economic significance of MTB “destination”. MTB users were at the beginning of the process not organized. Hikers are organized in the “Schwarzwaldverein”	High demand for MTB trails and other outdoor related opportunities. MTB users were at the beginning of the process not organized.
Biophysical attributes	Urban agglomeration and accessible for users. The Vienna Woods (Wienerwald). It is a hilly and forested area, highest peak at 893 m.a.s.l.	Urban agglomeration and accessible for users. Medium range mountainous area perfect for MTB trails.	Urban agglomeration and accessible for users. The Gurten mountain (“Hausberg of Bern”) is a small mountain close to the city of Bern, offers perfect setting for MTB trails.
Rules in Use	Forest Act (1975, no. 440, BGBl. I no. 56/2016): everyone has the right to enter forests for recreational purposes at any times, exemptions have to be indicated. Biking on forest roads only if forest owner or the ones responsible for the respective forest roads allow it. Biking outside authorized forest roads is forbidden by law if not explicitly permitted by local forest authorities.	Baden-Württemberg Federal state forest act § 37 (3): prohibits biking on trails and paths smaller than 2 m width. Local forest authorities may define exception.	Article 699 of the Civil Code (1907) allows access to all types of forests. Article 14 Forest Law: Cantons can restrict the access to the forest if necessary, e.g. for biodiversity protection. To legalize a trail, official permit from the forest owners, the local forest authorities (Art. 16 Forest Law) and the spatial planning authorities (Art. 24 Spatial Planning Law; depending on the size of the trail) is necessary.

3.2. Action situations – negotiation process of establishing mountain bike trails

We present the results on the action situation based on the following aspects 1) trade-off situations, demand for mountain-bike trails, stakeholders, responsibility for the trail, interactions and concerns of stakeholders and role of compensations and financial issues.

3.2.1. Trade-off situations

In all cases, we found several trade-off situations addressed by the negotiation process about the establishment of mountain-bike trails. In the Austrian and German case three similar trade-offs were identified:

- 1) Trade-off between benefits from different recreational uses (e.g. hikers and bikers).

- 2) Trade-off between the benefit from illegal mountain biking (for bikers) and the benefit from multifunctional forest-management (for the forest enterprise) – by increasing costs for forest management (e.g. damages in forest stands, increasing costs for measures to be taken for harvesting, liability costs).
- 3) Trade-off between the establishment of trails for bikers and interests in protection of the environment (for the public).

We also identified some case-specific nuances in terms of trade-offs. In the German case, additionally the trade-off between the establishment of trails and thus benefits for bikers and benefits for nature supported the negotiation process resulting in compensatory measures. In the Swiss and German cases, the trade-off between the benefit from illegal mountain biking (for bikers) and the benefit from forest ownership (uncertainty about liability and related costs for the forest owner) led or supported the begin of the negotiation process. Finally, in the Swiss case the trade-off between benefits from illegal biking and benefits from hunting, as well as the trade-off with all other forest utilizations at the corresponding spot due to illegal infrastructures supported the negotiation process for legalizing the mountain bike trail.

3.2.2. Demand for mountain-bike trails

In all cases, we found that the demand for mountain bike trails has strongly increased in the last two decades, which has caused all these trade-offs to develop and triggering the negotiation processes.

3.2.3. Stakeholders

In all cases, a diverse range of stakeholders with competing interests were involved (see Table 3). Also, a new bikers' association was formed in all cases, which was a pre-condition to start the negotiation process, as bikers were illegally using the forest. However, the degree of tolerance was different between the cases, as we describe below.

In the Austrian case, stakeholders (e.g. the Biosphere Reserve management, the hunters' association and some forest owners) initially wanted to ban mountain biking from the core zone of Vienna Woods Biosphere Reserve. Additionally, the forest owners wanted to keep parts of the trails as forests and not dedicate them as sports arena (Sulzgruber, 2016). Furthermore, the Biosphere Reserve management was concerned about biodiversity (Sulzgruber, 2016). Other stakeholders (e.g. City of Vienna, some other forest owners, tourism actors and mountain bikers) were willing to interact with the bikers to find a solution and started the negotiation process (Ibid). As bikers were not organized then, they first formed an association to articulate their concerns with the aim of creating “an attractive network of trails and to develop solutions for users and all interest groups under consideration of nature conservation and biodiversity aspects” (Int. I). At the same time iNUF (Agentur für Innovative Natur und Freizeitkonzepte, inuf.at), a private agency for developing and planning innovative outdoor concepts, was commissioned by the Biosphere Reserve to provide a trail feasibility study on mountain biking, taking the strict requirements of the biosphere reserve into consideration. This study then served as the basis for the negotiation process. At the beginning of the negotiation process the stakeholders agreed that trails will not be created in the core zone of the Biosphere Reserve (Int. Iic). They placed emphasis on providing attractive, legal trails outside the core zone (Sulzgruber, 2016). Through this agreement the main concern of the Biosphere Reserve and some forest owners was addressed.

In contrast to the Austrian case, illegal mountain bike trails were tolerated by the municipality in the German case for several years, as bikers were on good terms with the responsible forester (Int. IV & IX). However, as soon as the popularity of the trail increased due to videos, pictures and interviews shared on the internet (Int. IV & IX), trade-offs became more accentuated (Int. IX). To start the negotiation process the city's forest authority supported bikers to form an association (Int. IV) in order to collectively interact in the legalization process of the trail based on an exemption clause of the state forest law (§ 37/3; Int. IX).

Table 3
Stakeholders' competing interests. Source: Compiled by authors based on the IAD Framework categories.

	Vienna (A)	Freiburg (D)	Bern (CH)
Individual Forest owners	City of Vienna, Austrian Federal Forest Company, Klosterneuburg Monastery, Private owners: <i>avoid increasing costs for forest management and harvesting, damage to forest stands</i>	City of Freiburg: <i>avoid increasing costs for forest management and harvesting, liability issues, constraints in timber production</i>	Common citizen ownership (Bürgergemeinde), private owners: <i>avoid liability</i>
Organisations/Associations	Lower Austrian Hunters Association: <i>concern for wildlife.</i> Austrian Tourist Club (ÖTK): <i>concerned about conflicts with hikers</i> WWF: <i>concerned about damages to biosphere reserve</i> Biosphere park: <i>concerned about damage to biosphere reserve and keeping parts of the trail as forests.</i> Wienerwald MTB trails association, PHAT MTB & More GmbH, Trailaffairs (Phase II): <i>concern for attractive legal offer for bikers and other stakeholders</i> Lower Austrian tourist agency Wienerwald Tourism GmbH: <i>concern for legal offer under avoidance of additional costs</i>	Nature conservation (environmental NGO): <i>avoid negative impacts and pressure on ecosystem</i> Hunters association: <i>avoid limitation of hunting possibilities</i> Black Forest tourism association: <i>increase value added</i> Black forest hiking association: <i>avoid crowding conflicts and danger for hikers</i> Mountain bike Freiburg association, German Mountain bike Association: <i>gain additional space for biking activities</i>	Bear Riders, Trailnet: <i>legalize trail</i> Hunters association: <i>concerned about the effects of bikers on wild animals.</i>
Public authorities	Provincial administration of Lower Austria: <i>concern about damage to forests.</i> Forest department [MA49]: <i>avoid increasing costs for forest management and harvesting, damage to forest stands and nature</i> Sport department and Tourism department of the City of Vienna: <i>concern for legal offer without additional costs</i>	City of Freiburg: <i>increasing number of forest visitors, soft location factor by provision of diverse recreation opportunities</i>	Spatial planning department, Hunting regulating body, Forest department, transportation and energy department: <i>concerned about the route of the trail, concerned about wild animals habitat</i>
Local municipality	54 involved municipalities: <i>increase local economy</i>	City of Freiburg: <i>avoid increasing costs for forest management and harvesting, liability</i>	Community of Köniz: <i>mediate the process</i>

Table 3 (continued)

Vienna (A)	Freiburg (D)	Bern (CH)
		<i>issues, constraints in timber production</i>

The bikers were also riding illegally throughout the forest area in the Swiss case for several years and were tolerated. However, at some point, a biker criticised this situation in a readers' letter for a local newspaper by highlighting the trade-offs of liability and increasing costs for forest management (rejuvenation of stands) in order to provoke reactions of the involved stakeholders (i.e. forest owners and hunters). Subsequently, these stakeholders asked the forest administration for advice and expressed their concerns about the consequences of illegal biking on wildlife. At the same time, bikers wanted to add infrastructure to the trail (Int. X). To be able to interact in the negotiation process, they formed an association.

3.2.4. Responsibility for the trail

Regarding responsibility for the trail, in all cases the bikers' association ended up taking responsibility for the trails. However, we see a divergence in the process between the cases, as in the Austrian and German cases stakeholders quickly took responsibility, which enabled a successful start of the negotiation process. In contrast, the Swiss case, the bikers initially did not manage to take responsibility with their newly formed association, which delayed the negotiated process.

In the Austrian case, the bikers' association took responsibility of the negotiations and started a series of moderated workshops that served as a forum where the concerns of all involved stakeholders were discussed, e.g. the effects of not legalizing some trails on the Biosphere Reserve (Int. I, II, IIc). After several rounds of discussions and negotiations, three founding members of the biker's association formed the firm PHAT MTB & More Ltd. to address the increasing demand for trails. Some years later, the same firm founded another company named "Trailcenter Hohe Wand Wiese", led by members of the biker's association. This firm took full responsibility for maintaining the trails.

In the German case, based on a licensing agreement, the bikers' association assumed full responsibility for the maintenance and for liability issues of and for the trail (Int. IV & IX). To proceed with the negotiation process, it was necessary to address local demands, like the quest for silence, contemplation, wilderness, etc. and to reduce conflicts of interests between recreational users (e.g. between hikers and bikers; Int. V & IX). However, as one mountain bike trail did not suffice to address the increasing number of users (Int. V), over the course of further seven years, five additional trails were built (Int. V & IX). For these new trails the bikers' association once more assumed full responsibility for maintenance and liability issues. During the negotiations, the environmental authority of the city ensured that the environmental impact of the trails had to be kept at a minimum and that environmental regulations, like the flora-fauna-habitat directives, were kept (Int. IV & IX). After the negotiation process, the channelling of diverse forest visitors improved significantly. However, few illegal trails still remained. The biker's association is helping the city forest authority to address all bikers via social media and homepages to inform them about the opportunity to use legal trails and the does and don'ts while biking in the forest.

In the Swiss case bikers did not manage to take responsibility with their newly formed association "Bear Riders" and to submit the building application needed to start the legalization process of the trail within the 30-days deadline as provided by the forest administration (Int. XI). As a consequence, the municipality of Köniz issued a restoration order. At the same time the association "Bear Riders" was dissolved. However, as bikers really wanted to legalize the trail, the same biker that issued the reader's letter formed an association called "Trailnet" and took full responsibility for leading the negotiation process and acted as the contact

person throughout the negotiation process. Through him the association managed to submit the building application to the regional administration of Bern (Int. X), signed a liability insurance for the trail and managed to secure contracts with forest owners exempting them from their liability obligations (Int. XI). This step was a pre-condition for the main forest owner to accept the legalization of the trail (Int. XI). However, one small forest owner submitted an objection against the legalization decision but has not been successful. Other private owners decided not to get involved in the negotiation process. They were not concerned about bikers riding in their forests. Furthermore, the spatial planning department of the City of Bern had to grant permits for small constructions (Article 16 of the Forest Law, Article 24 of the Spatial Planning Law). While in the Austrian case the negotiation process took around two years, in the German and Swiss case it took around five years. As all cases show, the question of funding the establishment and maintenance of the trail raises competing interest and thus hampers or constrains the negotiation process.

3.2.5. Interactions and concerns of stakeholders

In the Austrian and German case, the interaction of the negotiation process was structured with a series of workshops and information events, wherein they expressed their competing interests (see Table 3). In the Swiss case site inspections were used to express the competing interests.

In the Austrian case, the focal interaction of stakeholder workshops in the negotiation processes aimed at finding an attractive solution for bikers and to channel biking away from the illegal routes and sensitive areas. First, some stakeholders were willing to negotiate for a future agreement (City of Vienna, some forest owners, tourism actors, bikers). Subsequently, several public (e.g. 56 municipalities, Provincial administration of Lower Austria, Forest department, City of Vienna) and private (e.g. Lower Austrian Hunters Association, Austrian Tourist Club, WWF) stakeholders needed to be considered in the negotiation process and their concerns needed to be articulated. To provide a forum for this and allow for interactions between stakeholders, the newly formed bikers' association took responsibility and started a series of moderated workshops. There, the competing interests were solved by finding options on how to integrate nature protection goals into the concept of "channelling" bikers in a network of legalized trails. In this regard, the feasibility study conducted by iNUF (Agentur für Innovative Natur und Freizeitkonzepte, inuf.at) played a crucial role.

In the German case, at the beginning of the process, public actors were concerned about the environmental consequences and social conflicts due to illegal trail building activities, as well as about the negative consequences the trails might have on forest management. At the same time, the forestry authority and the hikers' association received complaints about mountain bikers illegally using hiking trails and even constructing illegal trails. All these concerns needed to be addressed. In a series of workshops, organized by the local authorities, public and private stakeholders interacted to find a solution to the increasing demand of mountain bike trails and its effects on forest management. Even though several stakeholders were concerned about illegal mountain biking, only few interacted intensively in the discussions and bikers had to negotiate just with one public forest owner (i.e. the City of Freiburg, which is also the local environmental and hunting authority). NGOs and the hiking association had more or less advisory functions. It became evident, that the crucial factors for the establishment and acceptance of the trail network in Freiburg are the establishment of a biker's association which offers a communication channel to the organized and not organized bikers and can act as a reliable negotiator and contractual partner.

In the Swiss case, private and public forest owners were concerned about the effects of mountain biking. Bikers wanted to legalize the trail. During the negotiation process several public actors (the spatial planning department, hunting regulating body, forest department, and transportation and energy department) and few private actors (Trailnet,

private owners) were involved. Stakeholders involved interacted in the course of numerous site inspections to discuss the concerns of the actors involved and to define the best route of the trail (Int. XI).

During the site inspections some forest owners expressed their opposition to legalize illegal trails. Additionally, some public stakeholders expressed their concerns about safety at crossings. Regarding the former, in the course of information events forest owners were finally convinced that legalizing the trail is the more favourable option as compared to dealing with thousands of illegal bikers riding anywhere.

3.2.6. Role of compensations and financial issues

In terms of compensatory measures, we find divergence across our cases, as only in the German case were these pivotal for finding a compromise. However, in all cases defining who will take over which cost was crucial (Table 4).

In the Austrian case, the feasibility study conducted by iNUF provided sufficient compensatory measures. To conclude the negotiation process in the German case, compensatory measures were necessary to reach consensus. More concretely, the legalization of the trail was possible based on two compensatory measures: (1) the implementation of an environmental protection project in the municipal forests, and (2) active management of these areas by members of the bikers' association (Int. IV, V & IX). Otherwise stakeholders representing the environmental perspective (ENGOS and environmental authority) would have strongly opposed the legalization and establishment of trails. In the Swiss case no compensatory measures were necessary.

In all three cases a variety of funding mechanisms were agreed for the construction, operation and maintenance of the trails, which enabled the legalization of the trails. In the Austrian case, the trail was constructed based on volunteer work of bikers organized by the biker's association. The shared trails use existing hiking trails, which are constructed by the Austrian Tourist Club, which is a hiker's association in the Vienna Woods. The operation and maintenance of the shared trails is partly financed through: (1) a flat rate (10'000 EUR) that the Austrian Tourist Club and the biker's association receive from the local communities, (2) membership fees and volunteer work of the members of the Wienerwaldtrails association, (3) sponsorship by a range of bike manufacturers, dealers and bike repair companies, as well as from earnings from festivals (events for testing new biking equipment for free), courses and rentals organized by PHAT MTB & More GmbH. In the German case the maintenance of the trails is paid through membership fees, donations, revenues from annual events (e.g. races, festival) and sale of merchandise. In the Swiss case, bikers assumed the costs for the construction of the trails and finance the maintenance of the trail through charity races, sponsors and voluntary work of board members.

Finally, in all three cases the legalization of the trail had a financial impact in the region. In the Swiss case a third party – the local train provider – profits financially from the trail, as bikers have to pay a ticket to reach the start of the trail by train. In the German case, it is the municipality that profits from an increasing attractiveness of the region by providing its citizens and tourists additional sporting and recreation facilities. In the Austrian case landowners receive a levy (0,26 cents per trail-meter) from the tourism association as a compensatory measure for increased forest management costs.

3.3. Outcomes

All cases arrived at the outcome of legalizing bike trails, albeit to different degrees: in the Austria case two single trails (only for mountain bikers) and seven shared trails (shared with hikers) were negotiated, constructed and consensus among all involved stakeholders was reached. In the German case, one trail already partly existed and was legalized in the negotiation process, six others were newly constructed. In the Swiss case, one single trail was legalized. The outcomes prioritized different ecosystem services in diverging ways in our cases: while in the Austrian case some priority is given to biodiversity (as trails are in a

Table 4

Financial issues as a pivotal factor in Mountain bike trails negotiation processes. Source: Compiled by authors based on empirical data.

Financial issues <i>Who did finance the trail? How are the maintenance costs covered?</i>			
	Vienna (A)	Freiburg (D)	Bern (CH)
Construction	Legal single trails constructed by volunteers; shared trails by ÖTK (Austrian Tourism Club)	Mountainbike Freiburg association and its members financial contribution and voluntary work (costs for liability issues, PR, maintenance, labelling) Support by the municipality e.g. forest area, material, moderation of planning processes	Biking association and its members.
Operation & maintenance	Biking association (Wienerwaldtrails association) covered the costs for operating two single trails through sponsorship, membership fees and volunteer work. Austrian Tourist Club (ÖTK) and Wienerwaldtrails cover costs for maintaining seven shared trails through the 10'000 EUR they receive from the flat rate, which is financed by f 54 municipalities from Lower Austria and 7 districts of the city of Vienna. PHAT MTB & More GmbH raises sponsorship for the single trails from bike manufacturers, dealers and repair companies, and funds by means of festivals, courses and rentals.	Mountain bike Freiburg association and its members Support by the municipality e.g. material for maintenance	Biking association covers the costs by income from charity races, sponsorships and through voluntary work of board members of biking association.
Valorisation of forest owner	Receive a levy of approximately 0.26 cents per meter trail per annum from the Wienerwald Tourismus Ltd. (a so called "flat rate"). Are dismissed of liability issues.	Support mountain bike Freiburg association by provision of area and construction material. Are dismissed of liability issues.	No valorisation exists; they are just dismissed of liability issues.

Biosphere Reserve) while biking is tolerated, in the German environmental protection was prioritized and in the Swiss case wood production still plays a predominant role.

Through the establishment of the trails most of the trade-offs could be addressed in all cases. In the Austrian case, for example, three of the four trade-offs have been addressed. The trade-off between illegal mountain biking and multifunctional forest-management (including wood production) could be addressed through the legalization of official trails. Biking was canalised and forest management challenges (e.g. damages to young stands) were thus reduced. The trade-off between the benefit for bikers and the benefit for environmental protection could be addressed through the feasibility study. However, the trade-offs between different recreational uses have only been partly addressed. Not all recreational user groups are satisfied with the current situation.

In the German case, the trade-off between the benefit for bikers and benefit for environmental protection could be addressed by channelling the mountain bikers and thus keeping damages to the forest to a minimum as well by improved possibilities to inform bikers about sensitive forest areas.

In the Swiss and German case, the trade-off between the benefit from illegal mountain biking and the benefits for forest ownership could in both cases be addressed through clearly defining who is liable for what. However, as after some years new illegal trails were built in the German case, this trade-off has only been partly addressed in this case. Finally, in the Swiss case the trade-off between benefits from illegal biking and hunting, as well as the trade-off with all other forest utilizations at the corresponding spot because of illegal infrastructure were successfully addressed through the legalization of the trail by discussing their competing interests during the site inspections.

4. Discussion

We have analysed cases with similar external variables (context conditions) and have found variation in their negotiation processes and outcomes. In line with our initial expectation, we found all three types of trade-offs in our cases (between different recreation activities; between the forest uses for recreation activities and forest management for wood production; and between the forest uses for recreation activities and environmental protection). However, partially in contradiction with these expectations we found nuances between the specific trade-off

situations in the three cases: In the Austrian and German cases the central trade-off was between benefits to bikers versus environmental protection. In both cases the compromise for legalizing bike trails were compensatory measures to benefit the environment. In the Swiss case it was mostly the trade-off between benefits to bikers versus forest management and other forest utilizations that played a key role. In this case, no compensatory environmental protection measures were necessary.

Despite having similar context conditions, one reason for different trade-off situations is the number of stakeholders affected by mountain biking and the degree of influence that these stakeholders have in a given forest area (e.g. municipality as a forest owner – German case). Another reason is the interests and motivations that these stakeholders have on the given forest area and how these stakeholders relate to bikers. Both reasons have implications for the negotiation process. For instance, it is difficult to start a negotiation process if the motivation of stakeholders is just to conserve the forest area or if a forest owner is against allowing bikers to legalize a mountain-bike trail and subsequently on the outcome of the process (e.g. banning bikers from the forest).

In our analysis of the negotiation processes of establishing mountain bike trails (action situations), we have identified several key characteristics of these processes that contribute to our understanding about how the cases achieved certain outcomes. First, all three cases involve actor interactions through bikers' associations, which were a key ingredient for successful negotiations and implementation of agreements. Indeed, non-organized bikers can interfere - and hence hinder the establishment of outcomes - by accentuating competing interests, as such bikers have not agreed to compromise as a collective actor (Wilkes-Allemann et al., 2017). Thus, the creation and support of official bikers' associations which interact as collective negotiation partners, being able to assume liability, and may fully (Austrian case) or partly (German and Swiss case) assume responsibility for the construction, maintenance and operation of the mountain bike trails, can be considered as critical precondition for effectively addressing trade-offs. In this context, the degree of institutionalisation of the association played a crucial role leading to more efficient negotiation processes (e.g. Austria). While in the Austrian case the negotiation process took two years, the processes took twice that time in the German and the Swiss cases. In the German case it can be described as an ongoing process with successively establishment of several trails over the years. Moreover, the development of

the bikers' association as a reliable negotiation and contractual partner took quite some time as well as improving the regulations and contracts for handing over the liability obligations. In the Swiss case, bikers did not manage to interact as a negotiation partner from the beginning but only after a new organization with a new president was established. Additionally, one stakeholder opposed the legalization of the trail. Thus, this stakeholder needed to be convinced about the positive effects of legalizing the trail.

Besides the biker associations, the key form of interaction was stakeholder workshops (in Germany and Austria) and site inspections (in Switzerland). We found that the main difference between the cases in terms of the interactions is the number and type of actors involved: In the German case bikers had to negotiate with just one public forest owner (City of Freiburg), in comparison to several owners and several types of owners that were involved in the Austrian and the Swiss cases. However, our analysis showed that negotiation with just one stakeholder does not mean that the negotiation process will be easier, as in the German case the process was lengthy despite the “simpler” actor constellation, but rather it depends on the type of actor, the actors' influence on the negotiation process and on strong competing interests. Here it is important to note that the structure of forest ownership is changing (even if slowly), a change that often also influences forest management motives and practices (Živojinović et al., 2015). Forest owners are becoming more and more urbanised, implying that forest owners priorities and motivations are varying leading to forests not being managed (Weiss et al., 2019). Subsequently, this trend may create instable forests, which in turn affects the willingness of forest owners to care and negotiate and to allow such type of recreational infrastructures. Additionally, the type of interactions influences the outcome. In the case of Switzerland several site inspections were run where all stakeholders involved discussed and agreed on the route of the trail. If this type of interaction is not provided it seems to be very difficult to address all trade-offs and to satisfy the expectations of all stakeholders involved or affected.

The outcomes – legalized bike trails – were similar across the cases. Additionally, in all cases the primary management goal remained (biodiversity – Austrian case, wood production – German and Swiss case). Also, in all cases, trails would not exist if bikers were not involved in voluntary work to ease the financial burden. These key characteristics align with previous research (Wilkes-Allemann et al., 2017). Furthermore, the trails differ in terms of their establishment and implementation. While in the Austrian and German case it was the bikers that creatively found sources to provide financing for covering all costs of trails, in the Swiss case bikers “only” financed the maintenance and operation of the trail through membership fees.

The research presented in this article has some limitations. First, it could have benefitted from interviewing further stakeholders such as further local organisations (e.g. nature conservation organisations, hikers association, hunters association), local authorities and representatives. However, the objective of the study is not to cover the perspectives of all potential stakeholders, but rather to learn about and understand the negotiation processes of establishing mountain bike trails. Second, such negotiation processes are lengthy and there is not necessarily a definitive end. Particularly regarding the organization of all bikers and the prevention of further illegal action, the final situation is maybe not yet reached. Hence, we cannot make a definitive assessment on the final outcome. Third, the results are context sensitive, which precludes any broader generalization, as our cases exhibit the same peculiarities that prevent generalization to different contexts. E.g. all three cases are located in highly frequented (with existing recreational uses), low mountain and urban forest areas, close to very touristic cities and in all have a public owner involved. So, our cases are not applicable for rural contexts, with little tourism or where there are only private owners. Also, all cases are close to cities which probably makes the organization of bikers in associations easier. In addition, all cases are in a multifunctional forestry setting and hence the results probably cannot

be extrapolated to settings with more segregative timber production or biodiversity protection settings. On the flip side, our cases are analytically generalizable for similar contexts, so urban, highly frequented contexts (see above). Hence, our results presented provide grounds and starting points for understanding the negotiation process in similar contexts e.g. with forests intensively used for various purposes close to urban areas.

5. Conclusions

To understand how complex land-use trade-off situations can be negotiated to find acceptable outcomes, we have focused on specific action situations of negotiations about mountain bike trails in forests close to urban areas. We have shown how specific trade-off situations were dealt with in negotiations that led to outcomes that were accepted by the stakeholders, i.e. to compromises about legal mountain biking trails. Our findings show the importance of collective actors, a clear delineation of responsibilities and of compensation and funding measures as well as structured workshops and collective site inspections for addressing trade-offs for arriving at acceptable outcomes in our cases.

By applying the IAD framework, we shed light onto some key characteristics of the negotiation processes that contribute to understanding of how certain outcomes can be achieved. First, the organization of individuals (here bikers) into collective actors (biker associations) was pivotal across all cases, strongly facilitating common solutions. This finding is nothing new but coheres well with the environmental policy literature (Weale et al., 2002). Second, clear delineation of responsibilities (here the bikers' association) was critical for the negotiation process. In the future, managing forests on behalf of the provision of ecosystem services (e.g. such as recreation) in touristic and urban areas will play an even more prominent role. Consequently, finding ways to create clear responsibility and also to motivate (private) forest owners to manage their forests for the provision of ecosystem services may further increase in importance to address the trade-offs and to tackle the challenges (e.g. congestion, overuse, negative effects on flora and fauna) that urban forest areas are facing. Third, compensation measures and clearly dealing with financial issues is pivotal to reaching compromises in the context of establishing mountain bike trails. Particularly when it comes to environmental protection. Compensatory measures in this regard were key for legalizing the trails. Finally, the process matters: the workshops, collective site inspections and information events were central for getting different actor groups on board and reaching consensus. Our examples show that long and continuous initiatives and lasting commitment are needed for addressing trade-offs. These processes come with significant transaction costs for stakeholders, in terms of time, efforts and resources to come to enduring solutions (Scharpf, 1991; Ostrom, 1990).

Given the above characteristics, our study also has implications for practice: for better negotiating mountain bike trails, our findings can inform local administrations about how they could provide guidelines on how to proceed on this regard (see e.g. the Mountain Bike Concept of the City of Zurich, Switzerland). Finally, further research could propose new ways of managing “urban” forests on behalf of the provision of a variety of forest ecosystem services, as well as investigate role models of how several forest ecosystem services can coexist in urban forest areas without leading to major trade-offs.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

- Burgin, S., Hardiman, N., 2012a. Extreme sports in natural areas: looming disaster or a catalyst for a paradigm shift in land use planning? *J. Environ. Plan. Manag.* 55 (7), 921–940.
- Burgin, S., Hardiman, N., 2012b. Is the evolving sport of mountain biking compatible with fauna conservation in national parks? *Aust. Zool.* 36 (2), 201–208. <https://doi.org/10.7882/AZ.2012.016>.
- Chavez, D.J., Winter, P.L., Baas, J.M., 1993. Recreational mountain biking: a management perspective. *J. Park. Recreat. Adm.* 11 (1), 29–36.
- Civil Code, 1907. Schweizerisches Zivilgesetzbuch vom 10. Dezember 1907. SR 210. Stand 21. Dezember 2004.
- Clement, F., 2010. Analysing decentralized natural resource governance: proposition for a “politicized” institutional analysis and development framework. *Policy. Sci.* 43, 129–156.
- Clement, F., Amezaga, J.M., 2008. Linking reforestation policies with land use change in northern Vietnam: why local factors matter. *Geoforum* 39 (1), 265–277.
- Coleman, E.A., Steed, B.C., 2009. Monitoring and sanctioning in the commons: an application to forestry. *Ecol. Econ.* 68 (7), 2106–2113.
- Ellis, E.C., Pascual, U., Mertz, O., 2019. Ecosystem services and nature’s contribution to people: negotiating diverse values and trade-offs in land systems. *Curr. Opin. Environ. Sustain.* 38, 86–94.
- Forest Europe, 2015. State of Europe’s Forests 2015, p. 314. <https://www.forestseurope.org/docs/fullsoef2015.pdf>.
- Gerber, J.-D., Knoepfel, P., Nahrath, S., Varone, F., 2009. Institutional resource regimes: toward sustainability through combining property rights theory and policy analysis. *Ecol. Econ.* 68 (3), 798–809. Elsevier. <https://doi.org/10.1016/j.ecolecon.2008.06.013>.
- Gerber, J.-D., Lieberherr, E., Knoepfel, P., 2020. Governing contemporary commons: the institutional resource regime in dialogue with other policy frameworks. *Environ. Sci. Pol.* 112, 155–163. Elsevier. <https://doi.org/10.1016/j.envsci.2020.06.009>.
- Gerring, J., 2007. *Case Study Research: Principles and Practices*. Cambridge University Press, Cambridge.
- Hardiman, N., Burgin, S., 2013. Mountain biking: downhill for the environment or chance to up a gear? *Int. J. Environ. Stud.* 70 (6), 976–986. <https://doi.org/10.1080/00207233.2013.848531>. *Manag.* 55 (7), 921–940.
- INUF, 2017. *Entwicklung eines Grobkonzepts für die Sportart Mountainbike im Biosphärenpark Wienerwald “2017 +”*. Protokoll zu den Workshops in Pressbaum, Wien, Alland und Breitenfurt, p. 17.
- Koemle, D.B.A., Morawetz, U.B., 2016. Improving mountain bike trails in Austria: an assessment of trail preferences and benefits from trail features using choice experiments. *J. Outdoor Recreat. Tour.* 65, 55–65. <https://doi.org/10.1016/j.jort.2016.04.003>.
- Mayring, P., 2010. *Qualitative Inhaltsanalyse. Grundlagen Und Techniken [Qualitative Content Analysis. Theoretical Foundation and Basic Procedures]*. Beltz Verlag, Weinheim und Basel, p. 144.
- McGinnis, M.D., 2011. Networks of adjacent action situations in polycentric governance. *Policy Stud. J.* 39 (1), 51–77.
- Mehring, M., Seeberg-Elverfeldt, C., Koch, S., Barkmann, J., Schwarze, S., Stoll-Kleemann, S., 2011. Local institutions: regulation and valuation of forest use—evidence from Central Sulawesi, Indonesia. *Land Use Policy* 28 (4), 736–747.
- Oesten, G., 2016. Grenzen der Natur oder Natura als Grenze? – erörtert am Beispiel der nachhaltigen Forstwirtschaft. In: Schaffer, A., Lang, E., Hartard, S. (Eds.), *An und in Grenzen – Entfaltungsräume für eine nachhaltige Entwicklung*. Metropolis-Verlag, Marburg, pp. 175–199.
- Ostrom, E., 1990. *Governing the Commons: The Evolution of Institutions for Collective Action*. Cambridge University Press, New York.
- Ostrom, E., 2005. *Understanding Institutional Diversity*. Princeton, Princeton University Press, p. 376.
- Ostrom, E., 2009. A general framework for analyzing sustainability of social-ecological systems. *Science* 325 (5939), 419–422.
- Ostrom, E., 2011. Background on the institutional analysis and development framework. *Policy Stud. J.* 39 (1), 7–27.
- Pröbstl-Haider, U., Lund-Durlacher, D., Antonschmidt, H., Hödl, C., 2018. Mountain bike tourism in Austria and the alpine region – towards a sustainable model for multi-stakeholder product development. *J. Sustain. Tour.* 26 (4), 567–582. <https://doi.org/10.1080/09669582.2017.1361428>.
- Sandström, C., Lindkvist, A., Öhman, K., Nordström, E.-M., 2011. Governing Competing Demands for Forest Resources in Sweden. *Forests* 2, 218–242. <https://doi.org/10.3390/f2010218>.
- Scharpf, F.W., 1991. Games real actors could play: the challenge of complexity. *J. Theor. Polit.* 3 (3), 277–304.
- Schroff, U., Ammann, S., Bernasconi, A., 2005. *Bikerwaldpass Rheinfelden. Grundlagen und Umsetzung eines innovativen Finanzierungsmodells*, p. 18.
- Sulzgruber, T., 2016. *Der Schutz-Nutzen-Konflikt in Großschutzgebieten am Beispiel des Biosphärenparks Wienerwald*. Diplomarbeit, p. 140.
- Turkelboom, F., Leone, M., Jacobs, S., Kelemen, E., García-Llorente, M., Baró, F., Rusch, V., 2018. When we cannot have it all: ecosystem services trade-offs in the context of spatial planning. *Ecosyst. Serv.* 29, 566–578.
- Weale, A., Pridham, G., Cini, M., Konstadakopulos, D., Porter, M., Flynn, B., 2002. *Environmental Governance in Europe: An Ever Closer Ecological Union?* OUP Catalogue.
- Weiss, G., Lawrence, A., Lidestav, G., Feliciano, D., Hujala, T., Sarvašová, Z., Dobsinska, Z., Živojinović, I., 2019. Research trends: Forest ownership in multiple perspectives. *Forest Policy Econ.* 99, 1–8. <https://doi.org/10.1016/j.forpol.2018.10.006>.
- Wilkes-Allemann, J., Pütz, M., Hirschi, C., Fischer, C., 2015a. Conflict situations and response strategies in urban forests in Switzerland. *Scand. J. For. Res.* 30 (3), 204–216.
- Wilkes-Allemann, J., Pütz, M., Hirschi, C., 2015b. Governance of Forest recreation in urban areas: Analysing the role of stakeholders and institutions using the institutional analysis and development framework. *Environ. Policy Gov.* 25, 139–156.
- Wilkes-Allemann, J., Hanewinkel, M., Pütz, M., 2017. Forest recreation as a governance problem: four case studies from Switzerland. *Eur. J. For. Res.* 136 (3), 511–526. <https://doi.org/10.1007/s10342-017-1049-0>.
- Yin, R., 2014. *Case Study Research, Design and Methods*, 5th ed. Sage, Thousand Oaks and London.
- Živojinović, I., Weiss, G., Lidestav, G., Feliciano, D., Hujala, T., Dobsinska, Z., Lawrence, A., Nybakk, E., Quiroga, S., Schraml, U., 2015. *Forest Land Ownership Change in Europe. COST Action FP1201 FACESMAP Country Reports, Joint Volume. EFICEEC-EFISEE Research Report*. University of Natural Resources and Life Sciences, Vienna (BOKU), Vienna, Austria, 693 p. http://facesmap.boku.ac.at/librar y/FP1201_Country%20Reports_Joint%20Volume.pdf (last accessed on 3 April 2021).