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Where farmers see their role – Influence on sustainable regional development approaches in Alpine biosphere reserves

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Keywords: Alpine biosphere reserve, agriculture, nature conservation, participation processes

Abstract

Structural changes in agriculture are beginning to be felt even in remote mountain regions. The specific cultural landscapes, with their mosaic of different uses, remain in relatively good ecological condition. In general terms, agriculture fulfils a high variety of essential functions, such as the maintenance of the Alpine landscape, nature conservation and sustainable rural development. The biosphere reserves (BRs) selected for this study focus on the conservation of cultural landscapes. Alpine farmers as managers of the land therefore play an important role in sustainable regional development within the biosphere reserves. What affects farmers' willingness to participate in the development of biosphere reserves? Qualitative interviews with forty farmers in the UNESCO BR Salzburger Lungau and Kärntner Nockberge (AT), UNESCO BR Engiadina Val Müstair (CH) and UNESCO BR Entlebuch (CH) give insights into their opinions on the responsibilities of agriculture, nature conservation, BRs, and the importance of participation and cooperative approaches.
This research should help to identify, strengthen or complement existing approaches for sustainable regional development in conservation sites in the Alps. Generally, farmers accept and appreciate the BR as a shared platform for the participatory concepts of various stakeholder groups for sustainable regional development while acknowledging that the implementation of a BR is a long, slow process, which calls for numerous dialogues and relies on open minds amenable to mutual understanding.

Profile

Protected area

UNESCO BR Salzburger Lungau and Kärntner Nockberge, BR Engiadina Val Müstair and BR Entlebuch

Mountain range

Alps

Countries

Austria and Switzerland

Figure 1 – Agriculture and its typical structures characterize the landscape and its various habitats in the study areas (Entlebuch 2015). © Humer-Gruber

Introduction

Besides maintaining landscapes through the cultivation of the land and food production, agriculture performs numerous functions in rural areas (Haas et al. 2001; Renting et al. 2009) which are not always obvious at first sight, like maintaining ecosystem services (Daniel et al. 2012) and social functions. In mountain regions, a polarization of cultivation is observed at landscape scale (Lauber et al. 2014): on the one hand, land abandonment and fallow in disfavoured areas (MacDonald et al. 2000) and on the other hand intensification in the valley bottoms both lead to a loss of biodiversity and cultural landscapes (Marini et al. 2011; Pecher et al. 2017). Since the 1950s, *industrialization* and *intensification* of agriculture have led to structural changes. In general, the average size of farms is growing, while the number of farms is declining (MacDonald et al. 2000; Darnhofer et al. 2016). Especially in remote mountain regions, the number of vulnerable small-scale farms is high. These structural changes have tremendous impacts on landscape and nature, and affect biodiversity (Marini et al. 2011; Rüdisser et al. 2015). Biodiversity is highest in mountain areas consisting of various small habitats (Figure 1) that have evolved over centuries of cultivation (Holzner & Frohmann 2007).

In biosphere reserves (BRs) especially, through the use of sustainable agricultural systems, farmers conserve *nature* and preserve biodiversity at landscape scale (CBD 1993; Marini et al. 2011). Nature conservation measures have become essential in agriculture (Weiland 2011), and agri-environmental schemes are a source of income for farmers. In some areas of Austria and Switzerland, the typical (agri-)cultural landscape is also an economic factor for *tourism*, which is recognized as a cultural ecosystem service (Daniel et al. 2011). Extensively used agricultural land is valued (Pecher et al. 2017), and the *mountain idyll*, high qual-

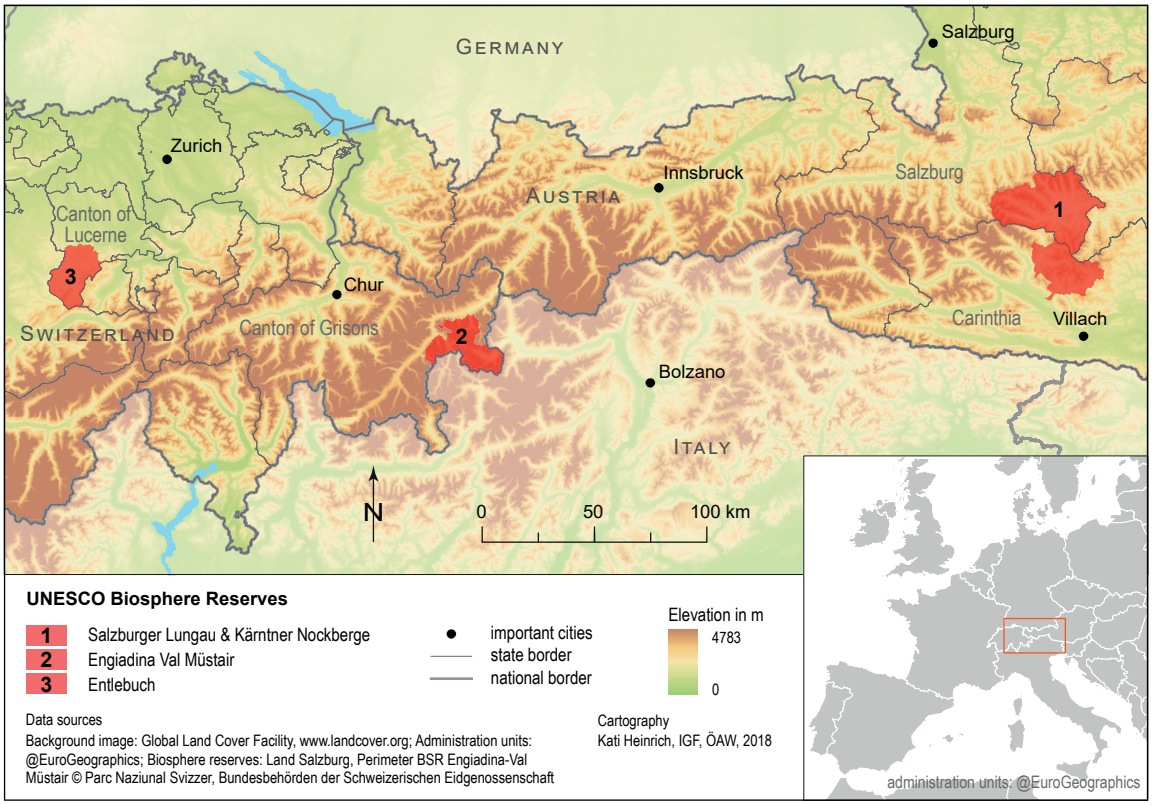

Figure 2 – The study areas in Switzerland (BR Entlebuch; BR Engiadina Val Müstair) and Austria (BR Salzburger Lungau und Kärntner Nockberge).

ity food and sustainability (Pröbstl & Müller 2012) are popular amongst tourists. Tourism relies on cultivated landscapes and a functioning infrastructure (for example, access to tracks, meadows, springs and mountain huts) offered by farming activities. It gives an important economic impulse to regional development in mountain areas, but in the face of global competition, tourist-dependent systems are generally fragile. Very few alpine areas have become strong autonomous regions through tourism (Bätzing 2015). In the research areas, gentle tourism is present.

Another side effect of agriculture is combating social problems in rural areas, by enabling decentralized settlement, by encouraging a dynamic village life, and by offering high quality workplaces in areas where employment opportunities are limited. Frequently, several generations live under the same roof (Mayr et al. 2016), and therefore the family-run farm fulfils important *social functions*, from childcare to care of the elderly. Farming also transmits numerous cultural assets, traditions and local ecological knowledge (Grasser et al. 2012). The preservation of cultural heritage and diverse innovations are linked to farming communities (Darnhofer 2005). Rural areas boast a high quality of life, and various interventions during recent decades should counteract rural out-migration. Nevertheless, the research areas for this study in Austria and Val Müstair still face demographic decline (Buchli et al. 2003). The farmers who responded referred in particular to the emigration of young people, who do not return after completing their training, largely due to a lack of career prospects (Bender et al. 2017).

In 1995, UNESCO revised the concept of BRs, and the organization offers a framework for a participative approach (UNESCO 2017). People working and living in and around BRs should participate in decision-making processes and be able to meet their economic, social, cultural and ecological needs. BRs are not economic wonder pills for rural areas, and their success relies on the commitment and creativity of local communities, who apply for this international label. The management offices are responsible for moderation and co-ordination, in a continuous process that involves heterogeneous stakeholder groups. Nevertheless, to become a model for sustainable regional development, a region needs a strong community which participates, discusses and innovates in the region to create sustainable living, including for future generations.

The aim of this research is first to identify where farmers see the tasks of agriculture and then to correlate their attitudes towards BRs and nature conservation, in order to identify where they see their role within this frame. Their points of view concerning the improvement of development strategies and conservation measures are also discussed.

Study area and research methods

BRs focusing on cultural landscapes were chosen as research areas as they are places where farmers carry

Table 1 – Profile and history of the BRs (Data source: Humer-Gruber and UNESCO 2016).

	UNESCO BR		
	Salzburger Lungau and Kärntner Nockberge	**Engiadina Val Müstair**	**Entlebuch**
Area [ha]	149 600	37 100	39,659
Core zone [%]	5.48	48.68	8.32
Buffer zone [%]	36.92	23.57	41.25
Transition zone [%]	57.60	27.74	50.43
Location	46° 58′ 09′′ N–13° 43′ 32′′ E	46° 36′ 25′′ N–10° 22′ 5.83′′ E	46° 54′ 30′′ N–08° 00′ 29′′ E
Altitude [m asl]	600–3 000	1 200–3 200	600–2 350
Inhabitants (2012) [people]	33 350	1 540	17 000
Population density [people/km²]	22.29	4.15	42.86
Year designated	2012	2010	2001
UNESCO BR Salzburger Lungau and Kärntner Nockberge - Extends across two Austrian Federal States, Salzburg and Carinthia - Citizen initiative in 1980 stopped a planned ski resort; national park Nockberge was designated by the Carinthian government in 1987 - Redesign launched in 2004 to form the BR together with Lungau - Anthropogenic influence on mountain pastures, diverse cultural landscape and local traditions receive better acknowledgement			
UNESCO BR Engiadina Val Müstair - Located in the east of the Swiss, Canton of Grisons - Operational since 2010 (Karthäuser et al. 2011) - Composed of the regional nature park Val Müstair (buffer and transition zone) and Swiss National Park established as a strict nature reserve in 1914 (core zone) - Rhaeto-Romance *Jauer* dialect is spoken by 78% of the inhabitants; 80% organic agriculture; vibrant traditional handcrafts			
UNESCO BR Entlebuch - Located in the centre of Switzerland, Canton of Lucerne - Rothenthurm initiative in 1987 was crucial; preservation of moors, which became legally protected - Feasibility study started in 1995; in 2001 the BR was designated - High participative approach; moors were identified as an asset for the region's sustainable development			

out important tasks. The selected BRs are richly structured inner alpine landscapes. Agriculturally shaped mountain regions have high biodiversity thanks to a mosaic of habitat types which have evolved over thousands of years of human habitation. Each area includes a ski resort where winter tourism has become well established. Of central concern to the areas is the conservation of the natural and cultural landscapes, which cover altitudes ranging between 600 and 3 200 m asl (Table 1).

Qualitative interviews with forty farmers in the BR Salzburger Lungau and Kärntner Nockberge (AT), BR Engiadina Val Müstair (CH) and BR Entlebuch (CH) (Figure 2) were conducted during the fieldtrips, which lasted between one and five weeks in each region, between November 2014 and July 2015. The interviewees were selected using an adapted snowball sampling method (Bortz & Döring 2006). The interviews, which were all conducted in the local dialects, were recorded, transcribed and analysed using the software MAXQDA (Kuckartz 2010). For each interview, the researchers also logged their own observations and memories of the conversations (in line with Deppermann 2008). Following the principles of *grounded theory* (Glaser & Strauss 1967), a coding system for the raw material of the interviews (n = 40) was developed, and typologies

Table 2 – Profile of interview partners (n = 40) and farm characteristics. Other animals include sheep, goats, horses, pigs and chicken. BR Salzburger Lungau und Kärntner Nockberge is treated as two separate research areas, see text.

		UNESCO BR			
		Salzburger Lungau	**Kärntner Nockberge**	**Engiadina Val Müstair**	**Entlebuch**
Person	Male/Female	8/2	8/2	9/1	7/3
	Average age	42.7	46.8	45	44.1
	Average number of years active	11.4	22.1	18.3	14.8
Farm	Family-run, inherited	9	10	10	8
	Part-time	4	2	1	3
	Conventional/Integrated/Organic farming	2/2/6	6/1/3	0/2/8	2/4/4
	Contractual nature conservation	7	8	10	10
	Farm size < 20 ha	1	1	1	2
	Farm size >50 ha	5	9	0	2
	Cattle	10	8	10	10
	Other animals	4	4	6	8
Other	Additional off-farm income	7	9	9	10
	Direct marketing	1	4	4	3
	Tourism	3	4	4	4

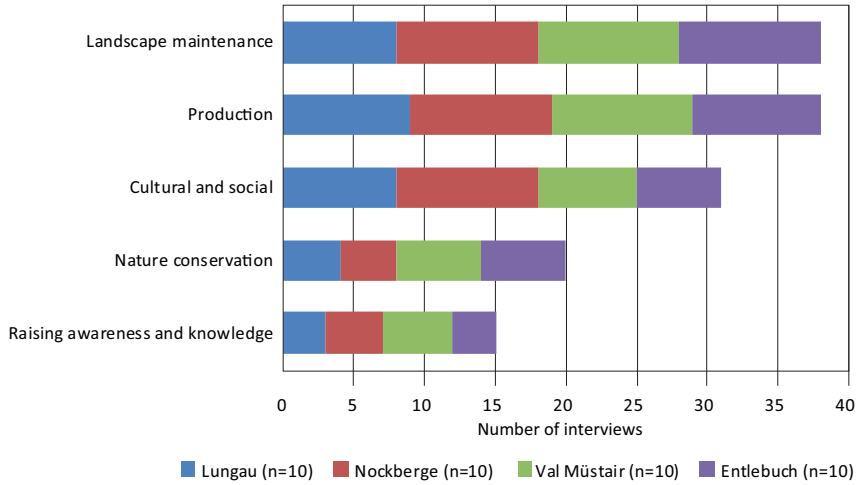

Figure 3 – Responsibilities of agriculture. Farmers see their agricultural activities as relevant for future generations, the region or society in general. BR Salzburger Lungau und Kärntner Nockberge is treated as two separate research areas, see text.

for the participants' attitudes were extracted. In the course of personal conversations on the farms, lasting around two hours, farmers were asked to share their opinions about the relevance of the responsibilities of agriculture, cultural landscape, nature conservation, biosphere reserves and knowledge transfer, with regard to agriculture in general or their farms in particular. In what follows, BR Salzburger Lungau and Kärntner Nockberge is treated as two separate research areas, Lungau and Nockberge, because of the different infrastructures and administrative structures in the two federal states of Salzburg (Lungau) and Carinthia (Nockberge).

Results

The focus of the *sample* selection was on a high variety of farm sizes and farming systems (Table 2). In Salzburg the proportion of organic farms is very high, around 50%, thanks to the particular market structures in place for organic dairy farmers. We find a similar situation in Val Müstair (80% organic farms). In the Nockberge region, production focuses on meat, market structures do not encourage organic production, and therefore many farmers (n = 6) use conventional production methods. Most of the farmers interviewed (n = 38) have cattle, the most typical animal in the research areas. The high variety of other animals on the farms reflects their small size and diverse farming systems.

Farms are family run. In 17 cases, several generations live on the farm, which has been passed on over a number of generations and has been managed for between 1 and 30 years by the interviewees (23 to 62 years old). The interview partners were mainly male (n = 32), corresponding to Mayr et al. (2016) as farming being a male-dominated business. Almost all farmers have additional off-farm income, and a large proportion of the farms (n = 15) offer guest beds. In Austria as a whole, 54.7% of all farming households derive more than half of the family income from jobs outside the farm (Mayr et al. 2016). This proportion is much lower in the sample. In Austria (n = 14), there are more farms of more than 50 ha than in Switzerland (n = 2), where many pastures are common land and not privately owned.

Different responsibilities were identified (Figure 3), of which the most important are landscape maintenance and food production (n = 38 each). Cultural and social responsibilities (n = 31) are considered important. Respondents mentioned farms as family-run operations, offering employment and housing in rural areas, maintenance of the land they had inherited, facilities to be passed on to the next generation in good condition (Figure 4), and carrying out various voluntary activities in the community and local organizations. Nature conservation as a duty of farmers is mentioned by one in two of the interviewees (n = 20). Some (n = 15) see raising awareness about nature,

Figure 4 – Farmers maintain facilities like this mountain hut and stable for future generations (Lungau 2015). © Humer-Gruber

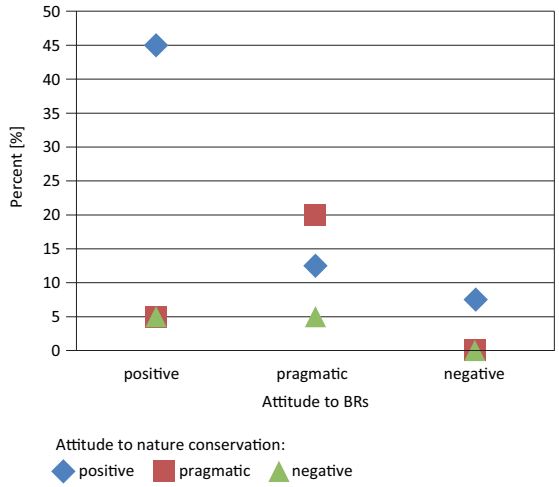

Figure 5 – Comparison of farmers' attitudes to nature conservation and to biosphere reserves n = 40.

agriculture and cultural knowledge as a task of their profession, as tourism and food advertising impart an unrealistic picture of agriculture.

Attitude to BRs

Typology groups were extracted concerning the farmers attitudes towards BRs. The majority of farmers (n = 31) put forward arguments belonging to more than one of the typological groups (positive, pragmatic, negative). The typology, shown in Figure 5, presents the predominant arguments as determined by the researchers' log of their own additional observations.

Farmers having a *positive attitude* (n = 22) towards BRs see a positive influence of the BR on their farm or for the region in general. They are supporters and participate actively. Interviewees voicing criticism are included if the criticism is constructive and expresses their interest in the development of the BR. Also included here are farmers arguing for a potential future positive effect of BRs.

Interview partners having *a pragmatic attitude* (n=15) do not express any direct relation to the BR and seem uninvolved. In this group, frequent statements are "*That's no concern of mine*" or "*I have not exposed myself enough*". They have not sought information yet, and this is not a priority in the near future.

The third group is characterized by a *negative attitude* towards the BRs (n = 3). This group refers to expected negative effects for the region, and / or is apprehensive about restrictions on farming and tourism. Another argument was that BRs would become a "*political issue with a dead end*".

Attitude to nature conservation

Figure 5 presents farmers' attitudes to nature conservation. Farmers having a *positive attitude* (n = 26) towards nature conservation aim to work in harmony with nature for ideological reasons. They see sustainable farming as their moral and social responsibility. Nature and soil fertility in particular are considered the farmers' material basis as well as their source of income. A holistic approach is taken to animal welfare, which is seen as more important than its reduction to the application of veterinary medicine.

A *pragmatic attitude* (n = 10) towards nature conservation characterizes those farmers who adopt agri-environmental measures, because it is *common decency* nowadays, and because both society and certain regulations demand it. Nature conservation in general is not considered to be essential, but it provides additional income for the farm, or is even obligatory in terms of cross-compliance.

Farmers having a *negative attitude* (n = 4) towards nature conservation feel restricted and see it as obstructive in their everyday work. They see regulations as too strict and ineffective, and they do not participate in contractual nature conservation. Some expressed frustration with regard to specific issues more than about the idea of nature conservation in general.

As Figure 5 shows, nature conservation and BRs do matter for farmers: 45% of the people interviewed (n = 18) have a positive attitude towards both. A positive attitude towards nature conservation but a negative attitude towards BRs can be attributed to the fading away of the initial excitement in the planning phase, or to frustration about the loose and non-binding label of BRs. The results also show that none of the farmers has a totally negative attitude towards both. Some are sceptical about nature conservation in general or even see it as hindrance in their daily work routine, but they appreciate the BR as a positive development in their region.

Discussion

First, the various functions of agriculture and its importance in rural areas are discussed. Some functions are obvious, like food production; others are side effects of small-scale farming, like nature conservation or social functions (presented in Figure 3). The more obvious tasks mentioned by Weiger (1990) and Renting et al. (2009) are discussed by the farmers themselves. Protecting cultural assets, traditions and local knowledge is seen as a responsibility (Grasser et al. 2012), in Austria ($n_{AT} = 18$) more than in Switzerland ($n_{CH} = 13$). The results underline the argument that although farmers' motivation lies in food production, their tasks have shifted to landscape maintenance (Schermer 2005). In most interviews (n = 38), landscape maintenance was mentioned first, with an element of disappointment: they stated that this, and not their products, is what they are paid for. Farmers (n = 38) see their main responsibility in food production, primarily milk and meat in mountain areas, but they cannot live on this alone: "*It's simply not possible to work economically on the steep surfaces, without subsidies it is simply not possible. (…) It is always more difficult. On the other hand, of course, it is our environment, and when cultivated, there's a quality of life for everyone who lives here*" (Lungau,

46 yrs). In mountain areas especially, public funds are essential, and farm income comes from a variety of on- and off-farm sources (Darnhofer et al. 2016).

The implementation of agri-environmental schemes is obligatory to obtain direct subsidies; farmers can, in addition, participate voluntarily in specific nature conservation measures such as contractual nature conservation programmes (Table 2). In Switzerland, an ecological performance record has been compulsory since 1997 for direct payments; in Austria, agri-environmental measures, which are still in force, were introduced in 1995 as part of the common agricultural policy (CAP). Against their expectations, farmers have realized that their ecological performance improves with little effort. Although similar principles are in place in Switzerland and Austria, a comparison shows that landscape maintenance ($n_{CH} = 20$; $n_{AT} = 18$) and nature conservation ($n_{CH} = 12$; $n_{AT} = 8$) are mentioned slightly more often in the Swiss interviews. This reflects the different perception of public funding systems. While Austrian farmers (see quote Lungau, 46 yrs, above) regard subsidies as a necessity, in Switzerland nature conservation is generally viewed more positively by farmers, and agri-environmental measures are identified as a source of income, as expressed here: "*Our production is so expensive that we simply cannot live from sales of produce. That is why we are dependent on the fact that we are supported by the state. And our service is preserving and maintaining the cultural landscape*" (Val Müstair, 36 yrs).

The individual areas might be seen as being at different stages of the development process of BRs: BR Entlebuch has evolved over more than 15 years, Val Müstair over seven years, while the Austrian BR was designated only two years before the interviews were conducted. Fewer sceptical arguments were found in Entlebuch, which supports assumptions of an ongoing output of this research: expected negative impacts are often based on fears, and apprehensions disperse over time (Humer-Gruber 2016). Positive experiences gained over a longer period are of major importance for a BR's success: such experiences both reflect and translate into people participating, sharing ideas and becoming empowered. It emerges from the interviews that when farmers do not participate, this is a personal decision, or they have not found a niche for themselves in terms of how they can participate in the BR with their farming system. "*In the beginning we were very afraid. You cannot do anything; you will be completely restricted (…). But this is not the case at all. No one loses anything. Some cooperate with the BR; you can come with any idea. For those who do not participate, nothing will change*" (Entlebuch, 42 yrs).

Within the Austrian BR, the purpose of BRs in general is unclear to people. They do not feel concerned and see the BR as *something for tourism*, or as being of concern only to landowners in the core zone. In the BR Entlebuch, on the other hand, almost all farmers interviewed have a positive attitude towards the BR. A neutral and transparent BR management has a crucial role in the acceptance of the BR. „*You have somehow the label. You have the region, you can promote it. (…) But the BR alone does not bring jobs. But maybe the basic idea. Together, for each other*" (Entlebuch, 54 yrs).

Figure 6 – Livestock guardians. Nature conservation measures and re-introduction of wild animals influence farmers' working routine (Canton of Grisons 2017). © Humer-Gruber

Figure 5 shows that most farmers (n = 26) have a positive attitude towards nature conservation, more than towards BRs (n = 22). This is seen particularly in the BRs Lungau and Val Müstair. The higher number in more sceptical typologies in the Carinthian part of the Austrian BR can be explained by an emotional dispute, over a period of several years, between landowners and nature conservationists, which was resolved only recently by compensation payments being made. In this area, the BR attracted a sceptical attitude from the farmers because they confused the purpose of the BR with wider controversy about nature conservation.

The interviews demonstrate that the creation of regional value and regional processing cooperatives are essential for BRs. For a successful participatory process, balanced power structures are required (Wallner & Wiesmann 2009). Farmers appreciated thematic round table sessions in the initial phase of the BR Lungau. BRs try to use the potentials in place to fight migration from rural areas, by creating regional value. A vibrant agricultural community is valuable for society and presents a basis for decentralized settlement. People should be able to earn a viable living from farming, as the abandonment of agricultural land is detrimental from a socio-economic perspective (Haddaway et al. 2014). Val Müstair provides good examples, as the new statutes (2016) addressed the question of commitment by increasing the transparency and the reliability of the Biosphere label. Strong cooperation between farmers, gastronomy and tourism should help to pool profits in the region.

Participative approaches are desirable in the agricultural sector in general; more independence for farmers would also be useful to improve the performance of agri-environmental measures. Constant dialogue with nature conservationists is already in place in all research areas, for example regarding hay-cutting times and herd protection (Figure 6). Initiatives in the research areas show that farmers and other producers are very creative concerning product development, as seen for the brand *Echt Entlebuch*, a BR breakfast in Lungau, or in Val Müstair, where *Agricultura Jaura GmbH* is going to create a combined processing site for milk, meat and grain. The BR Nockberge specializes in cooperation with schools for awareness-raising and education programmes.

Conclusion

In general, farmers see the BR as a positive development for the region. It encourages discussions on a neutral platform to voice problems, and to propose solutions and improvements. Hence, the BR supports the formation of a strong, creative and innovative community in a participative way. Participatory processes encourage and rely on open discussions, although it emerges from the interviews that lengthy discussions might be interpreted as failures or as obstacles to the implementation of BRs. Overall, BRs receive local support, and motivation to participate is in place, although not always actively put into practice. An attitude of detached observation on the part of farmers, as found throughout the Austrian BR, has been reported from the initial phase in all research areas. Although the regions are not directly comparable, over time farmers have become strong partners in the management of the BRs. Experiences from BRs that have been in existence for a longer period suggest that BRs have a huge potential to address farmers' concerns with regard to support in product development and marketing, value-added processing in the region, nature conservation training and awareness building, shared workforce, and sustainable tourism.

While this research presents the attitudes of just one stakeholder group, farmers, the BR is appreciated and well established as a shared platform for participatory concepts, open to all stakeholder groups. The creation of durable BRs has to be acknowledged as a long and slow process, calling for numerous dialogues and balanced power structures, and relying on regional situations and open minds for mutual understanding.

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References

Bätzing, W. 2015. *Die Alpen. Geschichte und Zukunft einer europäischen Kulturlandschaft*. Munich. [In German]

Bender, O., C.E. Roth & H. Job 2017. Protected areas and population development in the Alps. *eco.mont* 9 (special issue): 5–16. Innsbruck. Available at: https://dx.doi.org/10.1553/eco.mont-9-sis5

Bortz, J. & N. Döring 2006. *Forschungsmethoden und Evaluation für Human- und Sozialwissenschaftler*. Heidelberg. [In German]

Buchli, S., B. Buser & P. Rieder 2003. Die wirtschaftliche Situation im Val Müstair. MovingAlpsFoundation. Institut für Agrarwirtschaft, ETH Zurich. Zurich. Available at: http://www.movingalpsfoundation.ch/userfiles/file/pdf/de/WirtschaftlicheSituationValMuestair.pdf (accessed 15/01/2018). [In German]

CBD 1993. *Convention on Biological Diversity*. Available at: http://www.cbd.int/convention (accessed 15/01/2018).

Daniel, C.T., A. Muhar, A. Arnberger, O.Aznar, J.W. Boyd, K.M.A. Chan, R. Costanza, T. Elmqvist, C.G. Flint, P.H. Gobster, A. Grêt-Regamey, R. Lave, S. Muhar, M. Penker, R.G. Ribe, T. Schauppenlehner, T. Sikor, I. Soloviy, M. Spierenburg, K. Taczanowska, J. Tam & A. von der Dunkj 2011. Contributions of cultural services to the ecosystem services agenda. *Proceedings of the National Academy of Sciences of the United States of America*. Tempe AZ. doi: 10.1073/pnas.1114773109

Darnhofer, I. 2005. Organic Farming and Rural Development: Some Evidence from Austria. *Sociologia Ruralis* 45: 308–323. doi: 10.1111/j.1467-9523.2005.00307.x

Darnhofer, I., C. Lamine, A. Strauss & M. Navarette 2016. The resilience of family farms: Towards a relational approach. *Journal of Rural Studies* 44: 111–122. https://doi.org/10.1016/j.jrurstud.2016.01.013

Deppermann, A. 2008. *Gespräche analysieren*. Heidelberg. [In German]

Glaser, B.G. & A.L. Strauß 1967. *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Chicago.

Grasser, S., C.R. Vogl, C. Schunko, M.M. Grabowski, T. Vogl & B. Vogl-Lukasser 2012. *Biokulturelle Vielfalt. Vom Lokalen Erfahrungswissen zu Pflanzen im Biosphärenpark Großes Walsertal, Austria*. MaB-ÖAW. Vienna. doi: 10.13140/RG.2.1.3226.0248 [In German]

Haas, G., F. Wetterich & U. Köpke 2001. Comparing intensive, extensified and oganic grassland farming in southern Germany by process life cycle assessment. *Agriculture, Ecosystem & Environment* 83(1-2): 43–53. https://doi.org/10.1016/S0167-8809(00)00160-2

Haddaway, N.T., D. Styles & A.S. Pullin 2014. Environmental impacts of farm land abandonment in high altitude/mountain regions: a systematic map of

the evidence. *Environmental Evidence* 3: 17. https://doi.org/10.1186/2047-2382-3-17

Holzner, W. & E. Frohmann 2007. *Almen – Almwirtschaft und Biodiversität*. Vienna. [In German]

Humer-Gruber, A. 2016. Farmers' Perceptions of a Mountain Biosphere Reserve in Austria. *Mountain Research and Development* 36(2): 153–161. Bern. https://doi.org/10.1659/MRD-JOURNAL-D-15-00054.1

Karthäuser, J.M., F. Filli & I. Mose 2011. Perception of and attitudes towards a new Swiss biosphere reserve – a comparison of residents' and visitors' views. *eco.mont* 3(2): 5–12. Innsbruck. doi: 10.1553/eco.mont-3-2s5

Kuckartz, U. 2010. *Einführung in die computergestützte Analyse qualitativer Daten*. Wiesbaden. [In German]

Lauber, S., F. Herzog, I. Seidl, R. Böni, M. Bürgi, P. Gmür, G. Hofer, S. Mann, M. Raaflaub, M. Schick, M. Schneider & R. Wunderli (eds.) 2014. *Zukunft der Schweizer Alpwirtschaft*. Fakten, Analysen und Denkanstösse aus dem Forschungsprogramm AlpFUTUR. Birmensdorf. [In German]

MacDonald, D., J.R. Crabtree, G. Wiesinger, T. Dax, N. Stamou, P. Fleury, J. Gutierrez Lazpita & A. Gibon 2000. Agricultural abandonment in mountain areas of Europe: Environmental consequences and policy response. *Journal of Environmental Management*. 59: 47–69. Munich.

Marini, L., S. Klimek & A. Battisti 2011. Mitigating the impacts of the decline of traditional farming on mountain landscapes and biodiversity: a case study in the European Alps. Environmental Science and Policy 14: 258-267. Available at: https://doi.org/10.1016/j.envsci.2010.12.003

Mayr, J., T. Resl & E. Quendler 2016. Situation der Bäuerinnen in Österreich 2016. Ergebnisse der repräsentativen Studie zur Arbeits- und Lebenssituation der Bäuerinnen in Österreich 2016. Available at: https://www.baeuerinnen.at/?+Die+Situation+der+Baeuerinnen+in+OEsterreich+2016+&id=2500%2C2550191%2C%2C%2C (accessed 15/01/2018). [In German]

Pecher, C., M. Bacher, E. Tasser & U. Tappeiner 2017. Agricultural landscapes between intensification and abandonment: the expectations of the public in a Central-Alpine cross-border region. *Landscape Research* 43(3): 428–442. https://doi.org/10.1080/01426397.2017.1315062

Pröbstl, U. & F. Müller 2012. Hotel certification and its relevance for sustainable development: examples from the European Alps. *Sustainable Tourism V* 161(3): 3–15. DOI 10.2495/ST120011

Renting, H., W.A.H. Rossing, J.C.J. Groot, J.D. Van der Ploeg, C. Laurent, D. Perraud, D.J. Stobbelaar & M.K. van Ittersum 2009. Exploring multifunctional agriculture. A review of conceptual approaches and prospects for an integrative transitional framework. *Journal of Environment and Management* 90: 112–123.

Rüdisser, J., J. Walde, E. Tasser, J. Frühauf, N. Teufelbauer & U. Tappeiner 2015. Biodiversity in cultural landscapes: influence of land use intensity on bird assemblages. *Landscape Ecology* 30(10): 1851–1863.

Schermer, M. 2005. Die Motivation von Bauern zur Teilnahme an der ÖPUL-Maßnahme „biologischer Landbau" am Beispiel Tirols. In: Darnhofer, I., M. Penker & H.K. Wytrzens (eds.), *Jahrbuch der Österreichischen Gesellschaft für Agrarökonomie* 10: 77–85. Vienna. [In German]

UNESCO 2017. Biosphere reserves – Learning Sites for Sustainable Development. Available at: http://www.unesco.org/new/en/natural-sciences/environment/ecological-sciences/biosphere-reserves/ (accessed 15/01/2018).

Wallner, A. & U. Wiesmann 2009. Critical Issues in Managing Protected Areas by Multi-Stakeholder Participation – Analysis of a Process in the Swiss Alps. *eco.mont* 1(1): 45–50. Innsbruck. doi: 10.1553/eco.mont1s45

Weiger, H. 1990. Landwirtschaft und Naturschutz. Situation – Defizite – Strategien. *Forstwirtschaftliches Centralblatt* 109: 358–377. Hamburg and Berlin. [In German]

Weiland, S. 2011. Umwelt- und Nachhaltigkeitskonflikte in europäischer Landwirtschaft und Agrarpolitik. In: Groß, M. (ed.), *Handbuch Umweltsoziologie*: 598–612. Wiesbaden. [In German]

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