
The Implementation Status of the Alpine Convention Soil Conservation Protocol

A report based on Alpine-wide surveys in
Austria, France, Germany, Italy, Slovenia,
and Switzerland



Imprint

What this is about?

This report presents the result of an Alpine-wide survey among soil experts. The aim of the survey was to find out to which extent the Soil Protection Protocol of the Alpine Convention is already implemented in the Alpine countries and where a demand for action is required.

Project and funding

Links4Soils (ASP399); EU Interreg Alpine Space

WP, Task and Deliverable

WPT1 AT1.2 (D.T1.2.2)

Lead

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How to cite

Schaber, E., Neuner, S. and Geitner C. (2019). The Implementation Status of the Alpine Convention Soil Conservation Protocol. A report based on Alpine-wide surveys in Austria, France, Germany, Italy, Slovenia, and Switzerland.

Acknowledgements

We would like to thank the team of authors from the report “Quo vadis soil protection in the Alps? Assessment of the Alpine Convention Soil Conservation Protocol and preparation/implementation of an international conference” – Marianne Badura, Nina Kuenzer, Gertraud Sutor, Roland Kals, Sebastian Schmid – for providing the structure of their survey as well as the respective collected information.

We further like to acknowledge the help provided by the partners from Links4Soils – Office of the Tyrolean Government, IRSTEA (France), Agricultural Institute of Slovenia, and University of Torino – to translate the questions and answers of the survey as well as to disseminate the questionnaire.

The very valuable contributions by the Permanent Secretariat of the Alpine Convention as a member of the EUSALP AG 6 in the thematic topic of quantitative soil protection were greatly appreciated.

As the study would not have been feasible without the participation of 136 experts from five Alpine countries, we would like to express our gratitude towards all survey respondents.

Last but not least we thank Borut Vrščaj and Jože Hladnik (Agricultural Institute of Slovenia) and Silvia Stanchi and Nicola Colombo (University of Turin) for reviewing the report.

Date

October 2019

Abstract

The Alpine Convention's Soil Conservation Protocol (SCP) was signed between 1998 and 2006 by the countries Austria, France, Germany, Italy, Liechtenstein, Monaco, Slovenia, and Switzerland, as well as by the European Union. It provides a comprehensive basis for soil protection but there are still major obstacles to its implementation. Although the protocol has already been largely integrated into the national legislation of some Alpine countries, it is not satisfactorily implemented regarding all topics and levels. Concerning the latter, the SCP is often not sufficiently considered, especially by public administration and local policymakers. Soil conservation is particularly crucial in the Alps as their special environmental characteristics (e.g. topography, climate) limit most land-use activities, such as agriculture and housing, to particular areas, often resulting in land-use conflicts. In those areas, sealing due to the construction of buildings and infrastructure is the major soil threat. In addition, the risk of erosion on slopes underlines the special vulnerability of Alpine soils. Therefore, soil protection strategies and sustainable soil management suited to the specific mountain topography and the diversity of Alpine soils and their functions and services are essential.

Within the "Links4Soils" Alpine Space Interreg project (2016-2020) we carried out an Alpine-wide online survey of the implementation status of the SCP. This was based on a previous survey carried out by Badura et al. (2016) (UFOPLAN survey), which was conducted in 2015 during the German Presidency of the Alpine Convention and was well received in German-speaking countries but not in the other Alpine countries. To fill this knowledge gap, the Links4Soils survey was designed as a slightly modified version of the UFOPLAN survey in order to enable the results to be merged. The surveys cover the following thematic topics: a) risk assessment / erosion, b) qualitative soil protection and soil functions, c) mountain farming, forestry, wetlands, and moors, d) quantitative soil protection / land take, as well as e) international/Alpine-wide cooperation. In this synthesis we present the combined results of both surveys. The results, which are based on the knowledge of 9 to 48 experts per country, enable us to draw some general conclusions regarding the entire Alpine region. Thereby, the main purpose is to identify what is hampering effective implementation of the Soil Conservation Protocol and the steps required for its future realization.

The survey's key results can be summarized in the following points:

- The SCP has an influence on legislation but greater relevance is desired.
- More databases and methodological tools are needed for all thematic fields.
- More available and harmonized data are needed along with more knowledge about the availability thereof.
- Stronger advocacy groups (lobbies) for soil are needed at the regional, national, and international levels.
- A focus on the regional and local levels regarding soil protection is missing and strongly desired.
- Prudent use of soils is seen as the most important topic in international/Alpine-wide cooperation.

In summary, about 15 years after signing the SCP it is quite well recognized by soil experts but yet there is a substantial need for its effective implementation.

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1 What is the motivation for an Alpine-wide online survey?

About the Soil Conservation Protocol

The Alpine Convention is an international treaty, signed between 1991 and 1994 all Alpine countries and the EU and aims to protect the Alps and enable sustainable development in this region (Alpine Convention 2018). The Soil Conservation Protocol (SCP) from the Alpine Convention was signed between 1998 and 2006 by the countries Austria, France, Germany, Italy, Liechtenstein, Monaco, Slovenia, Switzerland, and the European Union. Between 2002 and 2013 it was ratified by all parties with the exception of Switzerland region (Alpine Convention 2018). The protocol is aiming to reduce quantitative and qualitative soil impairments. Specific SCP objectives are also to raise awareness regarding Alpine soils, the need for their protection and to recognize that the Alps host highly diverse and sensitive ecosystems (Alpine Convention 1998).

The aim of the survey

The online survey was carried out to receive feedback of soil experts from local, national and international administration, scientific institutions, NGOs, and educational institutions and of private soil experts on the achievements and difficulties related to the SCP's implementation. The aim was to understand whether the SCP is successful to implement soil protection in the Alpine convention area and if regional or national differences or differences between certain thematic topics are recognizable. Those thematic topics are defined in the SCP, as soils are considered as a complex issue with many different actors and sectors involved. They were adopted from a first survey (UFOPLAN survey, Badura et al. (2016)), which was carried out in 2015 within the project UFOPLAN during the German Presidency of the Alpine Convention, as well as for this newly conducted survey in 2017. The motivation for the second survey (Links4Soils survey) was the comparably low return flow in not German-speaking countries in the scope of the UFOPLAN survey. The combined information gained during both surveys were analysed together and the respective results will be presented in this report.

2 Methods and survey structure

Questionnaire structure

The main structure of the questionnaire was predetermined by the UFOPLAN survey where a structure based on the structure of the SCP was developed. The SCP contains 28 articles, which were aggregated into five thematic core topics (see below, 3a-3e). The structure of the questionnaire was as follows:

1. Personal information
2. Legal implementation
3. Thematic implementation:
 - a) Risk assessment / soil erosion
 - b) Qualitative soil protection and soil functions
 - c) Mountain farming, forestry, wetlands and moors
 - d) Quantitative soil protection / land take
 - e) International/Alpine-wide cooperation
4. Outlook

To gain a higher return flow, respondents had the possibility to skip those topics of which they judged their own expertise as not sufficient. Another measure to raise the return flow in the second survey was the exclusion or simplification of some questions from the first survey. The aim was to create an exhaustive but not too long questionnaire. In total the Links4Soils questionnaire consisted of 67 questions.

Dissemination

Within the Links4Soils project, a stakeholder list was created by all project partners. It is a collection of institutions and private soil experts that are related to the topic soil of all Alpine countries. The questionnaire was sent out to all stakeholders on the list except the ones that were already questioned in the first survey. In total, the Links4Soils questionnaire was sent to 440 stakeholders. During the questioning time, two reminders were sent to the stakeholders.

Response

The weakness of the first study – being available only in German and English – resulted in a high response rate among German-speaking experts but a very low one among all others (see Table 1). The translation of the second survey into all Alpine languages helped to gain more information on the situation in France, Italy and Slovenia. The answers to the first survey were made available by the author team Badura et al. (2016) and were merged with the answers to the second survey.

With this Links4Soils survey, the original return flow of 81 respondents (UFOPLAN survey) could be increased to a total of 136 persons for further processing. However, not each question was answered by all 136 respondents, as it was technically possible to skip not only individual thematic blocks but also individual questions. Therefore, the number of answers varies from question to question. Considering that this is a survey among soil experts, which

means that only a limited number of potential persons with the required knowledge exist, it is acceptable that for some questions the return flow is rather low.

Table 1: Respondents per country and geographical information

	Number of respondents			Geography*	
	UFOPLAN survey	Links4Soils survey	Total	Share of the Alps** [%]	Share of the Alps** in the country [%]
Country					
Austria	33	15	48	29	65
France	3	6	9	21	8
Germany	18	1	19	6	3
Italy	7	18	25	27	17
Slovenia	3	11	14	4	34
Switzerland	11	1	12	13	61
No country indicated	6	3	9		
Total	81	55	136		

* Data source: Baruck et al. 2016
 ** Alpine Space as defined after the Alpine Convention

Although it could be improved, the distribution of respondents among countries is still unequal (see Table 1), which makes it difficult to compare results of different countries. Nine respondents did not reveal their country which lowers the number within country comparisons from 136 to 127. Table 1 also shows the distribution of the Alpine Space among the six biggest Alpine countries as well as the proportion of the Alps within those countries. However, the survey response per country does not fully reflect the geographic situation. Furthermore, it can be problematic to derive reliable statements of countries with a low response rate, e.g. France, as the obtained information is more likely to be unilateral. In general, a statistical analysis is not applicable or useful with this number of respondents, especially within thematic topics (see Table 2) or regarding country comparisons. The results are mostly presented as absolute and only sometimes as relative numbers in tables and bar charts. Only few results, e.g. specific statements, are presented qualitatively.

Table 2: Number of respondents per thematic part

	Number of respondents
Personal information	136
Legal implementation	113
Thematic implementation	
a) Risk assessment / soil erosion	56
b) Qualitative soil protection and soil functions	82
c) Mountain farming, forestry, wetlands and moors	71
d) Quantitative soil protection / land take	62
e) International/Alpine-wide cooperation	58
Outlook	89

3 Results and discussion

In this chapter, the most important results of the merged information of both surveys to the main topics of the SCP are summarized and briefly discussed. All detailed results are included in the attachment 1 of this report.

3.1 Personal information

In total, 136 persons responded properly to the survey and 127 of them indicated their country (place of work). From those, the majority works in *Austria* (48). The other respondents are distributed among *Italy* (25), *Germany* (19), *Slovenia* (14), *Switzerland* (12), and *France* (9).

Figure 1 clearly shows that the by far biggest group of respondents is employed in *local, municipal administration*, followed by *national administration*, *educational institutions*, *scientific institution* and *non-governmental organisation*. Altogether more than 50% are working in international, national and local/municipal administrations.

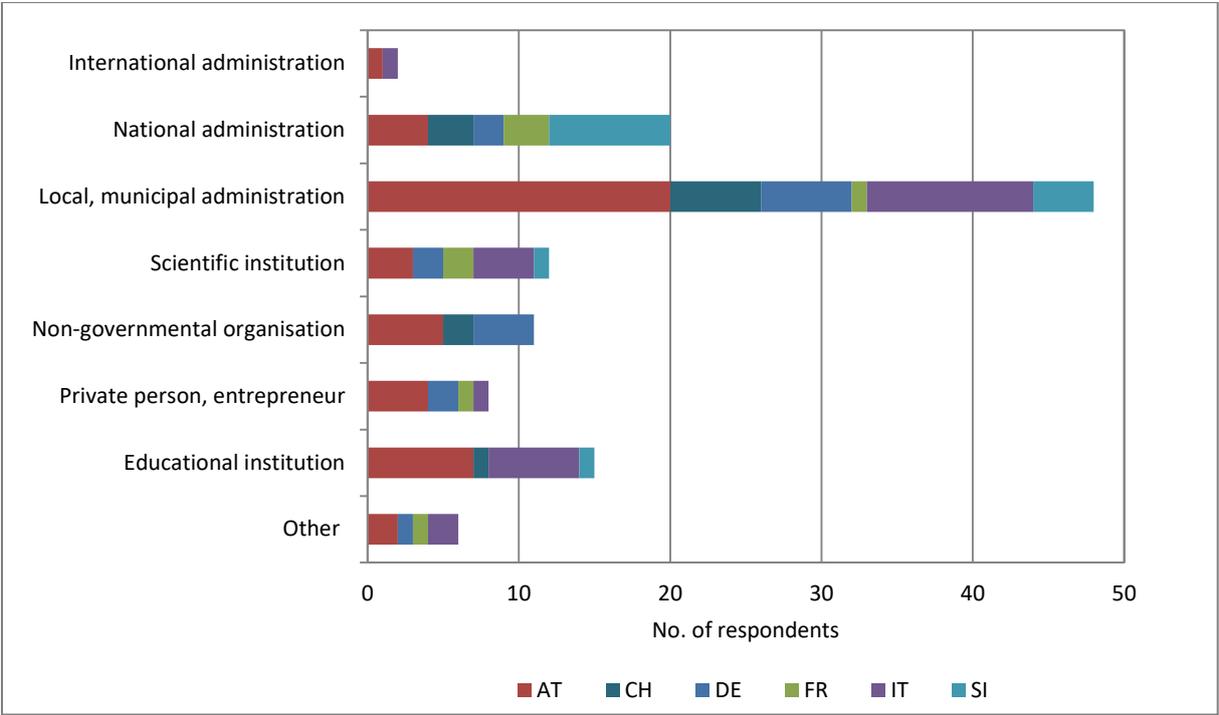


Figure 1: Number of respondents per work level and country

The respondents were asked to indicate one or several fields that represent their expertise. Most experts assigned themselves to the field of *soil conservation*. Other fields that are covered well by the knowledge of the questioned experts are (*mountain*) *farming, forestry*

and *erosion protection* as well as *other* fields, which were not explicitly mentioned. Considering that this survey covers the implementation of an international treaty, it is should be kept in mind that only a small group claimed to be experts in the field of law (see Figure 2).

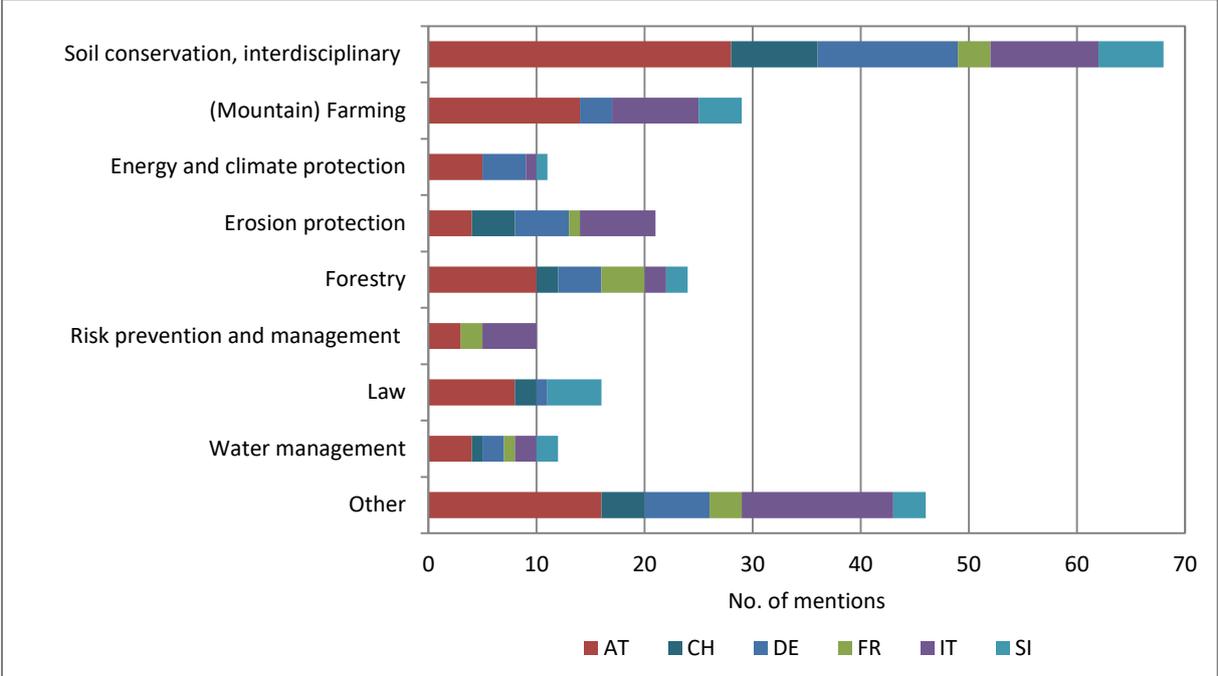


Figure 2: The respondent’s fields of expertise [multiple selection]

The respondents were asked to estimate the relevance of the SCP in their daily work and the results are summarized per country and depicted in Figure 3. It shows that most respondents from Switzerland (8 out of 12) do not ascribe any importance to the SCP. This can probably be attributed to the fact that the SCP was not ratified in Switzerland while the objectives of their national law are quite congruent with those of the SCP. Also in Germany, the respondents estimated the relevance of the SCP as rather low. In relative terms, the relevance of the SCP is seen highest in Italy. In absolute terms, the most respondents that ranked the SCP as relevant in their daily work come from Austria, but they make up only 14 out of 48 Austrian respondents. Looking at the entirety of the respondents, the majority (70%) said that there is no or a low relevance (1-3) of the SCP in their daily work.

Figure 4 illustrates the estimated relevance of the SCP per work level. The majority of all work levels rates the relevance of the SCP as low (1-3). This is particularly clear in the case of NGO’s, where 100% of the respondents ranked the SCP’s relevance as low (1-3). In contrast, private persons and entrepreneurs as well as persons working in the international administration rank the relevance of the SCP as rather high (4-6).

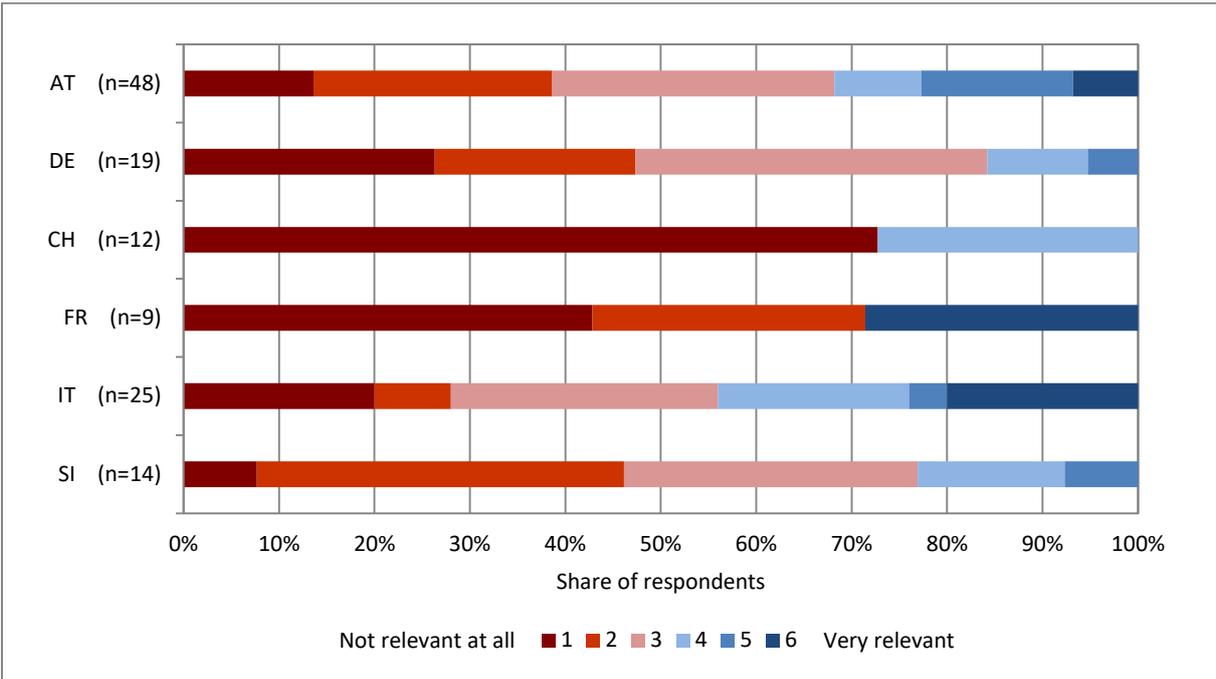


Figure 3: Relevance of the SCP per country (Question: How relevant is the Soil Conservation Protocol in your daily work?)

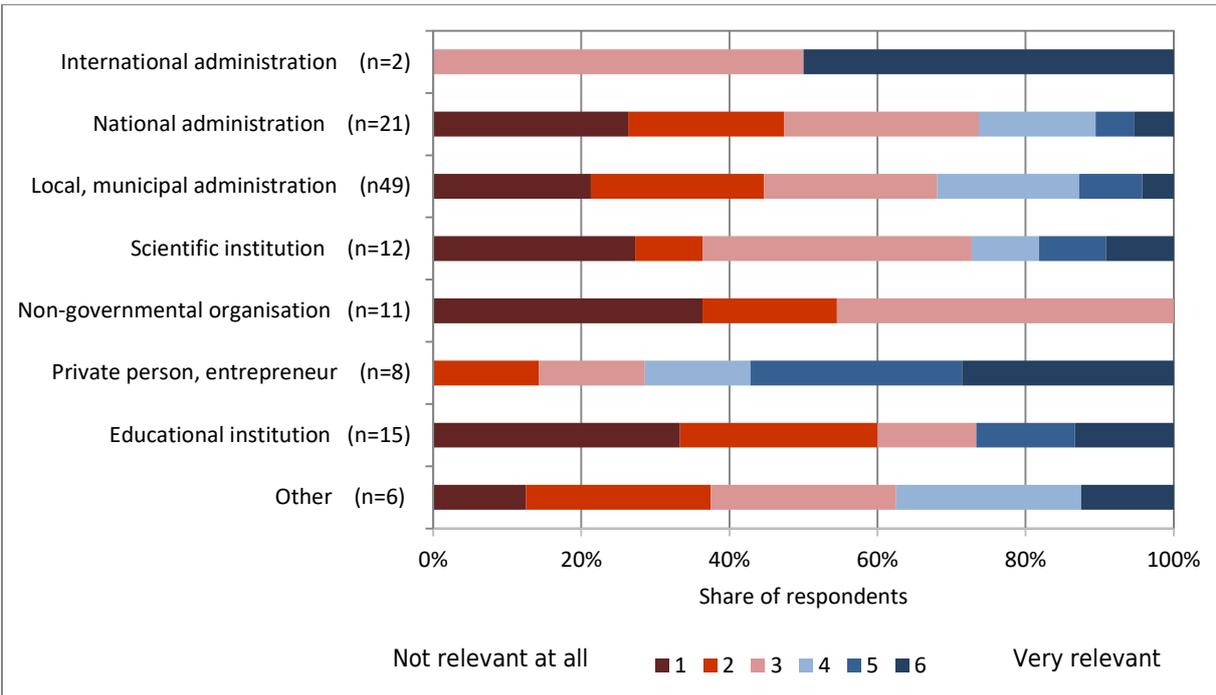


Figure 4: Relevance of SCP per work level (Question: How relevant is the Soil Conservation Protocol in your daily work?)

It is remarkable that the SCP apparently has a rather low relevance to most of the persons questioned and it allows the assumption, that the SCP’s implementation faces some difficulties. Those cannot be assigned to individual working levels or countries, as the answers of the respective groups to the question regarding the SCP’s relevance are quite ambiguous.

3.2 Legal implementation

This part was answered by 62 persons, which corresponds to 35% of the respondents. As an international treaty, the SCP can be integrated into national legal frameworks in different ways. Figure 5 shows the respective results of the survey. It gets clear, that the regional legislative level is just as important as the national one. The option *not valid* was included for Swiss soil experts, as the SCP was not ratified in Switzerland. However, also one Austrian and two German experts chose this option, probably because they see a lack of importance in practice and of legal consequences. However, only the answers of a minority would lead to this assumption whereas others show more encouraging tendencies. Thereby, most commonly the SCP is *implemented through national or regional laws or regulations*.

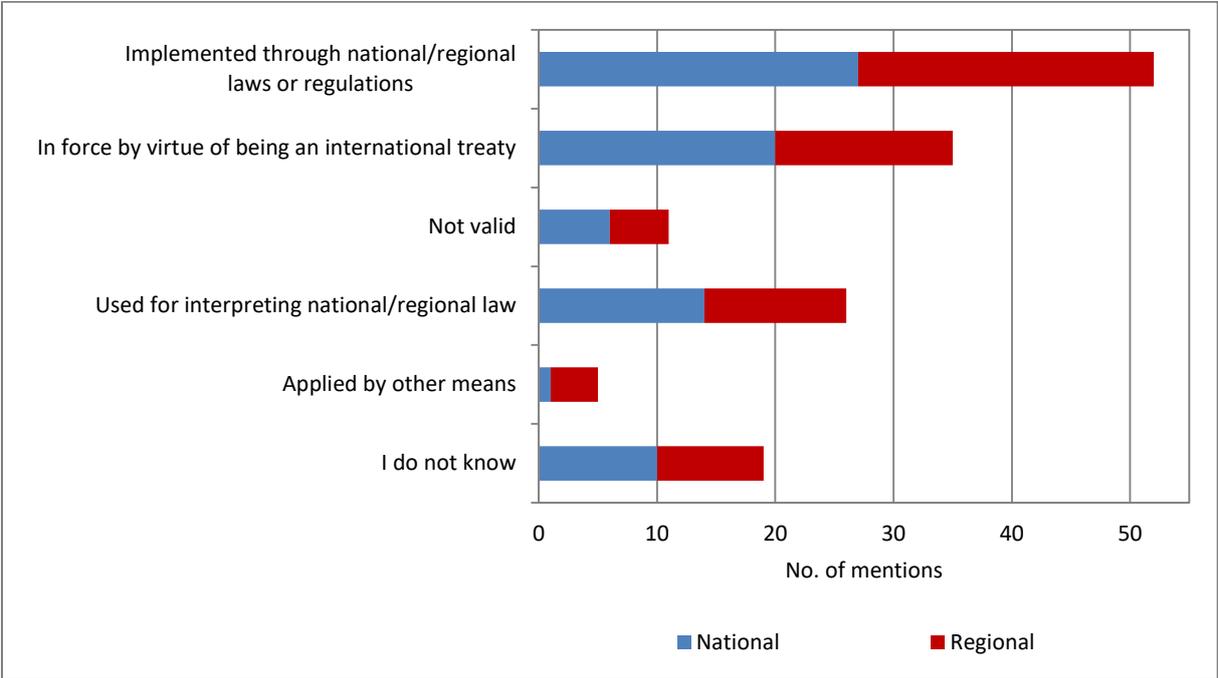


Figure 5: Different application forms of the SCP (Question: Is the Soil Conservation Protocol as an international treaty being applied in your national or regional legislation? [multiple selection])

To the question “Has the Soil Conservation Protocol (SCP) influenced the legislation you are familiar with?”, 22 responded that the SCP has an influence, 18 negated it and 17 could not judge. In comparison to the UFOPLAN survey, the distribution of the responses changed considerably as it is now more balanced. Table 3 shows that the percentage shifted towards a majority recognizing an influence of the SCP on national or regional legislation. As mentioned above, the adaptation of national or regional legislation is not the only way to assure the implementation of the SCP. Yet it is a good sign that almost 40% of the experts are familiar with at least one law that was influenced by the SCP.

Table 3: Comparison of 2015 and 2017 surveys: The SCP’s influence on legislation (Question: Has the Soil Conservation Protocol (SCP) influenced the legislation you are familiar with?)

	UFOPLAN survey (2015)	UFOPLAN and Links4Soils survey (2015, 2017)
Yes	30,8%	38,6%
No	40,4%	31,6%
I cannot judge	26,9%	29,8%

In the particular case of administrative actions, the responses show once more a quite diverse distribution (see Figure 6). The answers from Austria indicate that the SCP does play a considerable role within administration, but even in this case it is mostly not frequently, but occasionally applied as a basis for administrative actions. Overall, the biggest group (50%) stated it is taken occasionally but also 30% said that the SCP was never used as a legal basis in their country. It is controversial that in Italy, where the highest percentage stated that the SCP has high relevance in their daily work (see Figure 3), the respondents could not agree if the SCP is used as a legal basis in their country.

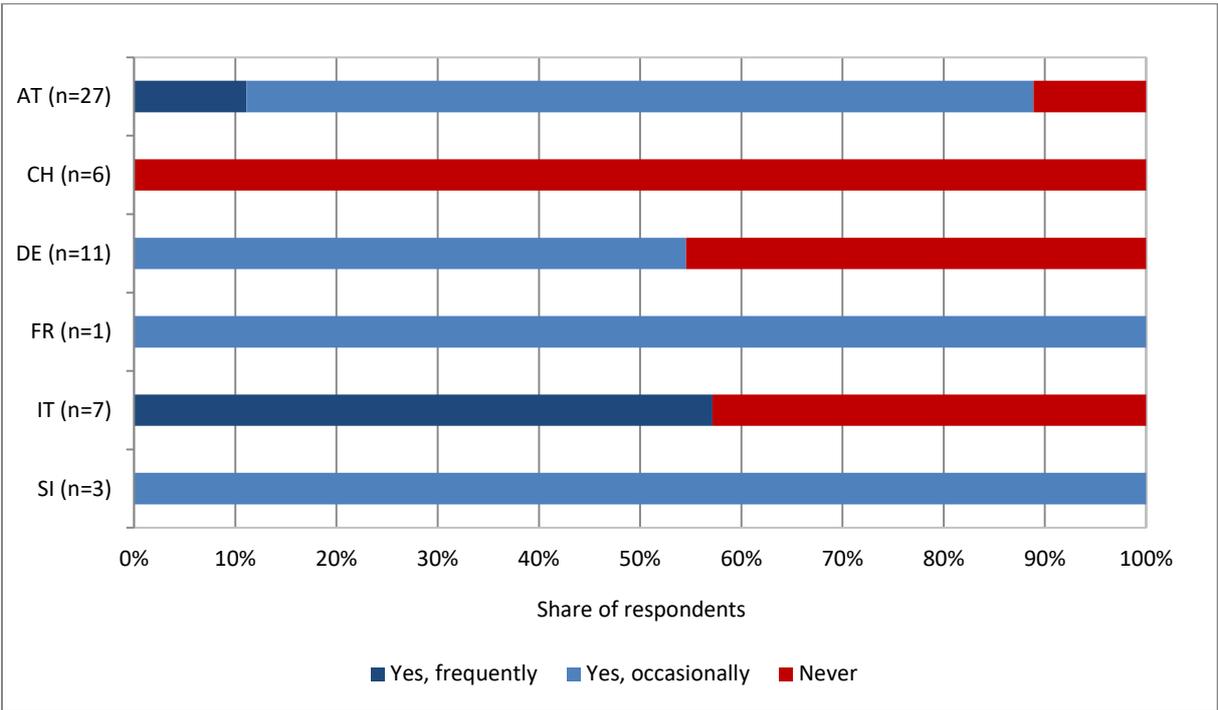


Figure 6: SCP application in administrative actions per country (Question: Is the SCP used as a legal basis in your country or region for administrative actions (such as planning processes or individual regulatory decisions)?)

Also, the Austrian experts provided quite controversial information. It has to be considered, that the respondents might not be aware of SCP’s applications in fields outside their own area of competence.

Furthermore, the experts were asked for reasons for the non-application of the SCP. The answers can be summarized as the following (detailed information in attachment 1, p. 12):

- Unclear definitions within the SCP regarding exact content (e.g., what is a prudent use of soils?) or exact time frames (until when has to be done what?) lead to poor obligation.
- The implementation into national legislation is insufficient. Not each article is recognized within national legislation. The SCP is often used for interpreting the national law (Austria, Germany).
- The SCP is not enough known on an administrative level, therefore it is not sufficiently recognized and used.
- Soil has a weak lobby.
- Switzerland did not ratify it, so SCP has no legal relevance there.
- No interest in the topic soil and a lack of knowledge regarding the soil's central role are problematic.

3.3 Thematic topics

The thematic part of the survey was structured into five topics (see Table 2). Participants could skip individual topics if recognized as irrelevant to their work and interests. Furthermore, individual questions could be skipped.

3.3.1 Risk assessment / erosion

This part was answered by 56 persons, which corresponds to 41% of the respondents. Within the survey, this topic was limited on soil erosion, although in general aspects such as contamination or compaction would also be subject to soil risk assessment. In the SCP, erosion control is identified as a key measure for quantitative and qualitative soil protection in the preamble and Art. 1 (3). Art. 11 pays special attention to the subject of erosion with the “designation and management of Alpine areas threatened by erosion” (Alpine Convention 1998).

3.3.1.1 Positive of the SCP's implementation: Risk assessment / erosion

The following results refer to a successful implementation of the SCP. Art. 11 of the SCP demands from the contracting states to limit soil erosion to an inevitable degree. The survey revealed that the respondents are familiar with a wide range of measures to limit soil erosion as visible in Figure 7. The best-known measure is *sensitisation and advising of forest and agricultural land management*, followed by *maintenance and establishment of protective forests*.

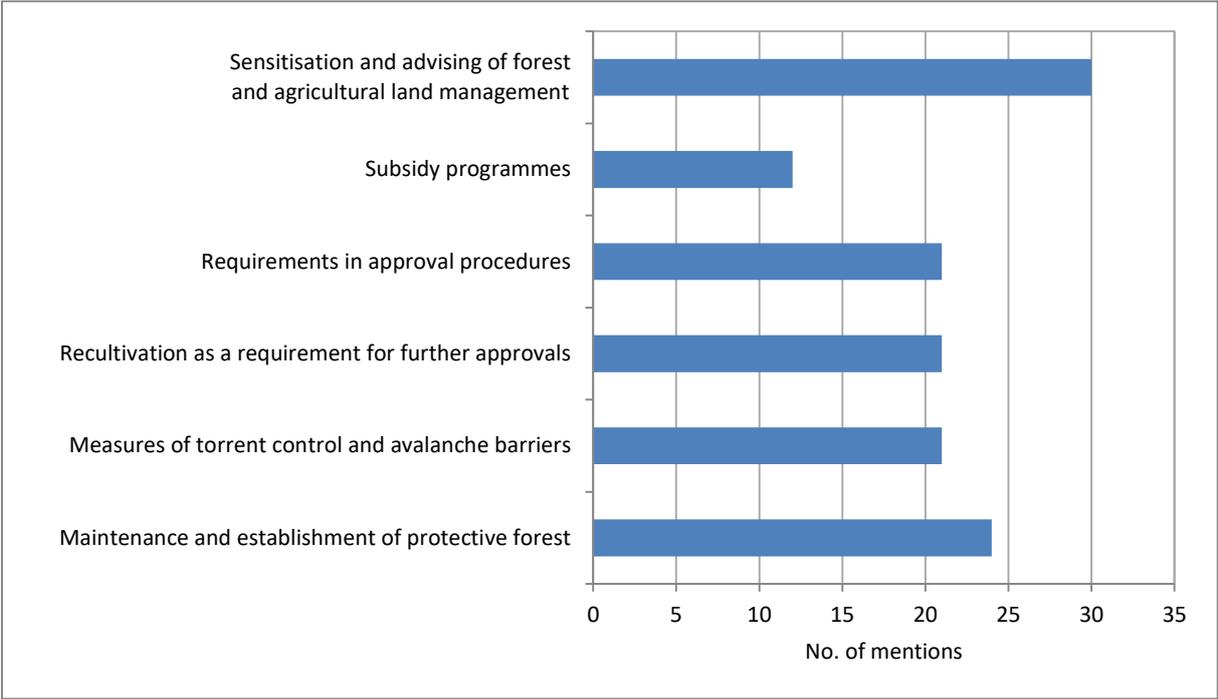


Figure 7: Known measures to limit soil erosion (Question: What are the measures you know to reach the goal of limiting soil erosion until an inevitable degree? [multiple selection])

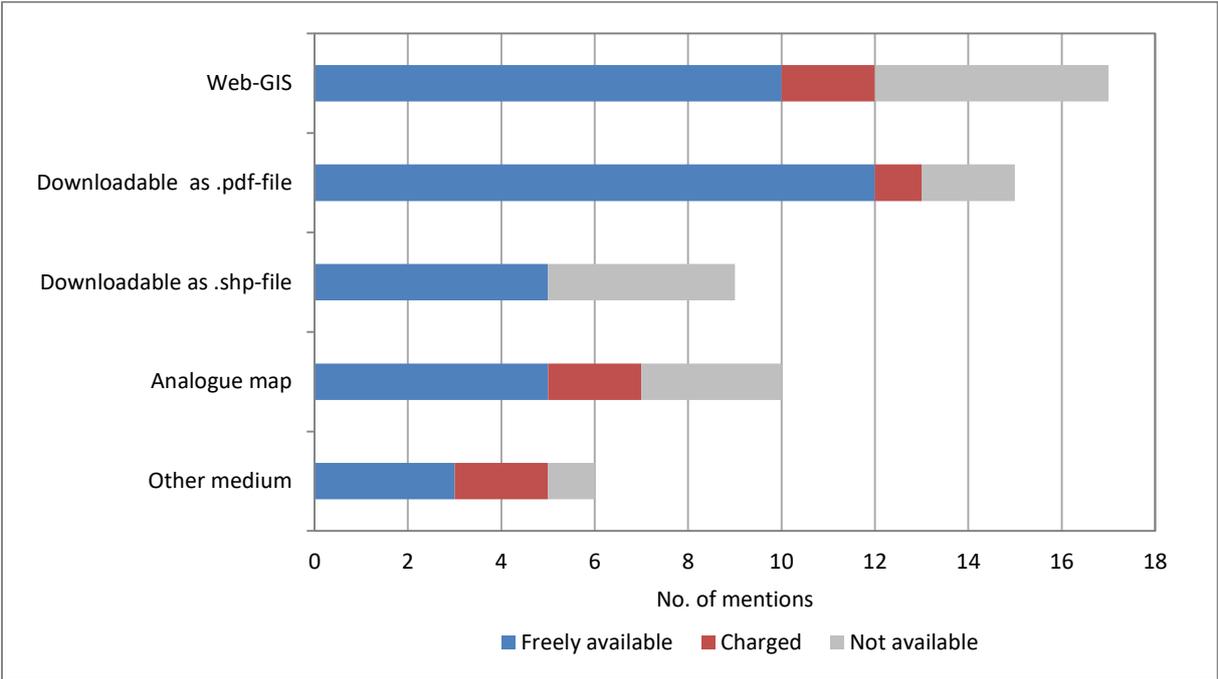


Figure 8: Existing spatial information on erosion per availability (Questions: In what form is the spatial information available? How is the spatial information accessible? [multiple selection])

Existing erosion-related spatial information covering the respective areas of interest are known by 29 and unknown by 22 respondents (see attachment 1, p. 14). Only 42% that work within the local and municipal administration know spatial information regarding soil erosion. Best known – by 83% of the respective respondents – are erosion-related maps by

experts working for NGOs and educational institutions. If existing, the information is mostly published on the internet, on intranets or in scientific and specialized journals. According to the respondents, most of the existing spatial information on erosion is freely available, in form of Web-GIS viewers or similar sources (see Figure 8). However, the data situation differs from country to country. It seems to be comparably good in Italy and Austria, while Germany, France apparently do not provide much data to users without charging them. In Slovenia, only one person knows about existing freely available, but analogue, data (detailed information see attachment 1, p. 15).

3.3.1.2 Shortcomings of the SCP’s implementation: Risk assessment / erosion

Apart from encouraging aspects, also some erosion-related shortcomings regarding the implementation of the SCP could be identified. For example, the listed erosion-reducing practices in agriculture and forestry are rarely connected to the SCP. Rather, it is believed that this *historically always has been practised* (see Table 4). Although this is generally good, it cannot be attributed to the implementation of the SCP and indicates that, if the measures do not go beyond historically practised ones, the protocol fails to meet the needs in order to further reduce soil erosion.

Table 4: Influence of the SCP on the implementation of measures to reduce soil erosion (Question: Were these measures applied due to the Soil Conservation Protocol?)

	No. of respondents
Yes, due to the SCP these measures were promoted and applied	4
No, from a historical perspective, these approaches have always been practised	23
I cannot judge	17
Total	44

Further, common methodological bases for assessing the sensitivity of soils to erosion are risk maps, soil cadasters and evaluation modules. According to the respondents, however, soil cadasters (i.e. database to manage soil data) and evaluation module seem to be desired but rarely existing. The situation regarding erosion risk maps is a bit better, as the group knowing of their existence is bigger than the one that would desire but does not have access to or knowledge of such maps. However, it is possible that some respondents are referring to risk maps regarding natural hazards and not explicitly soil erosion. Natural hazards such as avalanches or debris flows also contribute to erosion, but the respective risk maps are usually limited to the settlement area, which corresponds with the accumulation zone rather than with the zone affected by erosion. All exact numbers are shown in Figure 9. They point out a weak implementation of the SCP, as Art. 11 (1) clearly demands comparable criteria for the quantification of soil erosion and the registration of threatened areas.

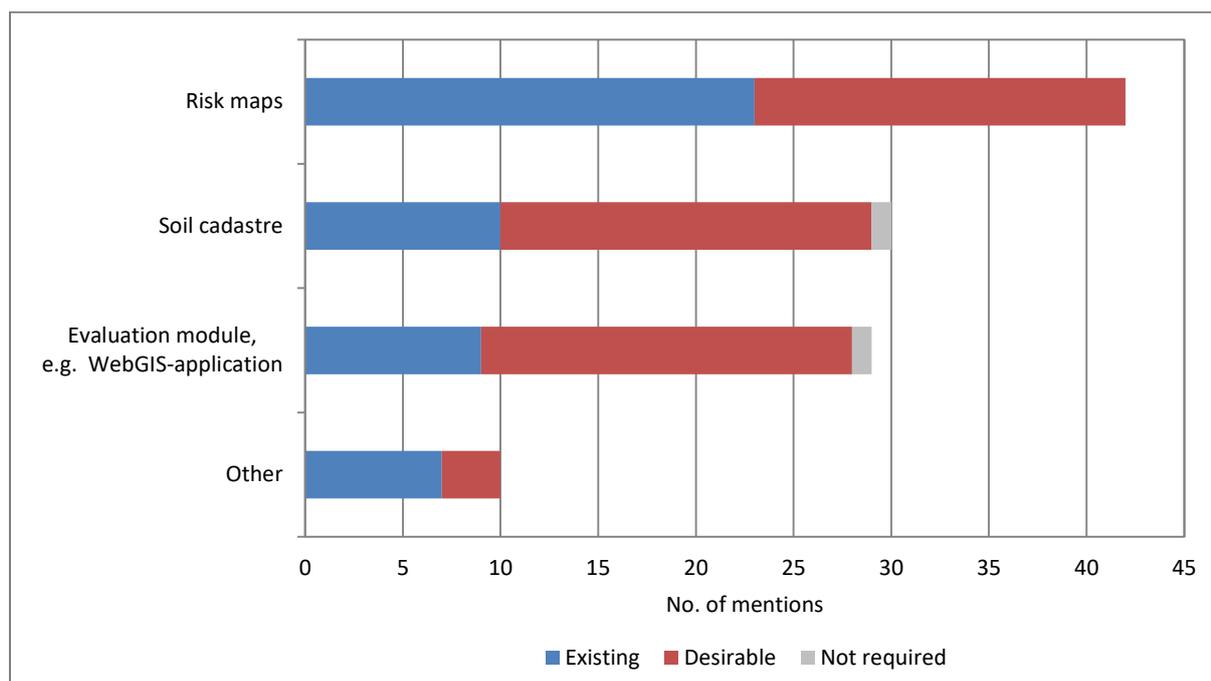


Figure 9: Methodological bases for the assessment of the soil's sensitivity to erosion (Question: Which of the following methodological bases for the assessment of the soil's sensitivity to erosion do exist in any region you are aware of and which would you desire? [multiple selection])

3.3.2 Qualitative soil protection and soil functions

This part was answered by 82 persons, which corresponds to 60% of the respondents. Soil as part of the ecosystem fulfils a variety of functions, such as habitat for soil organisms, location potential for natural plant communities, runoff regulation, natural soil fertility, filter and buffer for pollutants, contribution to groundwater recharge, thermal regulation, carbon storage and some more. Within the survey, the term "qualitative soil protection" has been limited to precautionary soil protection with regard to the assessment of soil functions. Therefore, the experts were not asked about aspects related to soil contamination (e.g. heavy metals, organic pollutants). The safeguarding and the preservation of ecological soil functions are explicitly mentioned in Art. 1 (2) of the SCP (Alpine Convention 1998).

3.3.2.1 Positive aspects of the SCP's implementation: Qualitative soil protection and soil functions

It can be positively stated, that out of the 82 persons, 76 respondents said that soil functions play a major role in their daily work. Which soil functions these are, is shown in Figure 10. It illustrates that the most known soil function is *natural soil fertility*, closely followed by *filter and buffer for contaminants*, *water flow regulation* and *location potential for natural plant communities*.

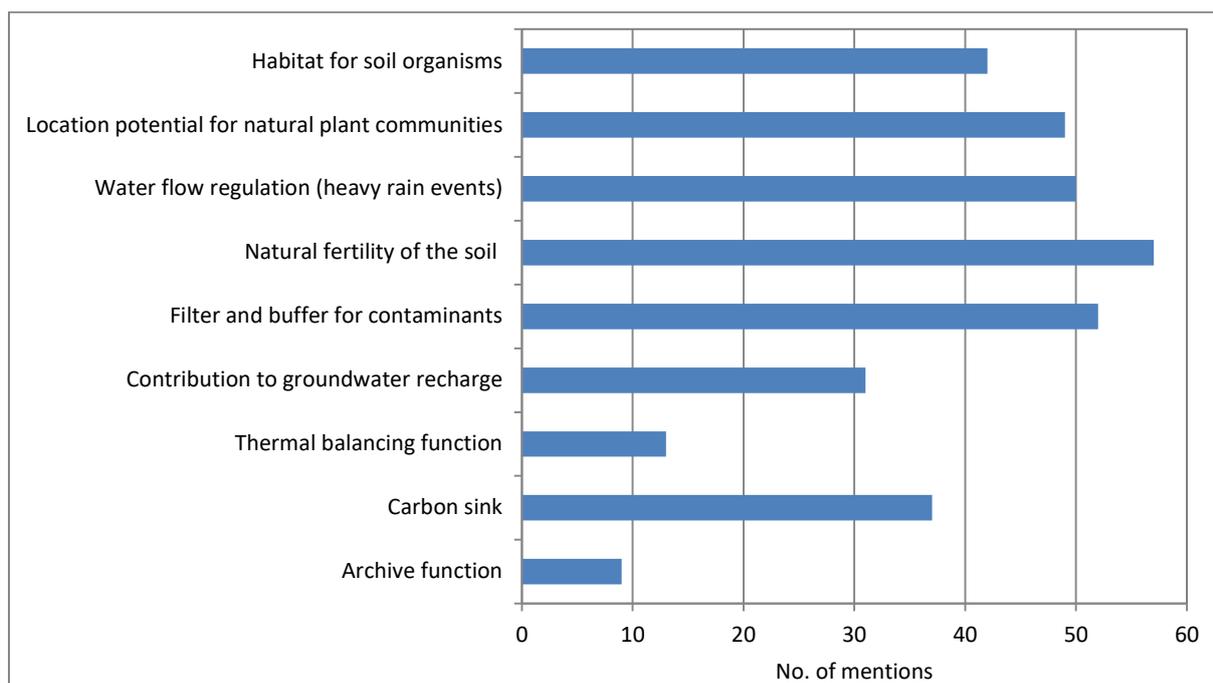


Figure 10: Relevance of soil functions (Question: Which soil functions play a role in your daily work? [multiple selection])

3.3.2.2 Shortcomings of the SCP's implementation: Qualitative soil protection and soil functions

Also regarding the qualitative soil protection, shortcomings with respect to the SCP's implementation could be identified. With regard to relevance of soil functions the *thermal balancing function* and the *archive function* are not much recognized (see Figure 10). Regarding the former, this is quite interesting and surprising, as especially cities are suffering during hot periods in summer and it is likely to impair given the climate change and the expansion of settlements. Therefore, this soil function should receive more attention. Another negative aspect is that only 40% of the 82 respondents that answered to this topic know about existing soil function maps although 93% said that soil functions are important for their daily work (see Figure 11). This leads to the assumption, that soil functions are considered in discussions, but due to the lack of spatially explicit information, they play just a minor role in decision-making. It can be concluded that the provision of soil function maps to policy and decision makers and to spatial planners would be an important step towards an appropriate consideration of soils. Figure 11 also illustrates that, apart from soil function maps, also other information sources are existing, but even more, they are desired, e.g. evaluation modules like Web-GIS applications. The integration of soil function maps into an existing Web-GIS, as for instance in the Austrian federal states of Upper Austria and Salzburg, is not yet the standard.

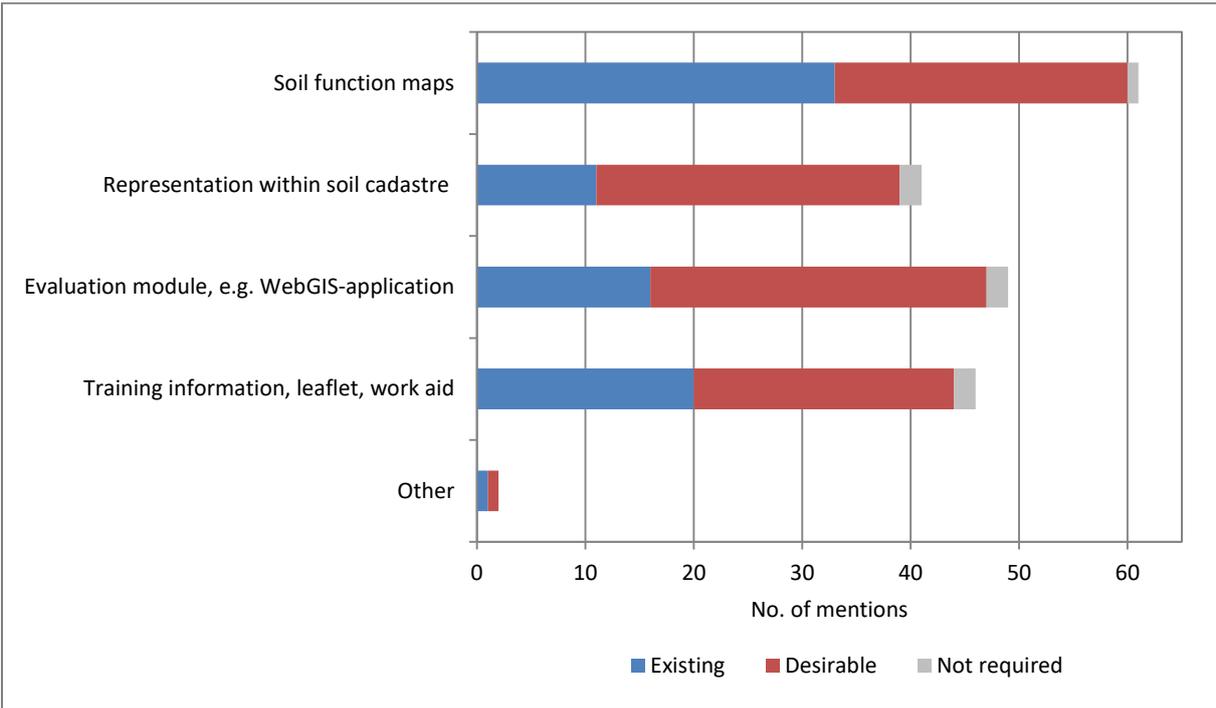


Figure 11: Methods and data bases to evaluate and present effects on soil functions (Question: Are you aware of methodological and databases existing to evaluate and present positive/negative effects on natural capacities of soil functions? [multiple selection])

Table 5: Influence of the SCP on the implementation of measures to assure qualitative and quantitative soil functions (Question: Were these measures applied due to the Soil Conservation Protocol?)

	No. of respondents
Yes, due to the SCP these measures were applied and promoted	9
No, the measures have been implemented independently	28
I cannot judge	20
Total	57

Furthermore, it was asked about the knowledge of regions where concrete measures assure qualitative and quantitative soil functions and if these measures were applied due to the SCP. The results (see Table 5) show, that the motivation to apply the measures is not clear.

3.3.3 Mountain farming, forestry, wetlands and moors

This part was answered by 71 persons, which corresponds to 52% of the respondents. Art. 12 and 13 of the SCP aim at preserving and promoting environmentally friendly mountain farming and at taking specific Alpine conditions for agriculture and forestry into account. The mountain forestry (Art. 13) must strive to preserve the mountain forest as a natural habitat and, if necessary, to reforest or extend it and to improve its stability. This is achieved through a careful and sustainable mountain forest management. In this way, usually also the protection function against natural hazards by mountain forests can be assured.

The SCP states, that the natural environment is to be conserved through extensive use (with special protection for wetlands and moors (Art. 9)) and the input of substances (pesticides, fertilizers) must be kept as low as possible (Art. 15) (Alpine Convention 1998).

3.3.3.1 Positive aspects of the SCP’s implementation: Mountain farming, forestry, wetlands and moors

A positive example for the SCP’s implementation are the results regarding the efficiency of soil conserving instruments within agriculture, forestry and wetland management, which are considered by the majority as more or less up to very effective (see Figure 12). Especially *agri-environmental measures* are known and judged as effective. *Fiscal* and *other financial instruments* are less known by the respondents and the estimation of the effectiveness of those measures is rather ambiguous.

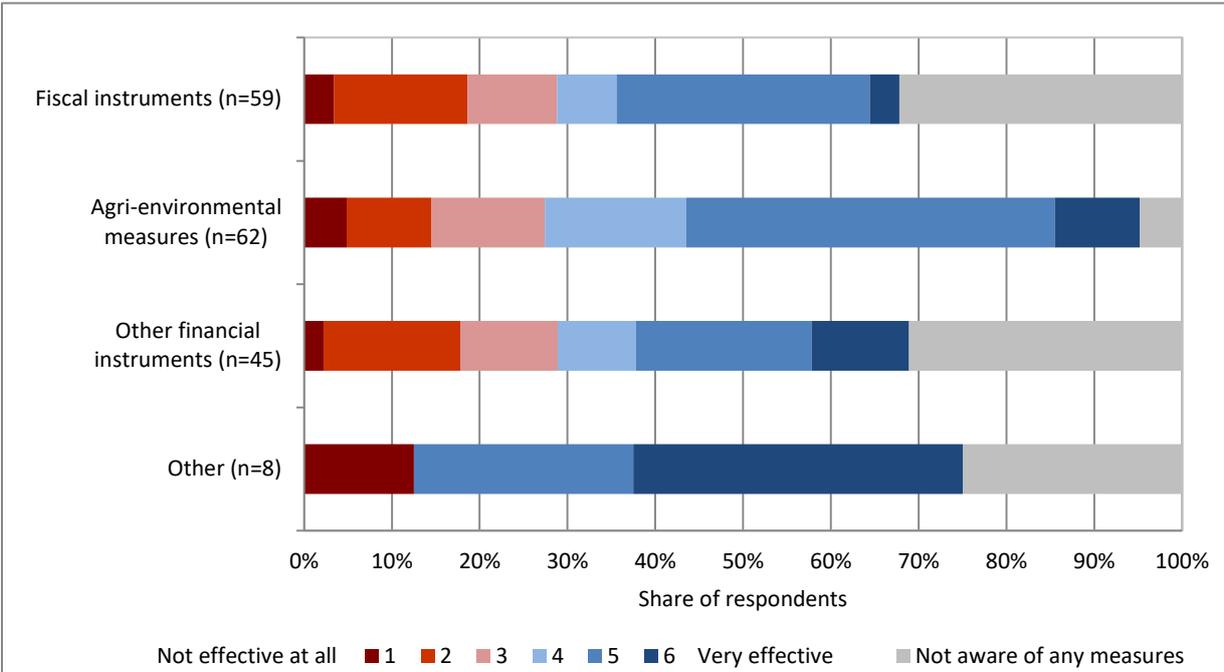


Figure 12: Effectiveness of instruments/incentives for soil protection (Question: How effective are financial or fiscal instruments/incentives to promote actions in favour of soil conservation in your region? [multiple selection])

3.3.3.2 Shortcomings of the SCP's implementation: Mountain farming, forestry, wetlands and moors

On the other hand, some answers also pointed out considerable shortcomings regarding the implementation of the SCP. In respect of wetlands, the experts were asked how sufficient they judge the existing legal instruments to preserve those soils. The results are depicted in Figure 13. While the majority of the Austrian respondents judge existing legal instruments as sufficient, most German and French respondents who know legal instruments to preserve soils in wetlands judge them as rather insufficient. In Italy, in comparison, existing legal instruments are seen as rather sufficient. Due to the low response to the entire part "Mountain farming, forestry, wetlands and moors" from Switzerland, Slovenia and France, it is difficult to derive a trend for those countries.

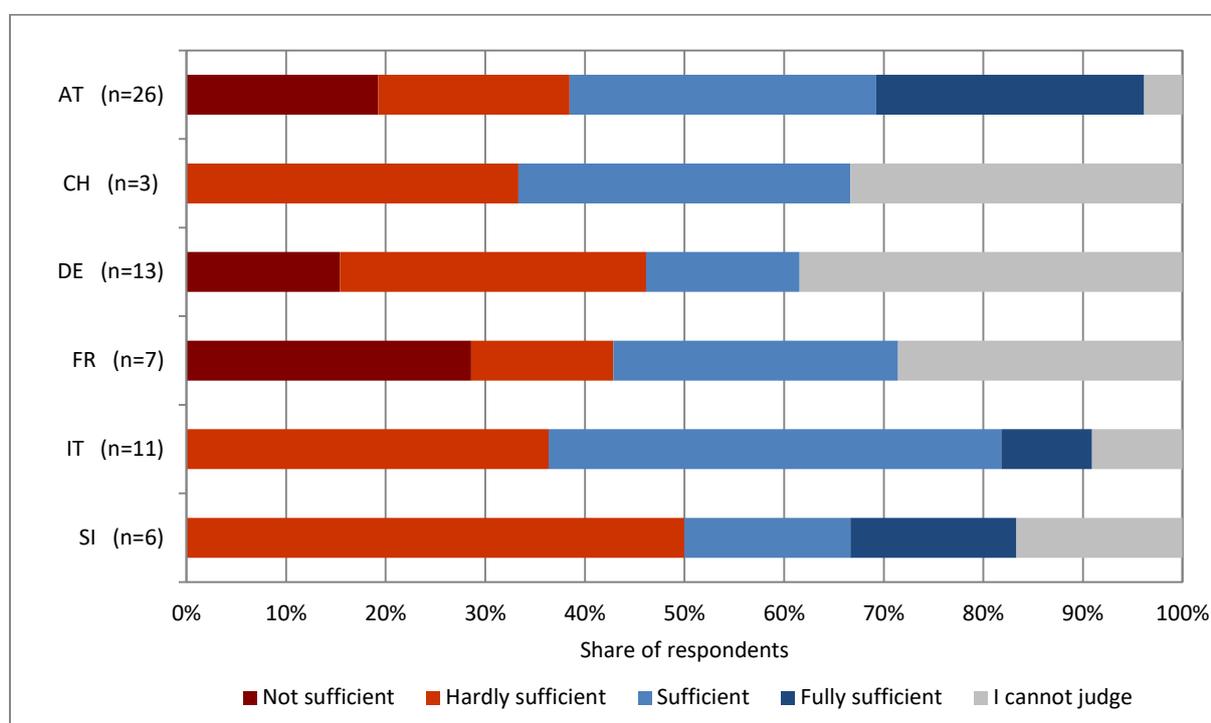


Figure 13: Sufficiency of existing legal instruments to preserve soils in wetlands per country (Question: In your opinion, are the existing legal instruments sufficient to preserve soils in wetlands?)

Furthermore, the respondents were asked to name reasons why legal instruments seem not to be fully sufficient to preserve soils (agriculture, forest, and wetland). Among others (see attachment 1, p. 29), the following answers were received:

All statements are based on the original wording but were translated into English.

- Other economical values are more important.
- Soil protection is not on the mind of land users and soil protection is not a politically important topic.
- There are too many rules of exceptions, especially for agriculture.

- Wetland destruction is one of the sections of the Water Act; Lack of resources for monitoring the impact of developments.
- Art. 9 SCP in Austria is interpreted as meaning that only functional moors enjoy protection.

3.3.4 Quantitative soil protection / land take

This part was answered by 62 persons, which corresponds to 46% of the respondents. The Art. 7 of the SCP requires an economical and prudent use of soils. It is demanded that “in order to limit soil sealing and soil consumption, the Contracting Parties shall provide for the space-saving construction and an economical use of soil resources” (Alpine Convention 1998).

To get an impression of how the quantitative soil protection is organized in the individual countries, it was asked for spatial planning methods on all administrative levels as well as for methods to monitor the land take. The answers are compiled in Table 6 and Table 7. If some fields remained empty, it does not necessarily mean that there are no methods or instruments, respectively, but that none of the respondents mentioned any.

Table 6: Spatial planning instruments on different administrative levels (Question: Please assign the spatial planning instruments you are aware of according to the importance of soil protection or the required level (national, regional, local) of soil assessment within those instruments?)

If an answer was given by more than one person, it is indicated in brackets and the wording might be changed slightly.

National				
	No consideration	Specified targets include soil protection	General soil assessment	Spatially explicit in-depth soil assessment
AT	n.a.	• Yes (3 mentions)	• Forestry laws • Yes	n.a.
CH	n.a.	n.a.	n.a.	• The crop rotation plan is playing a big role
IT	n.a.	• Laws	n.a.	n.a.
SI	n.a.	• Spatial Development Strategy of Slovenia (SPRS)	• National spatial plan (DPN) • Yes	• Strategic spatial plan (SPN)
Regional*				
	No consideration	Specified targets include soil protection	General soil assessment	Spatially explicit in-depth soil assessment
AT	n.a.	• Spatial planning law • Yes (3 mentions)	• Yes	n.a.
CH	n.a.	• Soil sealing is with the new „Raumplanungsgesetz“ extremely limited	• Especially for large projects, soil issues have to be dealt with	n.a.
DE	• Strategic environmental assessment, Soil Protection Act (ineffective), measures to restrict traffic	• Land-use plan, soil-saving development plans • Connection requirement of the Bavarian state development program	• Re-compaction, restoration obligations of abandoned mining and industrial areas	n.a.
IT	n.a.	• Law	• planning measures • Environmental impact assessment procedure (2 mentions) • Application of regional law 11/1998 - Standard construction manual	n.a.

Local				
	No consideration	Specified targets include soil protection	General soil assessment	Spatially explicit in-depth soil assessment
AT	<ul style="list-style-type: none"> • Building law • Yes 	<ul style="list-style-type: none"> • Yes (2 mentions) 	<ul style="list-style-type: none"> • Regional spatial planning concept 	n.a.
SI	n.a.	<ul style="list-style-type: none"> • Municipal Spatial Development Strategy (SPRO), municipal spatial plan (OPN) 	<ul style="list-style-type: none"> • Municipal spatial plan (OPN) 	<ul style="list-style-type: none"> • Municipal detailed spatial plan (OPPN) • Yes

*The regional level of administration in Slovenia does not exist

Table 7: Measures to monitor land take on different administrative levels (Question: If soil consumption is systematically registered in your country, which specific parameters and analysis methods (data basis, time interval) are used at which administrative level?)

	National			Regional			Local		
	Parameters with unit	Data basis	Time interval analysis	Parameters with unit	Data basis	Time interval analysis	Parameters with unit	Data basis	Time interval analysis
AT	Area consumption ha/day	n.a.	Annual	Balance of reserve of land	Orthophoto	5 Years	n.a.	n.a.	n.a.
				Area consumption ha/day	n.a.	Annual (planned)			
CH	Geographical survey of the federal government with ha sealing per year	Areal statistics Switzerland (Arealstatistik)	Annual	The canton's observation of sealing in ha per year, with additional buildings, etc.	Construction plans, aerial photographs, building applications, etc.	Annual	Hardly any	n.a.	n.a.
IT	n.a.	n.a.	Annual report of soil consumption (ISPRA)	n.a.	Digitalization of soil consumption areas	n.a.	n.a.	n.a.	n.a.
	ha/day		n.a.	ha/day					
FR	Registration of land use by statistical offices	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
SI	n.a.	Information on actual and purposed land use	When plan is changed	n.a.	n.a.	n.a.	n.a.	Information on actual and purposed land use	When plan is changed

*The regional level of administration in Slovenia does not exist

The information on the German situation is very limited as both questions were only included in the second survey, which was answered by only one German expert. It is noticeable that France and Slovenia, which are central states, seem not to have installed any planning or monitoring instruments on the regional level. In the federal republics (AT, CH, DE) on the other hand, the regional level turns out to be the most important one. Italy, which is regionally organized, spatial planning and monitoring instruments are found on the local and regional levels. The compiled information gives a first overview of existing instruments regarding quantitative soil protection and should be used as a starting point for in-depth research in the individual countries on all administrative levels.

3.3.4.1 Positive aspects of the SCP's implementation: Quantitative soil protection / land take

Effective measures to reduce soil consumption, also referred to as sealing, as well as obligatory compensatory measures, are two ways that can help to successfully implement the SCP. Both were investigated in the survey with the following results.

To the open question “Are there any official requirements for compensatory measures in connection with soil consuming projects in your region? (Art. 7 (1) and (2) of the SCP)” several requirements were mentioned, whereof the most important are listed below, yet more can be found in the attachment 1, p. 41.

All statements are based on the original wording but were translated into English. If an answer was given by more than one person, it is indicated in brackets and the wording might be changed slightly.

- Attribution of greater scores for building restoration (e.g. M 4.1.1 PSR (Piano Sviluppo Rurale) 14-20, Italy)
- Compensation by money (7 mentions)
- Compensation by ecological compensatory measures (10 mentions)
- Measures for the protection of the soil in the construction or operating phase (3 mentions)
- Compensation obligation for new sealing (e.g. by unsealing in inner-city areas) (3 mentions)
- Alleviation and substitutive measures

There are several measures to achieve a reduction of soil consumption. Figure 14 shows, how the experts estimate their effectiveness. *Densification*, i.e. the urban development within the borders of pre-existing urban areas, is seen as the most effective of all regulatory measures to reduce soil consumption. This is interesting as the results from the UFOPLAN, where German-speaking countries formed the majority, rather indicated an ineffectiveness of densification. All other measures are rated as less effective, which also corresponds to the results of Badura et al. (2016) (see Figure 14).

3.3.4.2 Shortcomings of the SCP's implementation: Qualitative soil protection / land take

However, most answers to this thematic topic indicate particularly many shortcomings of the SCP's implementation as the objectives regarding quantitative soil protection have widely not been achieved. Especially *strategic environmental assessment* based on soil quality, *land-use planning* and *soil protection laws* are not considered as very effective (see Figure 14). These results show that soil protection laws have not enough power, which results in an insufficient consideration of soil in land-use planning and strategic environmental assessment.

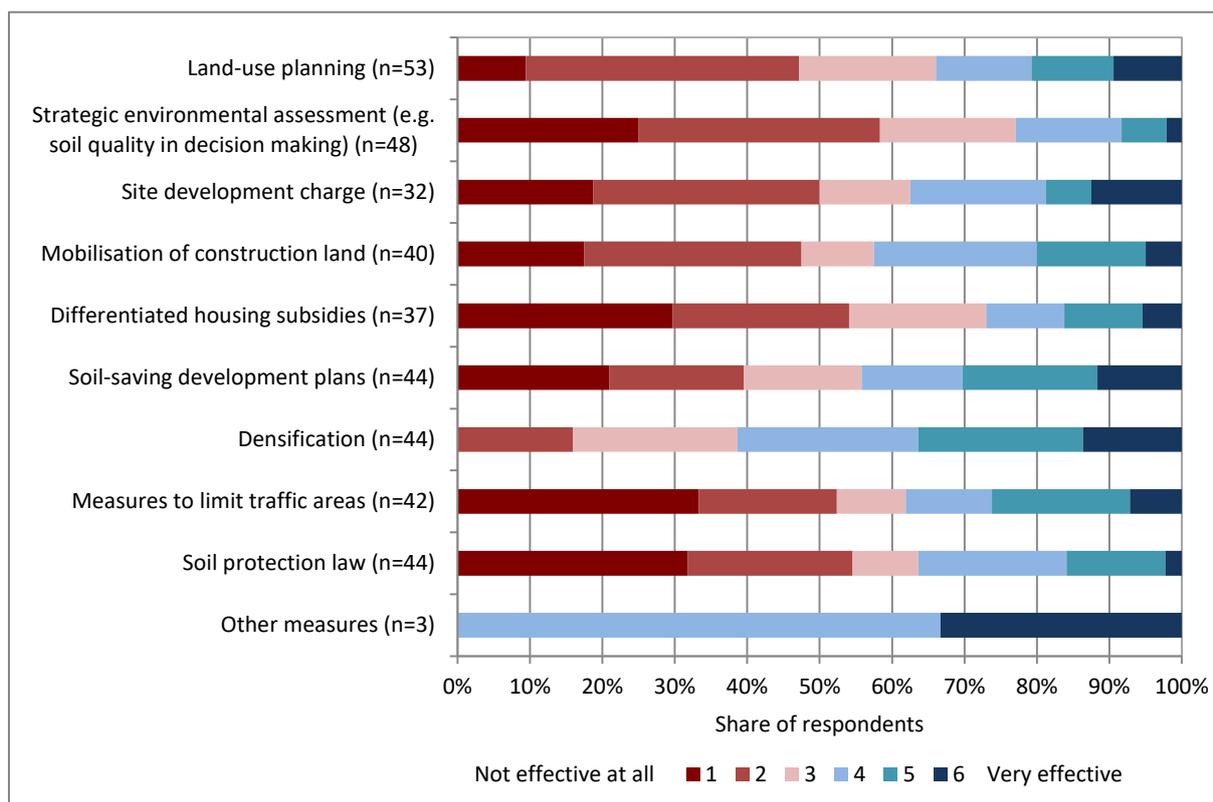


Figure 14 Effectiveness of regulatory measures for the reduction of soil consumption (Question: Please estimate the effectiveness of the regulatory measures to reduce soil consumption in your region: (Art. 7 (1) and (2) SCP) [multiple selection])

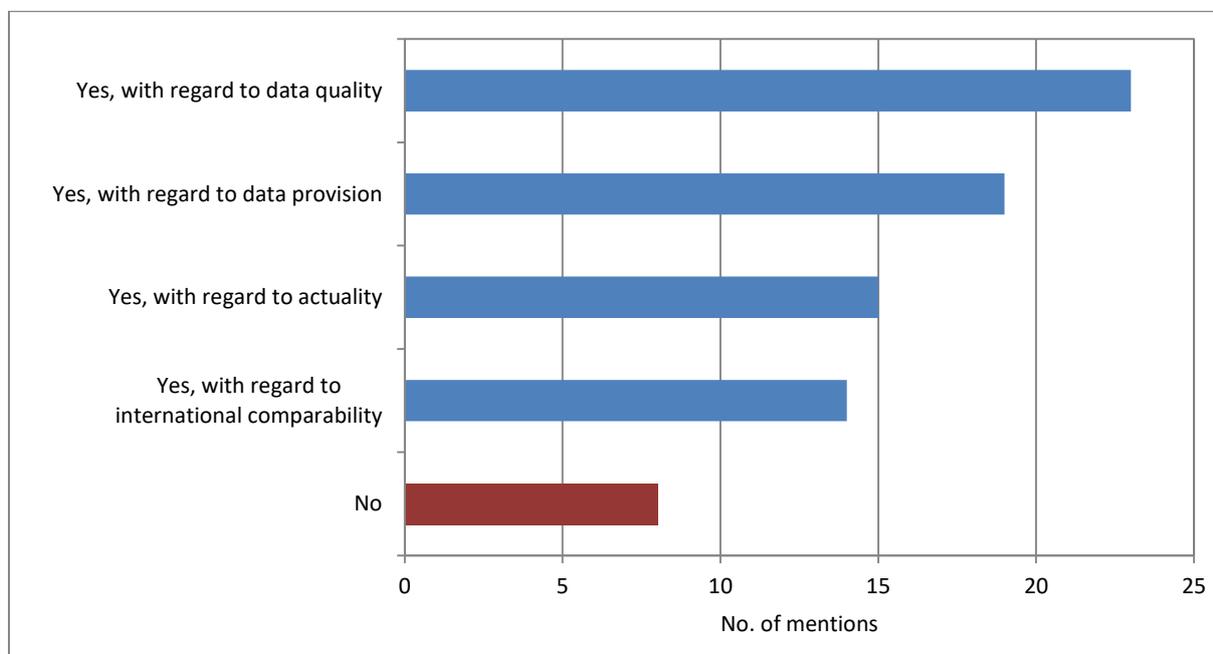


Figure 15: Needed improvements regarding land consumption registration (Question: Do you think improvements with regard to land consumption registration are needed in your country? [multiple selection])

About 80% of the respondents (29 out of 37) think that improvements regarding land consumptions registrations are highly needed, especially with respect to the quality and provision of data (Figure 15). Regarding international comparability, it can be added, that the topic quantitative soil protection is generally rated as the most important topic for international/Alpine-wide cooperation.

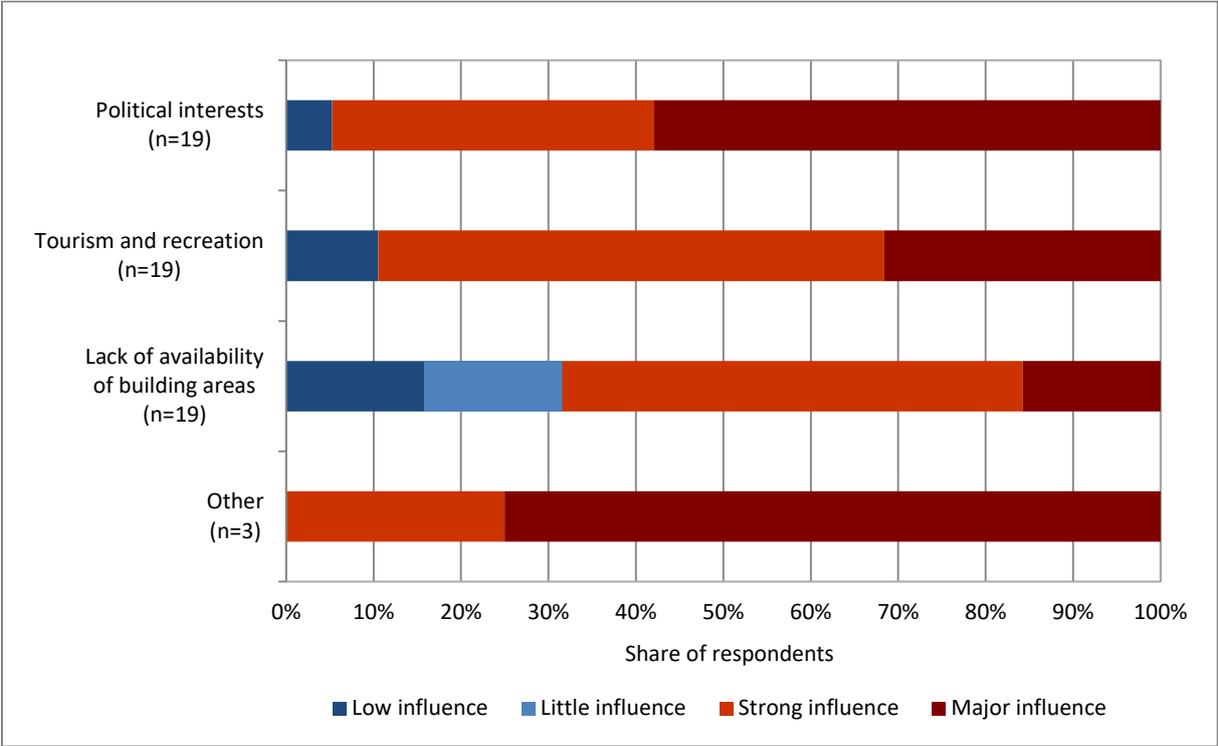


Figure 16: Main driving forces for soil consumption (Question: What are the main driving forces for soil consumption in your country? [multiple selection])

The results to the question about main drivers of soil consumption are depicted in Figure 16. The *lack of availability* refers to the limitation of valley areas, which all land users are competing for. However, the biggest driving force is seen in political interests, which were also criticized by respondents with respect to other subjects, e.g. qualitative soil protection. According to the experts, politicians have no or not enough knowledge about the importance of soil and see other topics as more important. Soil sealing due to the construction of touristic infrastructure, e.g. hotels, parking lots, skiing facilities, and additional roads also seems to play a very important role in the Alps (Figure 16).

3.3.5 International/Alpine-wide cooperation

This part was answered by 58 persons, which corresponds to 43% of the respondents. From those, only 2 persons directly work in the international administration in organisations based in Austria and Italy, respectively. In this section, the majority of respondents works in Austria (24), followed by Germany (13), Italy (11), Switzerland (6), France (2), and Slovenia (1) and one without indication of the place of work.

Art. 5 of the SCP demands international cooperation, in particular about drawing up soil registers, soil observation, identification and observation of protected, negatively affected, or hazard-prone areas, the provision and harmonisation of databases or the coordination of Alpine-related soil research as well as mutual reporting. In addition, Art. 19 “Research and Observation”, Art. 20 “Harmonized data-base preparation” and Art. 21 “Establishment of permanent observation areas and coordination of environmental monitoring” address international/Alpine-wide cooperation (Alpine Convention 1998).

3.3.5.1 Positive aspects of the SCP’s implementation: International/Alpine-wide cooperation

International and Alpine-wide cooperation is emphasized within the SCP in order to assure that the contracting parties remove obstacles between territorial authorities in the Alpine region and to encourage the development of solutions to shared problems at the most suitable level.

Figure 17 lists the topics mentioned in the SCP regarding international cooperation and shows that they are predominantly seen as moderate to very important by the survey participants. Especially *economical and prudent use of soils* is rated as the most important, but also the topics *Conservation of soils in wetlands and moors*, *Agriculture, pasture farming and forestry* as well as *Effects of tourism infrastructure* are each rated as very important by more than 50% of the respondents. Interestingly, the latter two show almost identical distributions of expert judgements. Although the mere recognition of their importance cannot directly be seen as a successful implementation of the SCP, a high awareness regarding those topics is indispensable in order to reach the SCP’s aims.

Apart from the importance, the experts were also asked about their opinion with respect to the sufficiency of addressing soil topics in international cooperation. The topic *Agriculture, pasture farming and forestry* is predominantly seen as partly sufficiently and sufficiently addressed as shown in Figure 18. We can thus assume that the awareness of soil protection is higher in sectors where stakeholders directly work with soils, like agriculture and forestry, in comparison with sectors such as tourism or land-use planning.

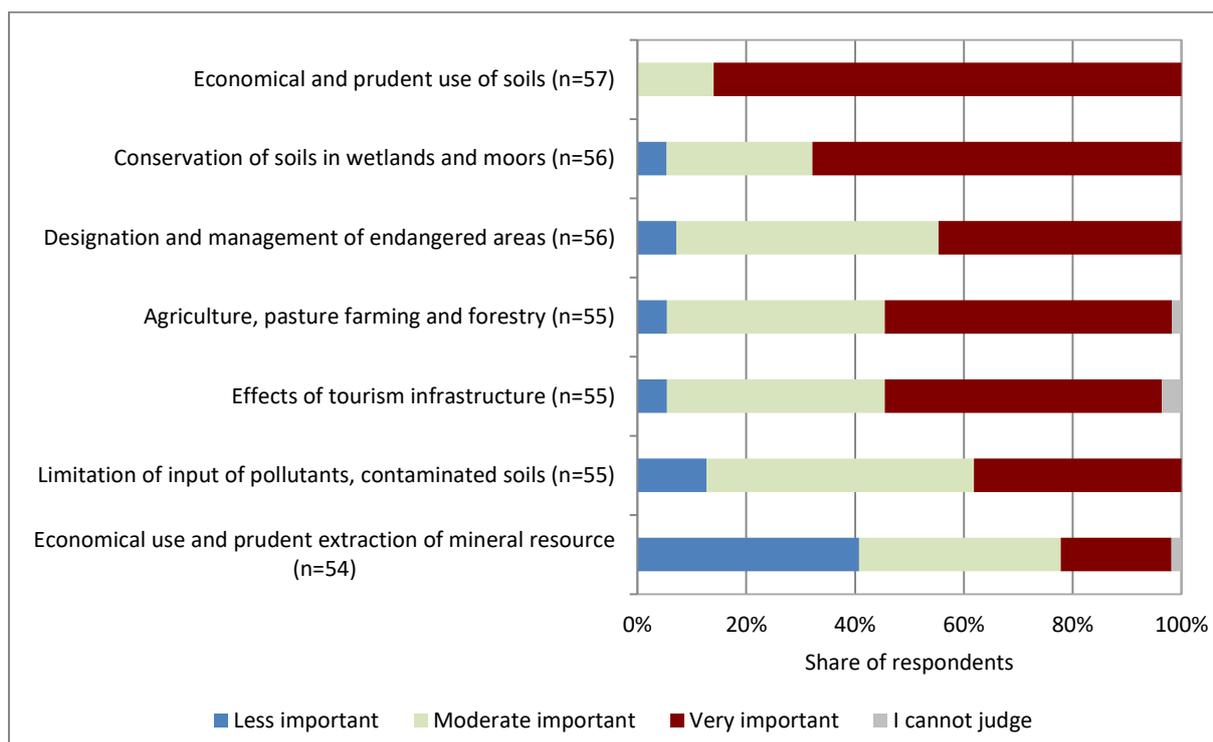


Figure 17: Most important topics in the international cooperation for an effective implementation of the SCP (Question: From your point of view, what are the most important topics in the international/Alpine-wide cooperation that lead to an effective implementation of the SCP? [multiple selection])

3.3.5.2 Shortcomings of the SCP's implementation: International/Alpine-wide cooperation

The international cooperation also seems to show considerable shortcomings. As visible in Figure 18, the vast majority of the respondents judges none of the soil topics as sufficiently addressed, but mostly as *partly sufficient* or *not sufficient*. Interestingly, the topic which seems most important for an effective implementation of the SCP, *economical and prudent use of soils* (Figure 17), is also the topic which is considered to be the least sufficiently addressed in the international/Alpine-wide cooperation (Figure 18). Whereas experts from Italy and Slovenia estimate the international cooperation as sufficiently covered, respondents from Austria (18), Germany (9), Switzerland (4), Italy (3), and France (1) indicated an insufficiency. The international cooperation with respect to *agriculture, pasture farming and forestry* is not sufficiently addressed according to the respondents. This is particularly true for Germany, where 6 out of 8 persons are of this opinion.

Figure 19 shows that nearly all listed principles of national and international/Alpine-wide cooperation are evaluated as equally important by the respondents. Yet, the international cooperation is estimated even more important than the national one. There are different opinions of how important the principals are but none of the mentioned is generally rated significantly more or less important than the others. Regarding the international level, the most important cooperation principles seem to be *soil monitoring* (31), *Alpine-specific soil research* (25) and *provision and harmonisation of databases* (24). On the national level,

provision and harmonisation of databases (25), soil monitoring (25) and drawing up soil registers/cadastrals (20) were seen as most important. The attachment 1 (p. 51f) provides more information regarding the involvement of the questioned experts with regard to the above-mentioned cooperation activities.

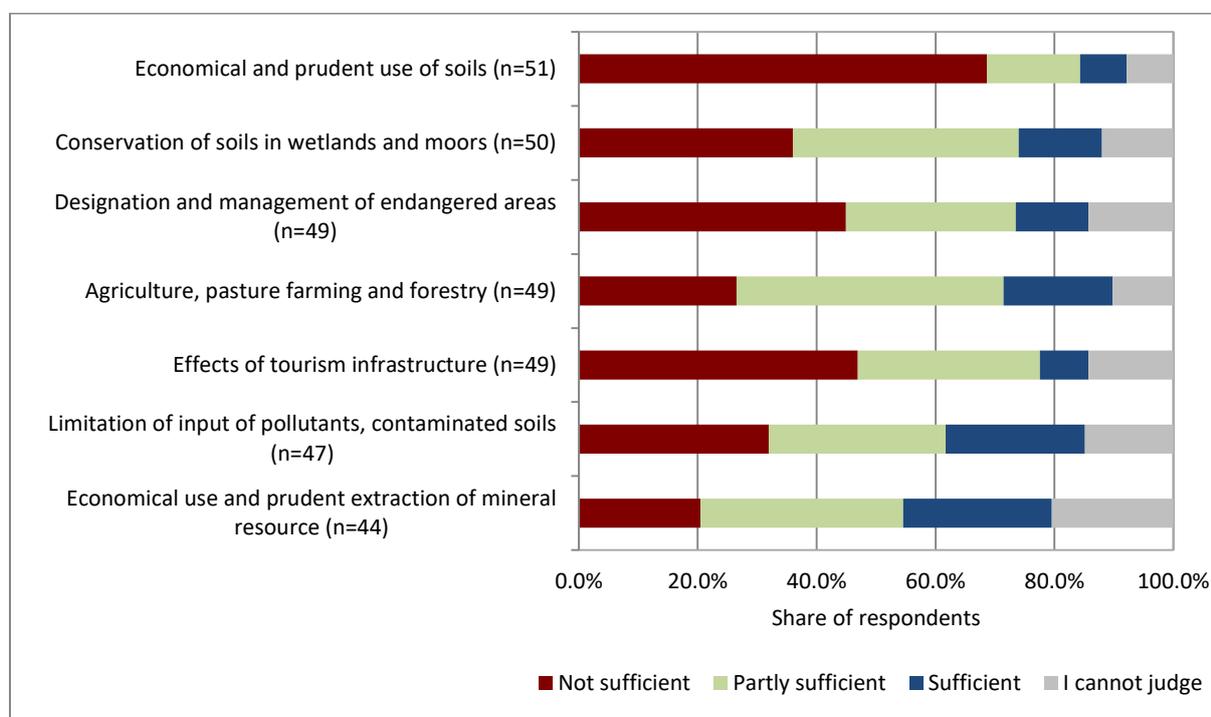


Figure 18: Consideration of soil topics in Alpine-wide cooperation (Question: Are these soil topics sufficiently addressed by the international/Alpine-wide cooperation? [multiple selection])

It was also asked if the respondent is involved in activities/projects in international/Alpine-wide cooperation on soil conservation in the Alps. From the 55 persons that responded to this question, 36 responded with *no*. If the response was *no*, it was asked for the reason and most respondents (16) answered that they were not involved due to *Lack of time resources*, followed by *Not professionally responsible* (13), *Lack of financial resources* (9) and *Lack of contacts* (8). The latter is alarming, however, the situation could be improved comparably easy with the establishment and strengthening of international networks, as, for example, the Alpine Soil Partnership created in the Scope of the Links4Soils project.

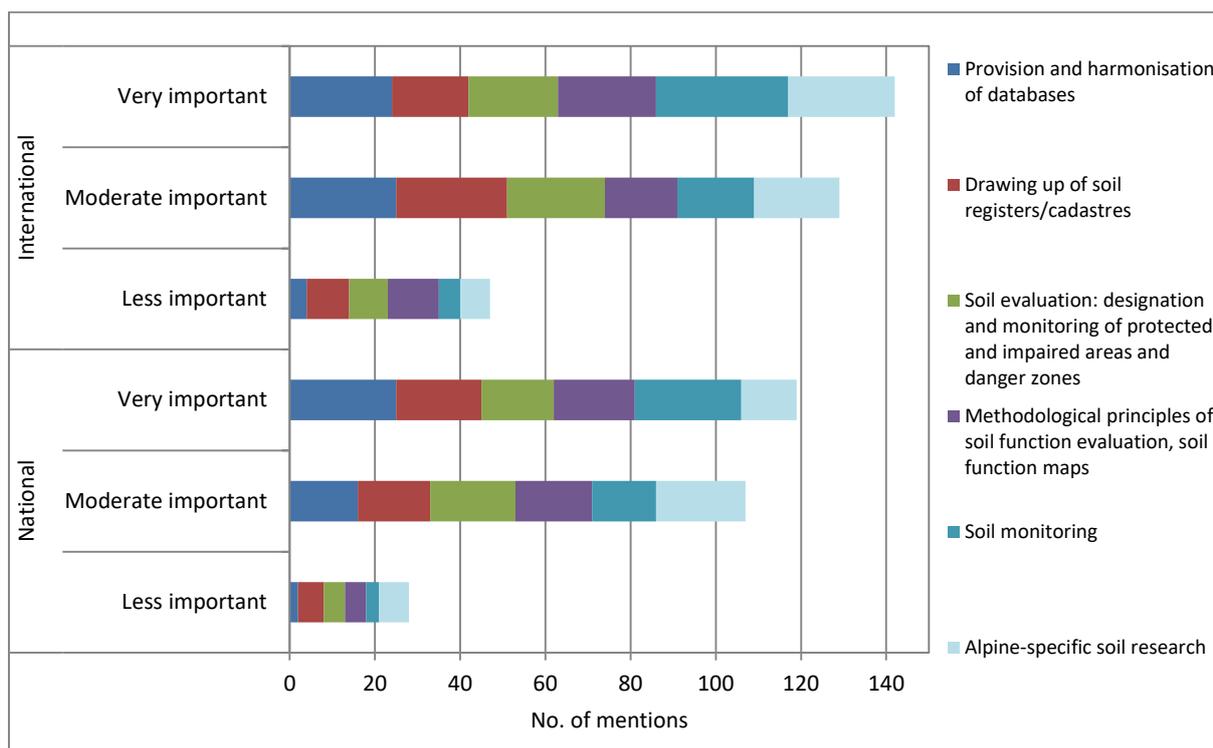


Figure 19: Importance of the principles of national and international cooperation (Question: What are the most important principles of national and international/Alpine-wide cooperation that lead to an effective implementation of the SCP? [multiple selection])

3.4 Outlook

The final section of the survey was dedicated to further suggestions for measures and any special topics the respondents would like to mention.

- Individual responses to the open question “Are there any current topics, which have not yet or only inappropriately been covered by the Soil Conservation Protocol?” can be summarized as the following: More training and information for other areas of expertise in characteristics and challenges of soil protection: agronomists, engineers, architects, etc.
- Quantitative soil protection, there are neither limits nor guideline values
- Link soil protection and climate protection/adaptation
- Suggestion to integrate existing database systems at a transnational level to introduce a unified monitoring and evaluation system for soil protection
- Spatial planning in connection with the SCP failed the aims of regional development; Problem of land speculation (for example by agriculture, second residences, etc.); Designation of commercial areas in almost every municipality; Labile areas

- Soil mapping must also be carried out in mountain areas so that the best soils are protected from exploitation by tourists. The pedogenesis of soils along forest edges is to be examined more closely.
- Actually, enough laws and instruments exist, just the implementation and control is insufficient.
- Improve acceptance of these topics among rural areas, especially farmers, economists and mayors
- New education initiatives are needed, soil has to be part of a general value debate.

To the open question “Which concrete measures/activities that support the implementation of the Soil Conservation Protocol and the Alpine soil protection would be additionally desirable?” numerous answers were given (see attachment 1, p. 54f). Their main points are listed below:

- General improvement and dissemination of awareness of the essential and existential meaning of soils and their functions for all life
- Establishment of a common information platform for the exchange of experience and an Alpine-wide network for soil observation
- Enhance the collection and provision of soil quality data and data harmonization as a basis for soil assessment
- Awareness raising, bring the SCP to the attention of decision-makers, more public relations
- More information should be transferred to politics and administrative levels, more cooperation between Alpine countries, e.g. EUSALP
- Clearer presentation of the legal relevance of the SCP at European level puts pressure on states; stronger laws and commitment to implementation
- Legal liability and sanction mechanisms

Being asked to estimate the efficiency of different levels to contribute to a better implementation of the SCP, experts identified especially the local and regional administrations as very effective, but also the other listed levels are judged as rather effective, which is depicted in Figure 20. Considering that most respondents work themselves within regional or local administration, it could be assumed that they would rate their own level as particularly important and thus, biasing the result. However, the estimations were rather homogeneously distributed among all respondents. Furthermore, it is interesting that for respondents that work in administration, the SCP is not more important in their daily work as for the rest of the respondents (see Figure 4).

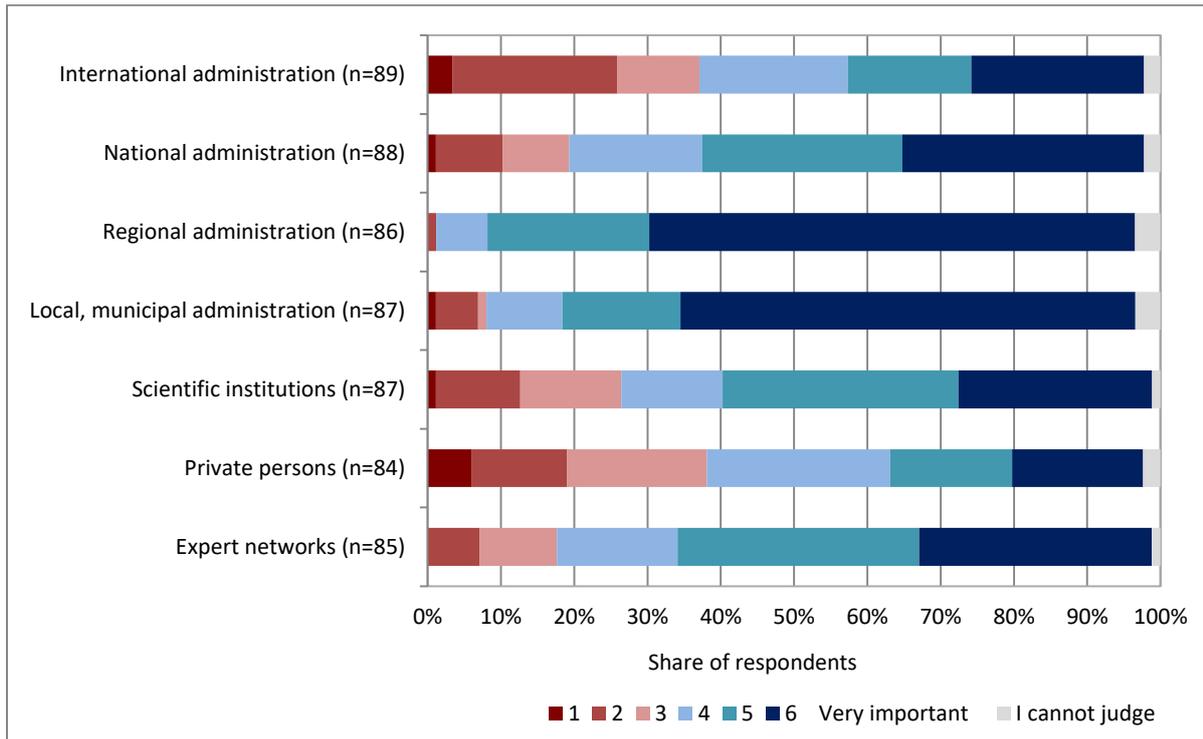


Figure 20: Importance of organisational levels for the SCP’s implementation (Question: In your point of view, how important are the following organisational levels for an effective implementation of the SCP? [multiple selection])

4 Summary and Conclusion

The online survey was conducted between June and September 2017 within the Links4Soils project (work package 1, activity 1.2) and was based on the structure of a previous survey conducted by Badura et al. (2016) (UFOPLAN survey). In combination, the UFOPLAN and Links4Soils surveys provide valuable information from 136 soil experts.

The most important findings are presented in this report, which is complemented by Attachment 1, which provides a full list of the survey questions with all respective answers. The main results of both surveys can be summarized as follows:

- The SCP has had an **influence on legislation** but greater relevance is desired by the survey participants. Depending on the country, only some of the legislation at the national and regional levels has been influenced by the SCP. However, only 12% of the respondents deem themselves to be experts in the field of law.
- The **relevance of the SCP within the work of soil experts** varies among the Alpine countries. It seems to be rather high in Italy, whereas the German and especially Swiss soil experts judge the SCP's relevance to be quite low.
- More and **better databases and methodological tools** are needed for all thematic topics. Soil function maps are seen as especially valuable to support policy and decision-makers and planners.
- **Harmonized data** on the national or even international level with better availability is needed for all thematic topics in order to ensure adequate understanding of soil threats and better soil protection.
- More **knowledge of existing and available data** is needed for all thematic topics. Often insufficient data is available or knowledge of where to find the relevant information is lacking.
- A **stronger lobby** for soil is needed. The survey exposed that soil is not viewed as being very important by policymakers or society in general.
- **Awareness of soil protection** is higher in sectors where stakeholders work directly with soils, i.e. agriculture and forestry, compared with sectors such as tourism or spatial planning.
- **SCP implementation activities** should be focused **on the regional and local levels** but with strong support from an international lobby. For international/Alpine-wide cooperation, it is urged that it should mainly act on the regional level. It has to be made clear at the regional and local levels why soil is important as it is at those levels that soil-relevant decisions are often made, e.g. regarding soil sealing.
- Regarding **international cooperation**, the prudent use of soils is deemed to be the most important topic, while it is often the one most neglected by decision-makers. (Note: The

latest developments – with initiation and/or impact only after these surveys were conducted – indicate improvement (e.g. EUSALP WG6).)

- Potential trade-offs regarding the **use of land within different sectors** must be considered in order to allow sustainable development and community prosperity.

A great benefit and advantage of the later survey in comparison to Badura et al. (2016) is the differentiation of results by country. However, the low number of questioned experts regarding individual thematic topics in some countries has to be recognized, which hampers a comparison between countries or working levels. Nevertheless, some trends can be derived and provide valuable insights into the country- or working-level-specific circumstances.

This report summarizing the results of the two surveys conducted in 2015 and 2017 provides a good overview of the numerous issues regarding soil protection in the Alps. However, the remaining open questions should be resolved and the research gaps eliminated. Thus, further research targeting those particular gaps, e.g. the systems for monitoring soil sealing in each region, is greatly needed. Expert interviews with detailed answers might be an effective way to complement the findings of the present study.

An even more important task, however, is to tackle the shortcomings of the SCP's implementation identified by the two surveys. In this regard, we urge policymakers and administrations at all levels to grant priority to soil protection and to follow up their words with actions.

With the newly gained information, the most important recommendations, which are broadly stated in Badura et al. (2016, p. 5), could be approved beyond the borders of German-speaking countries and constitute a sound basis for better soil protection in the Alps:

- The legal implementation of the SCP must be improved in all Alpine countries.
- The implementation of the SCP must be monitored by means of comparable indicators.
- The objectives of the SCP should be in line with the aims of sustainable development and soil conservation on the European and well as global levels.
- The actions taken and communication should link soil protection and climate change in order to relate both the potential of soil to mitigate climate change and the expected changes in soil threats.
- The importance of the issue of land take must be recognized; this issue can be tackled most effectively through a common international approach.
- Soil experts from different countries and regions should meet regularly and transfer knowledge via modern communication technology in order to enhance the understanding and, even more importantly, the protection of soils by providing expertise on how to better and efficiently implement the SCP.

- Actions to raise awareness must be targeted at stakeholders from sectors such as agriculture, forestry, and tourism, as well as from the spheres of local politics, public administration, and the wider public.

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Attachments

Attachment 1:

Name: Full content

Availability: separate file downloadable on <https://www.alpine-space.eu/projects/links4soils/en/project-results>

Attachment 2:

Name: Questionnaire

Availability: separate file downloadable on <https://www.alpine-space.eu/projects/links4soils/en/project-results>

About the Links4Soils project



Web links

Links4Soils results web page: Alpine Soil Platform – www.alpinesoils.eu

Links4Soils Interreg Alpine Space project web page: www.alpine-space.eu/projects/links4soils

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