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Tagung der Alpenkonferenz
Réunion de la Conférence alpine
Sessione della Conferenza delle Alpi
Zasedanje Alpske konference

XVI

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ANLAGE/ANNEXE/ALLEGATO/PRILOGA

6 Activity Report of the Natural Hazards Working Group – PLANALP for the period between the XV and XVI meetings of the Alpine Conference

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ACTIVITY REPORT OF THE
NATURAL HAZARDS WORKING GROUP – PLANALP
FOR THE PERIOD BETWEEN THE XV AND XVI MEETINGS OF THE ALPINE CONFERENCE (April 2019 – December 2020)

1. Overview of the mandate or relevant decision of the Alpine Conference

Summary of the main tasks according to the 2019-2020 mandate (for PLANALP) or decision ACXV/A6 of the XV Alpine Conference
• Knowledge transfer and exchange of good natural disaster risk reduction practices within the Alpine region (regular) • Contribution of prevention in contingency planning: challenges and synergies; including the consideration of residual risk and the case of overload • Climate change adaptation on local level including risk communication and focussing on different social groups e.g. children and youth

2. Meetings

Summary of the meetings (date, place, main topics and outcomes)

• 24 – 25 April 2019 in Seggau, Austria
  ○ Main Topics: Review of Ending PLANALP Mandate and RSA7, Handover of Chairmanship, Presentation of new mandate, Natural Hazard Model Exhibition and Workshop
  ○ Outcomes: Decision on renewing the mandate and continue PLANALP, new Chairman Florian Rudolf-Miklau, presentation of the content focus of the new mandate, agreement to focus contingency planning on the needed information and preparation for civil protection actors, decision to prepare dissemination material for RSA7
• 15 – 16 October 2019 in Vitznau, Switzerland
  ○ Main Topics: Contingency planning (CP) and Alpine Climate Target System 2050 (CTS 2050)

    - Outcomes: Presentation of the six key questions on CP and their feedback, Decision on how to continue CP including a timetable, PLANALP chair presented draft version on the pathways for the Alpine CTS2050, Discussion about new topic “Nature-based solutions” (NbS) for PLANALP
- 27 May 2020 Virtual Meeting
    - Main Topics: Contingency Planning and new topic Nature-based solutions”
    - Outcomes: Presentation of project consortium responsible for the study “CP in the area of natural hazards” and the timeline, initiation of a stakeholder analysis for CP online survey, decision that only one workshop on CP per country is necessary, discussion on main challenges regarding NbS
- 16 October 2020 Virtual Meeting
    - Main Topics: Contingency Planning and Nature-based solutions
    - Foreseeable outcomes: Presentation status quo of the CP study. Results of the workshops about good implementation practice to address stakeholders and draft version of final report.

3. Activities carried out

Synthetic report on activities carried out (including outreach and communication activities)
• Event for children and youth on natural hazard (Exhibition and Workshop) • Knowledge transfer and exchange of best-practices as well as current natural hazard events was carried out at all meetings of PLANALP (e.g. collection existing practises for CP, risk communication for journalists, good-practises on NbS) • Support the development of implementation pathways for natural hazards for the Alpine CTS2050 • Online survey in each country on CP • (Foreseeable Activity: Workshops on CP in each country to validate the results of the online survey)

4. Results and outputs

Description of main results and outputs achieved
• Dissemination material for RSA7 in all five Alpine languages • Minutes of the PLANALP meetings • Content for new mandate

- Stakeholder analysis on CP in every country
- Results of the online survey for CP
- (Foreseeable result: Executive Report/Guidebook for CP to foster planning & management exchange in contingency planning and natural hazards)

5. Cooperation

Description of cooperation initiatives and activities with other Alpine Convention Thematic Working Bodies and other relevant bodies and processes (e.g. EUSALP)
• EUSALP AG8 • Working Group Soil Protection • Alpine Climate Board (Alpine Climate Target System 2050)

6. Attachments

List of the documents attached to this report, such as papers proposed for approval by the XVI Alpine Conference (thematic reports, guidelines, statements etc.) and supporting documents (workshop proceedings, survey reports etc.).
• Interim Report *Contingency Planning in the Area of Natural Hazards* • Workshop Documentation Heimschuh.pdf

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Contingency Planning in the Area of Natural Hazards

Interim report

A comparative analysis of challenges, strengths and weaknesses between contingency planning and natural hazard management.

PLANALP – Thematic Working Body of the Alpine Convention

and **team**

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2. Austrian Forest Research Center, Department of Natural Hazards

   Anne Hormes, JT Fischer, Matthias Plörer

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   Renate Renner, Barbara Mühlbacher

Abstract

This interim report presents the results of the online survey on contingency planning in the area of natural hazards, which was carried out in August 2020. For this purpose, the answers from natural hazard management and contingency planning were compared in the four selected natural hazards, floods, avalanches / ice avalanches, soil slope failures and forest fires. From the results of the online survey recommendations for action for those responsible were formulated. This report also contains the qualitative analysis of the Austrian workshops and political instructions for action derived from the flood and avalanche workshop.

The theoretical and methodical background, the national analysis and results of the workshops from the other PLANALP countries and the results of a comparative analysis of all national workshops will be included in continuing work and presented in the end report of this study. A conclusion will sum up the findings at the end of our final report.

Table of contents

Introduction online survey

An online survey was created to examine the interface between contingency planning and disaster management in the countries of the Alpine Convention "PLANALP". One wants to learn from the similarities and differences between those responsible, between countries and between different natural hazards. To this end, an agreement was reached on four natural hazards, which the participants could focus on in this survey: floods, avalanches / ice avalanches, soil slope failures and forest fires.

There were a total of 143 questions, whereby the first 6 questions related to the personal information of the participant. Questions 7-142 were four question blocks for the four natural hazards, therefore the participants only answered one of these four question blocks as a rule. Question 143 gave the participants the opportunity to fill out the questionnaire for another natural hazard.

For the personal information, the country, the region, the location of the area of responsibility and the natural hazard in which the participant is an expert were queried. In addition, it was determined whether the range of tasks lies primarily in natural hazard management or in natural hazard planning. The participant could then decide on a natural hazard that he wanted to focus on in the survey. The specific questions on the individual natural hazards were asked in the categories of regional information / area of personal responsibility, data availability, risk communication, structural quality, material resources and human resources.

In the following, the individual natural hazards are considered, whereby the comparison of natural hazard management and natural hazard planning is always in the foreground. These analyzes are carried out with all the answers to the respective natural hazard. 484 participants took part in the survey, whereby the participants who had a response rate of less than 4.3% were sorted out in advance.

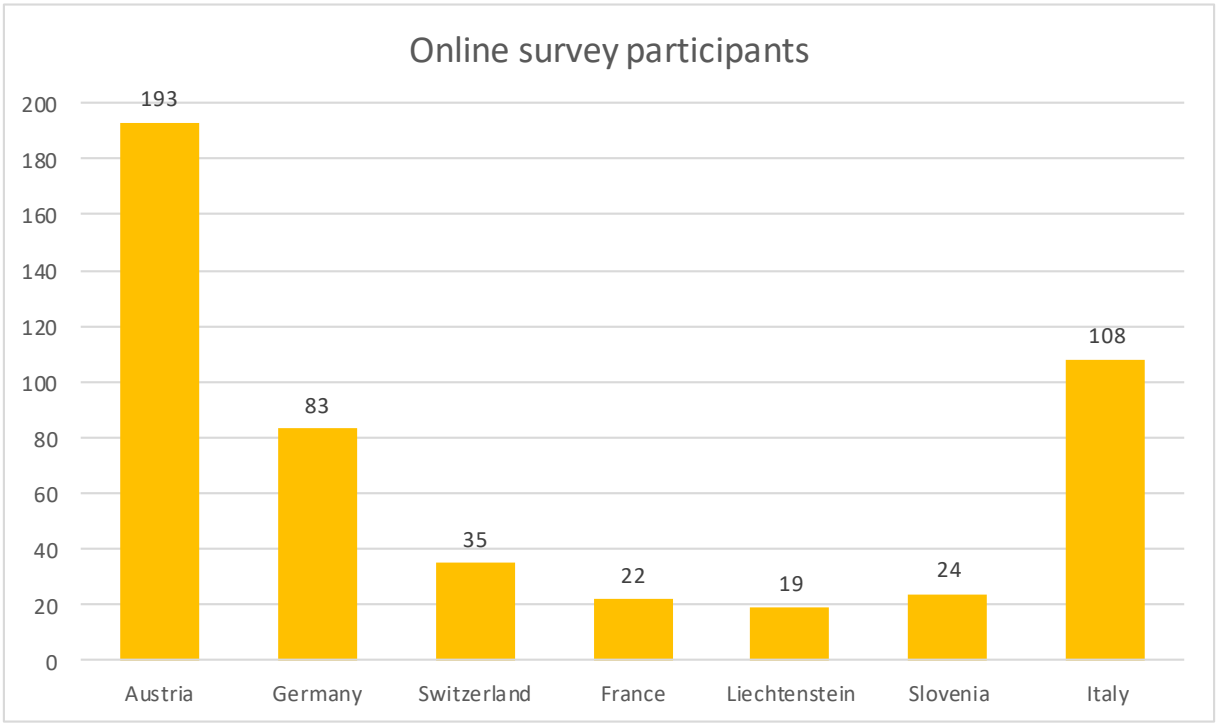

Figure 1: Participants in the online survey by countries.

Comparison of natural hazard management and natural hazard planning

Personal information

Floods

Total number of participants: 173

Distribution by country:

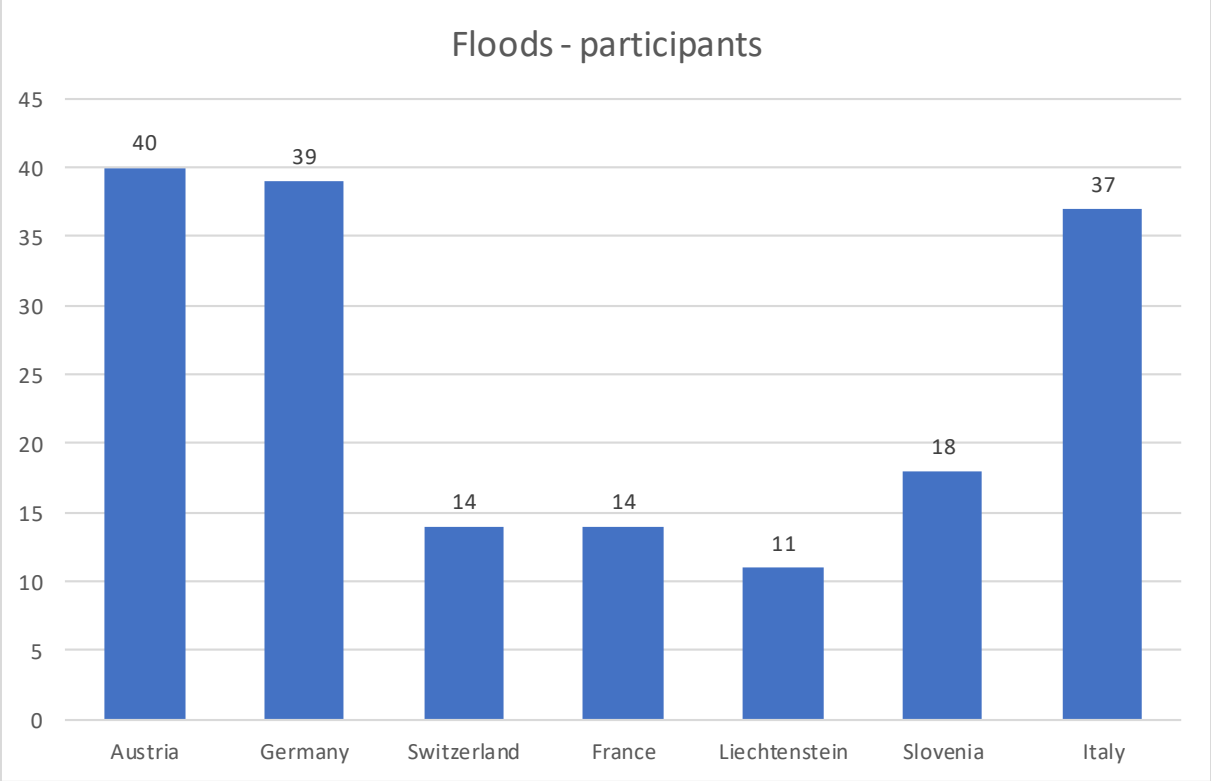

Figure 2: Participants with focus on floods by countries.

For the natural hazard floods, participants from all countries answered the questions. The most experts in this natural hazard were reached in Austria, Germany and Italy.

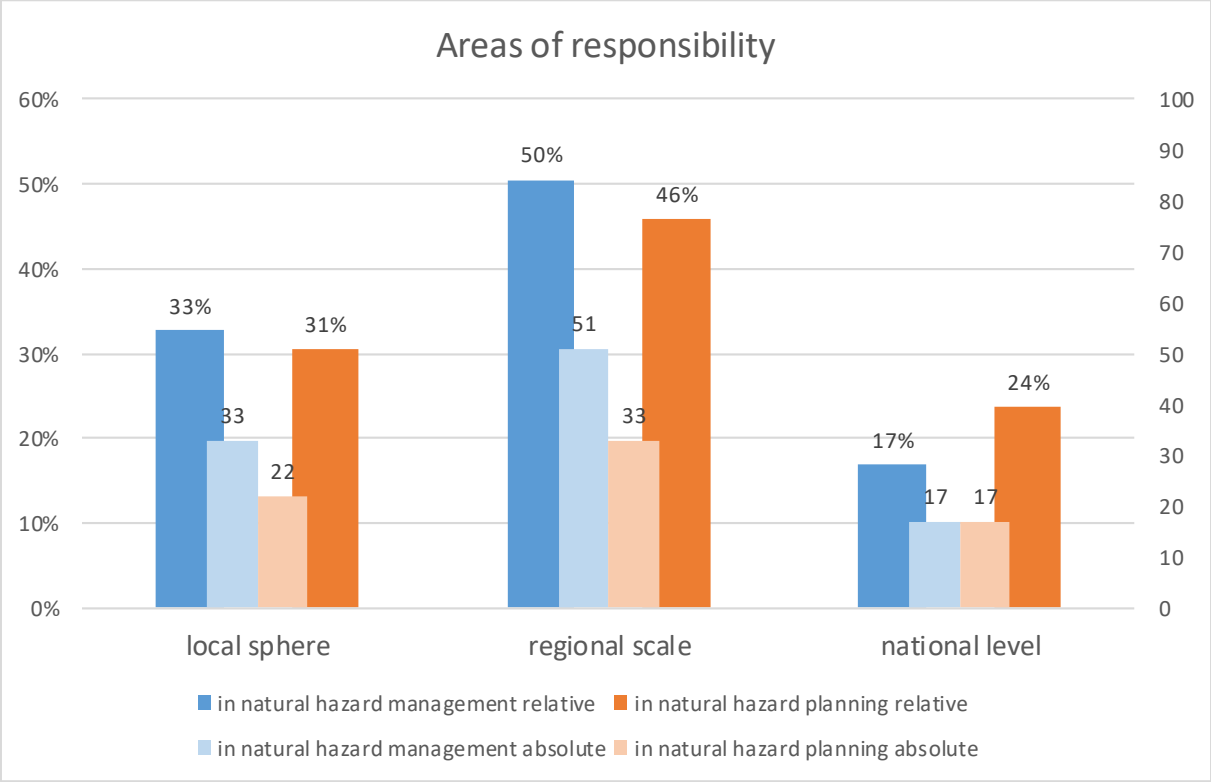

Figure 3: Categorization of the areas of responsibility of experts in floods.

The respective area of responsibility of the participant is categorized as local, regional or national. The majority responded with regional, around 30% with local and around 20% with national.

Avalanche / Ice avalanche

Total number of participants: 157

Distribution by country:

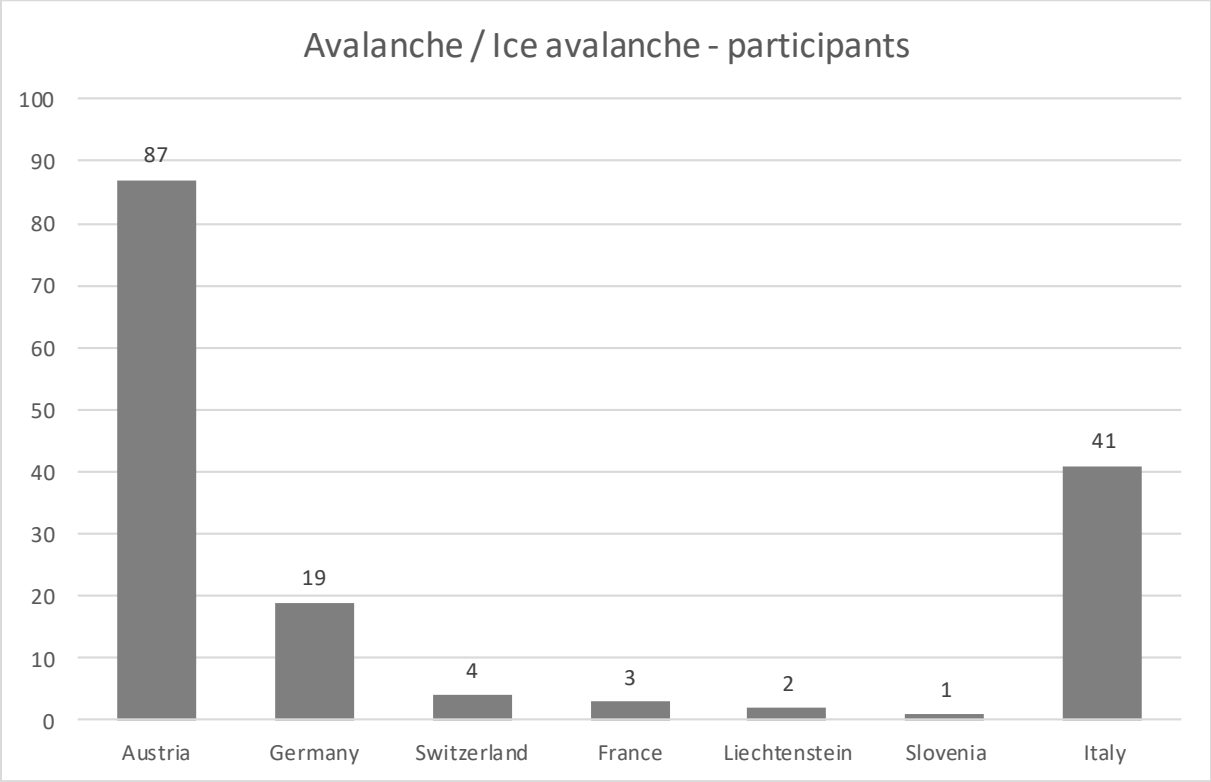

Figure 4: Participants with focus on avalanches / ice avalanches by countries.

Also for the natural hazard avalanche / ice avalanche, participants from all countries answered these questions, but the distribution was very uneven. Most of the experts came from Austria and Italy. From the countries Switzerland, France, Liechtenstein and Slovenia the number of participants was very low, these answers will not be considered in the country comparison.

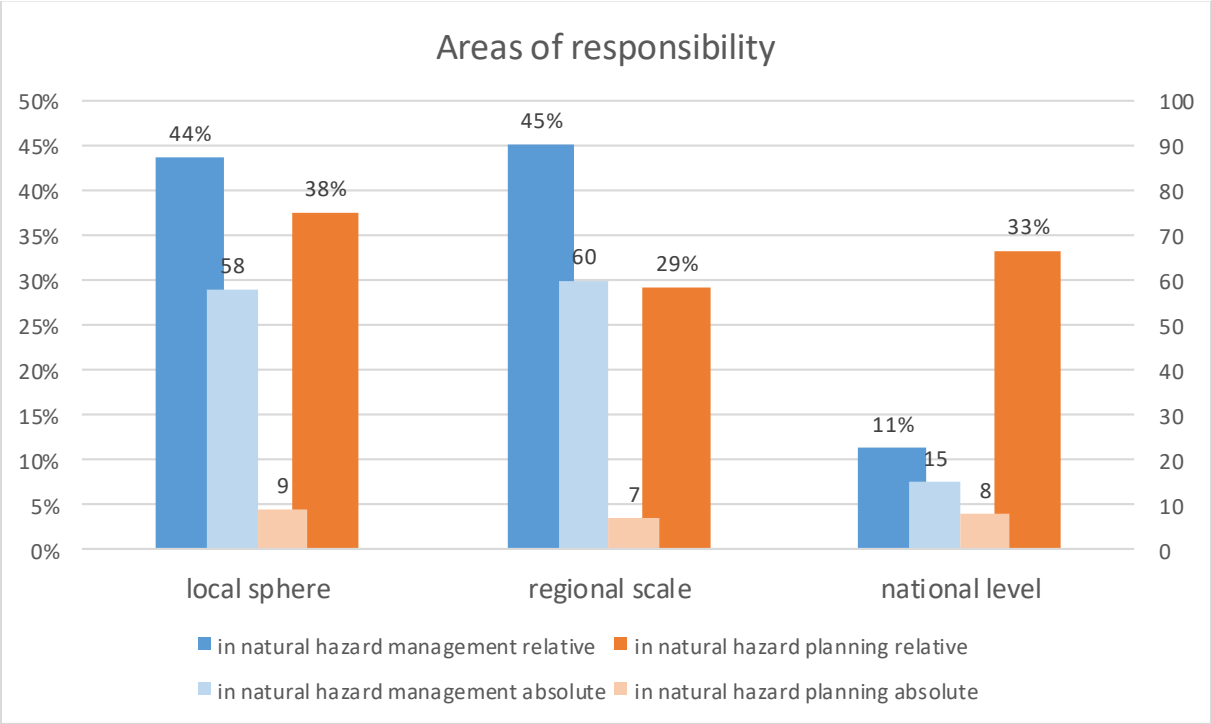

Figure 5: Categorization of the areas of responsibility of experts in avalanches / ice avalanches.

The areas of responsibility from the natural hazard management are mainly categorized as local and regional, only 11% as national. Whereas natural hazard planning categorized their areas of responsibility pretty even distributed into national, regional and local.

Soil slope failures

Total number of participants: 87

Distribution by country:

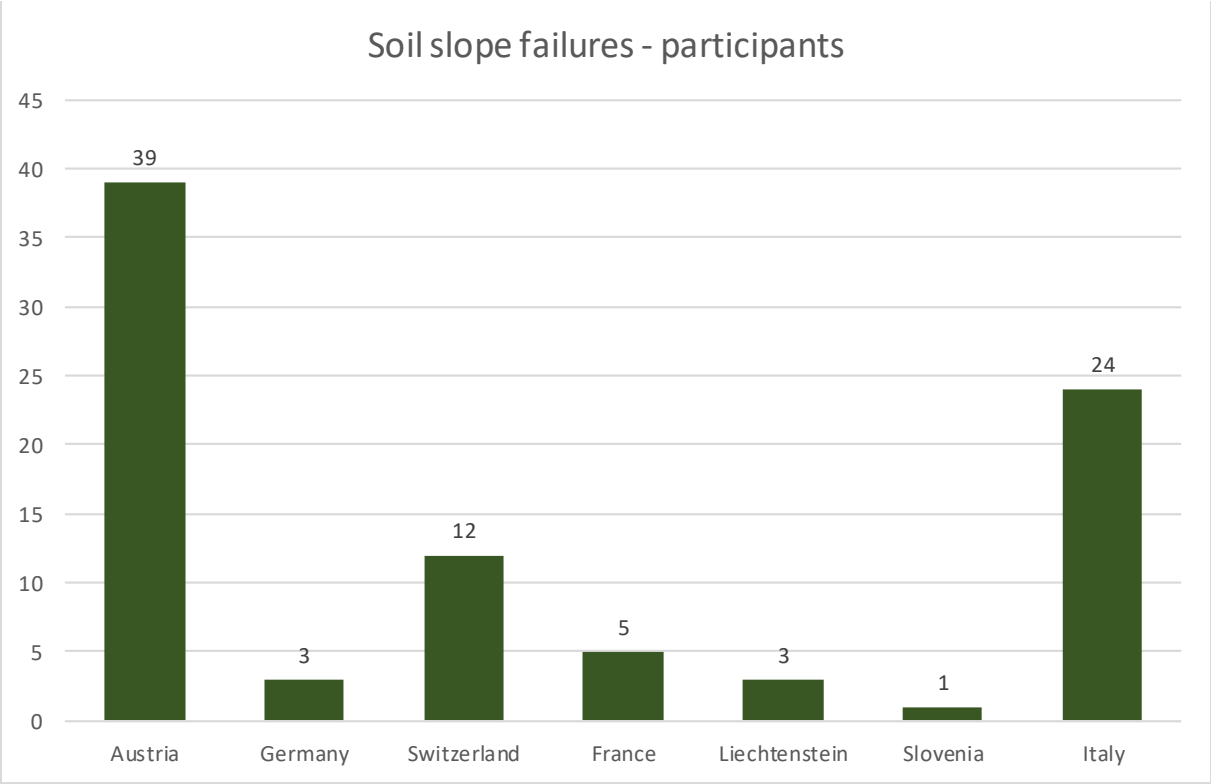

Figure 6: Participants with focus on soil slope failures by countries.

Most experts from Austria answered the questions focusing on soil slope failures, followed by Italy and Switzerland. The number of participants from Germany, France, Liechtenstein and Slovenia were too low to be considered in the countries comparison.

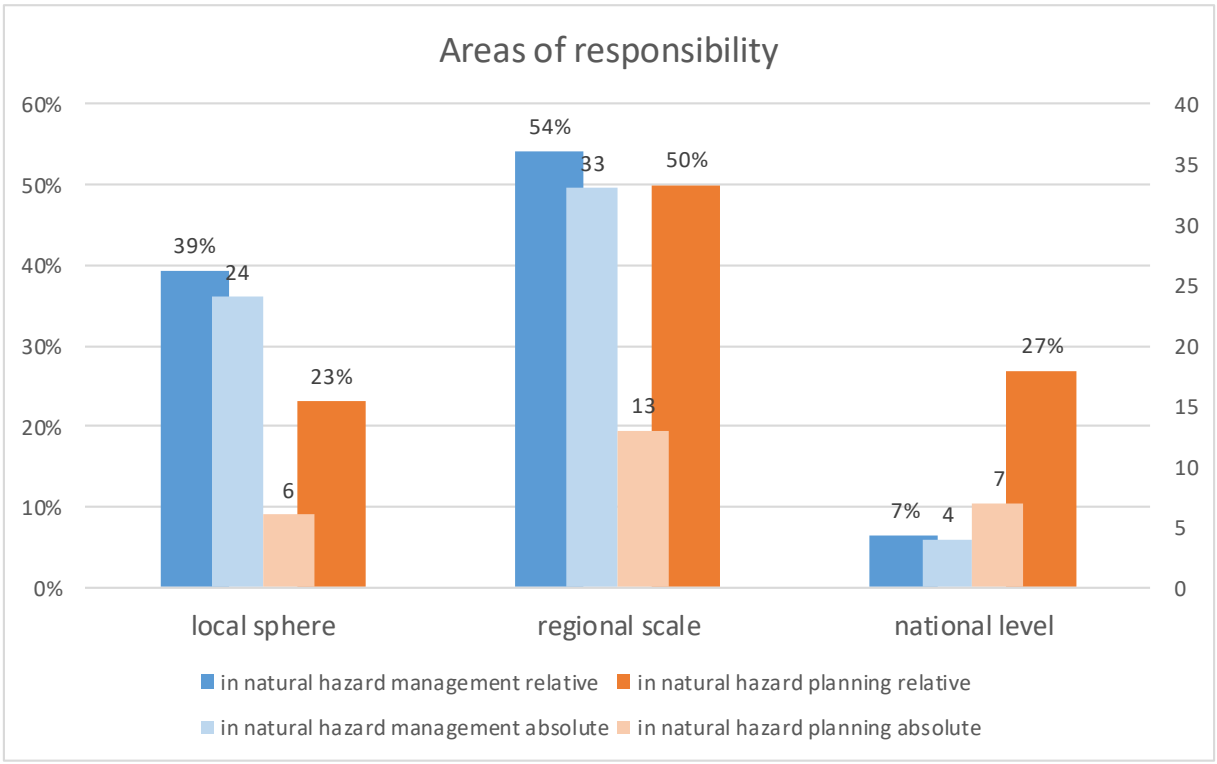

Figure 7: Categorization of the areas of responsibility of experts in soil slope failures.

From most natural hazard manager and planer their areas of responsibility are categorized as regional. However, on second rank the management sees his areas of responsibility on local sphere whereas the planner categorized their responsibility nearly to the same parts on local sphere and national level.

Forest fire

Total number of participants: 67

Distribution by country:

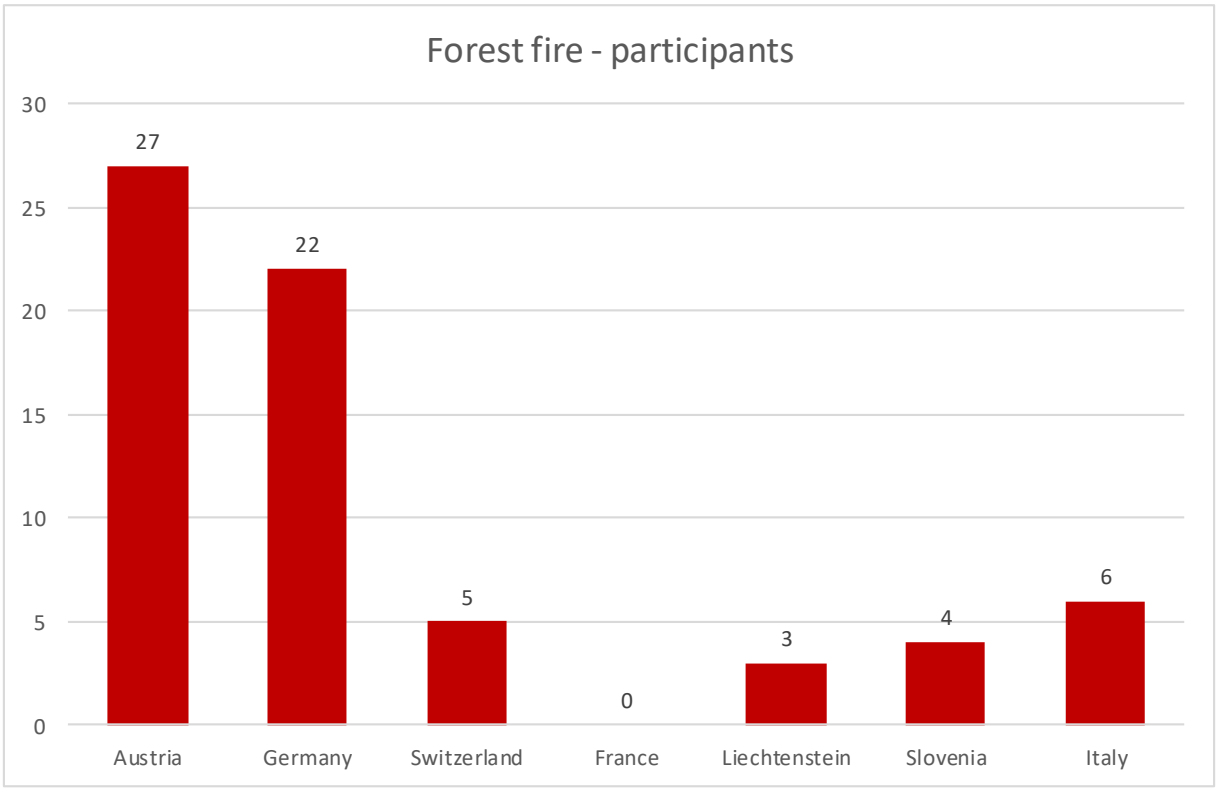

Figure 8: Participants with focus on forest fires by countries.

Unfortunately, no participant from France answered the questions focusing on forest fire. The number of participants from Switzerland, Liechtenstein, Slovenia and Italy is very low. For the country comparison only Austria, Germany will be considered.

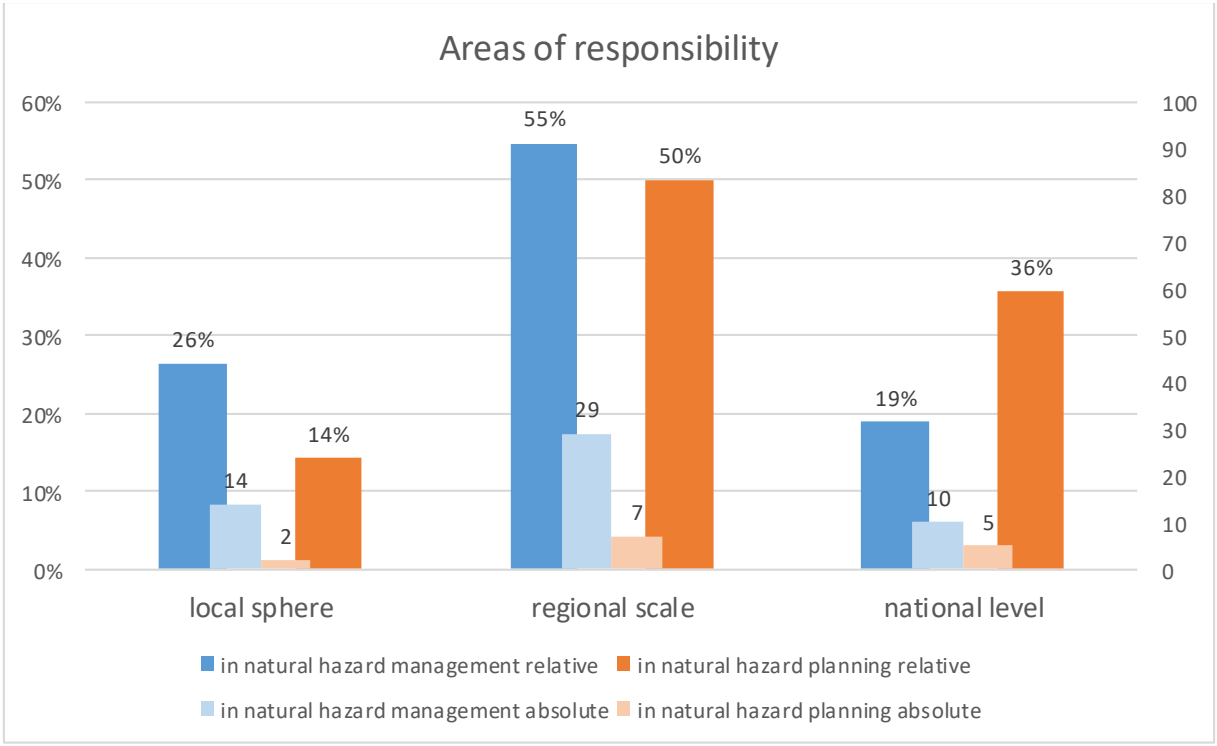

Figure 9: Categorization of the areas of responsibility of experts in forest fires.

Natural hazard management and natural hazard planning mainly categorized their areas of responsibility on regional scale, but in second place the management is more focused on the local sphere whereas the planning is focused on the national level.

Regional information / area of personal responsibility

When evaluating the regional information, the four questions asked on this topic (nos. 7-9) were summarized and evaluated according to the following criteria: If 4 or 3 of the answers were very/many/high, the information was classified as "very affected", with 2 very/many/high answers it was classified as “moderately affected”, with 1 very/many/high answer it was classified as “hardly affected” and with zero very/many/high answer it was classified as “not affected”.

In addition, the participants who did not answer these questions were removed from the analysis.

Floods

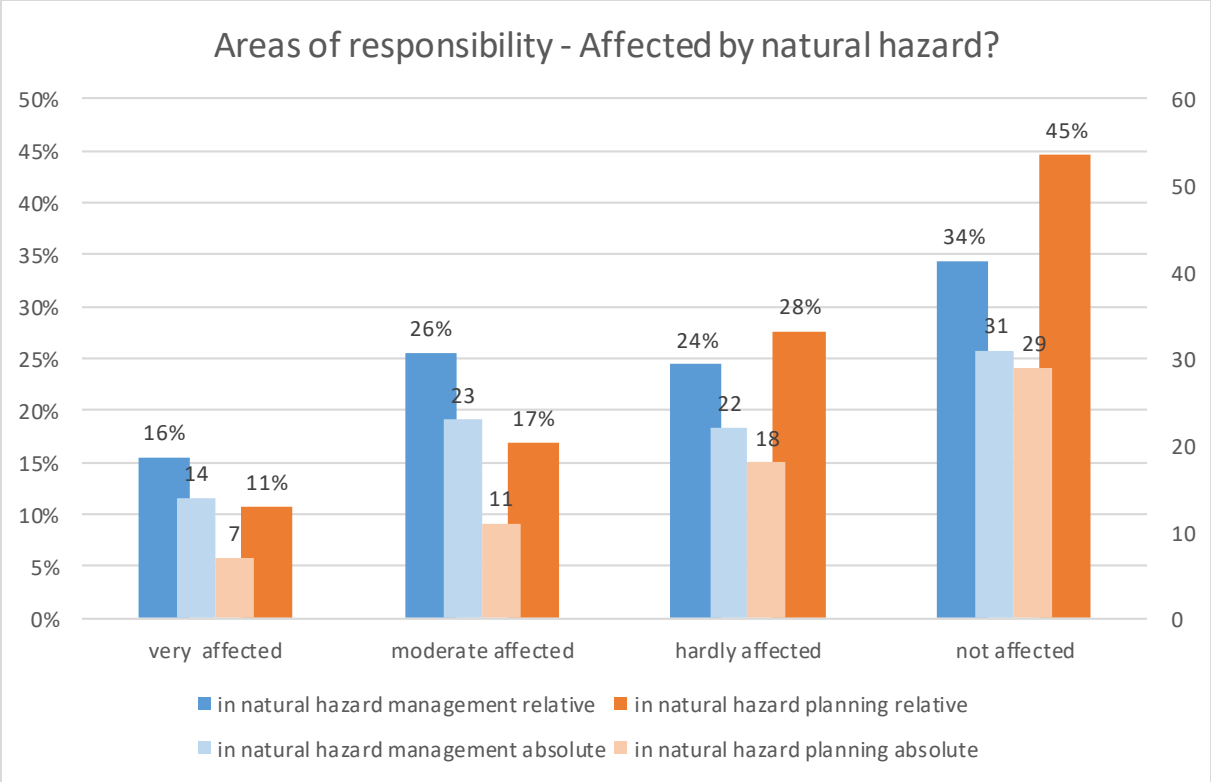

Figure 10: Figure showing how affected the areas of responsibility are by the natural hazard floods.

In this evaluation, it was very surprising that more participants classify their area of responsibility as moderate or hardly affected than as a very affected area. The majority even categorized their area of activity as not affected. This evaluation could indicate that there is a very good infrastructure of natural hazard planners and natural hazard managers, but fortunately, the disaster events only occur very rarely.

Avalanche / Ice avalanche

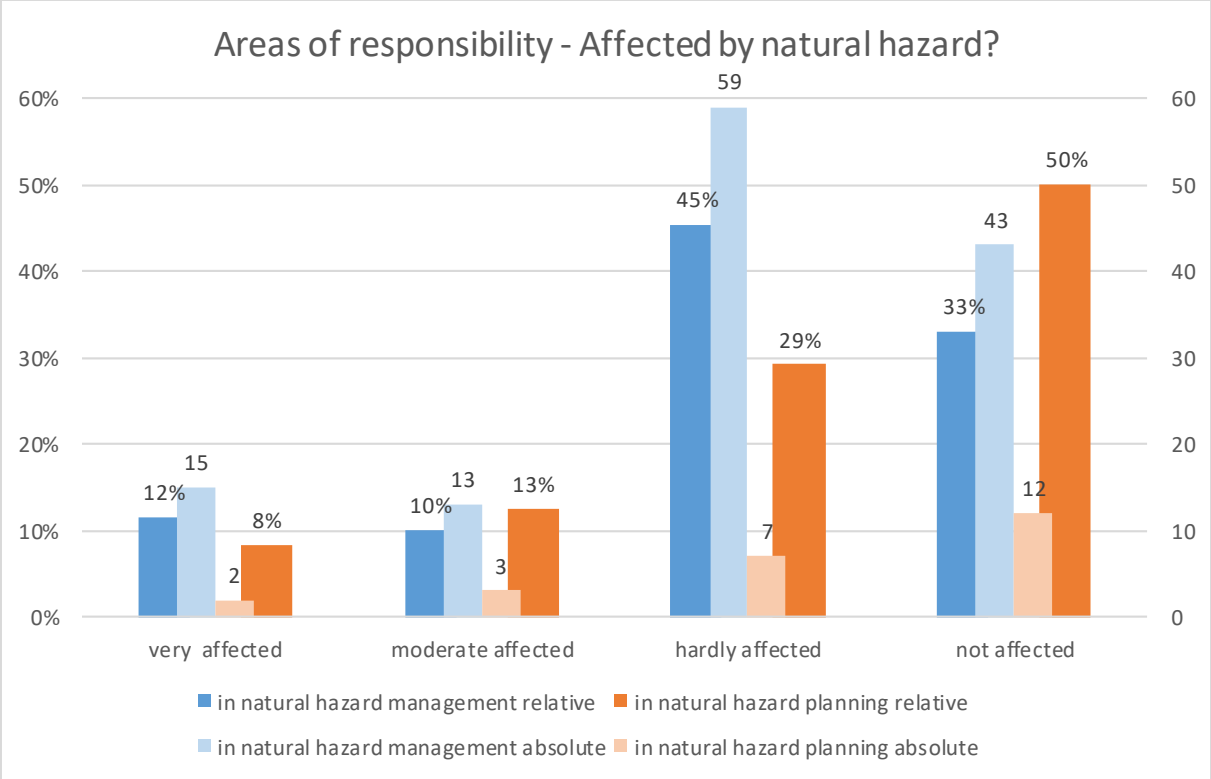

Figure 11: Figure showing how affected the areas of responsibility are by the natural hazard avalanches / ice avalanches.

Just a very low percentage of the participants evaluate their areas of responsibility as very or moderate affected. The majority of the natural hazard management categorizes it as hardly affected and the majority of the natural hazard planning categorizes their areas of responsibility as not affected. This result could indicate the same as with floods: The infrastructure of responsible persons is very good, but the disaster events occur quite rarely.

Soil slope failures

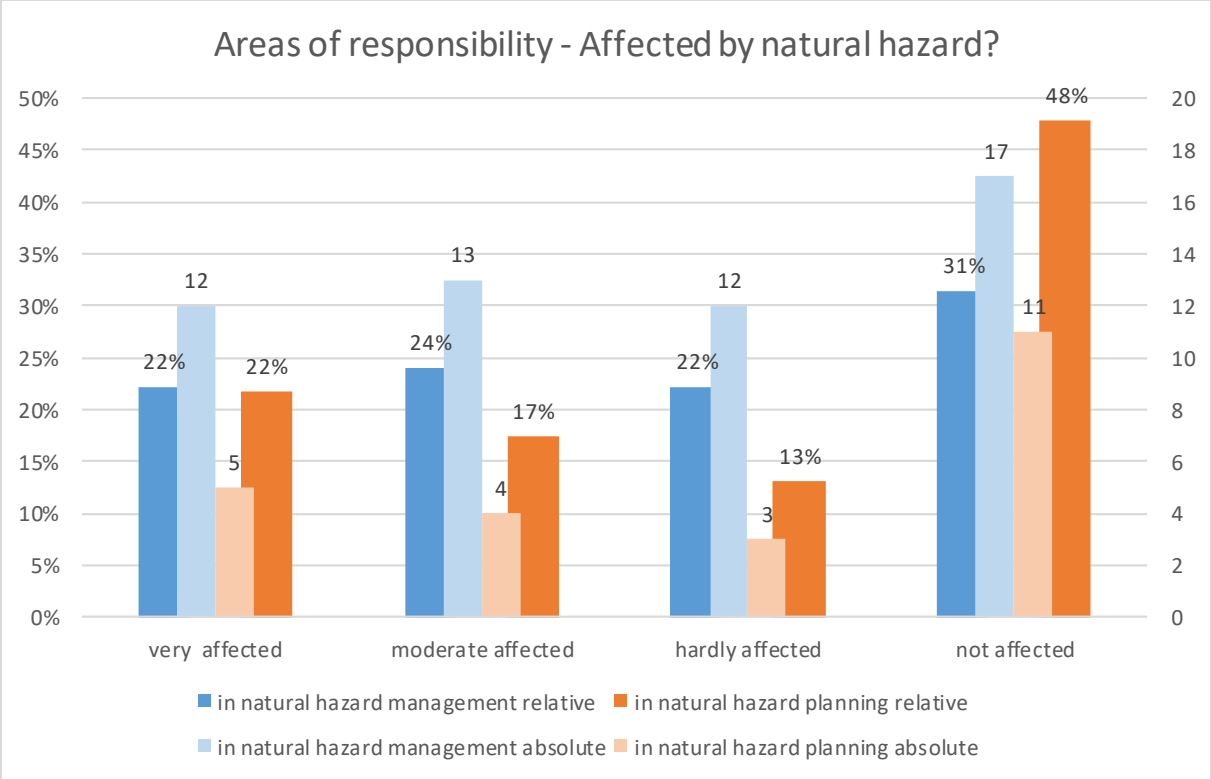

Figure 12: Figure showing how affected the areas of responsibility are by the natural hazard soil slope failures.

Most of the answers point to not affected areas of responsibility in natural hazard management and planning, but the rest of the answers is quite even divided in very, moderate and hardly affected areas of responsibility.

Forest fire

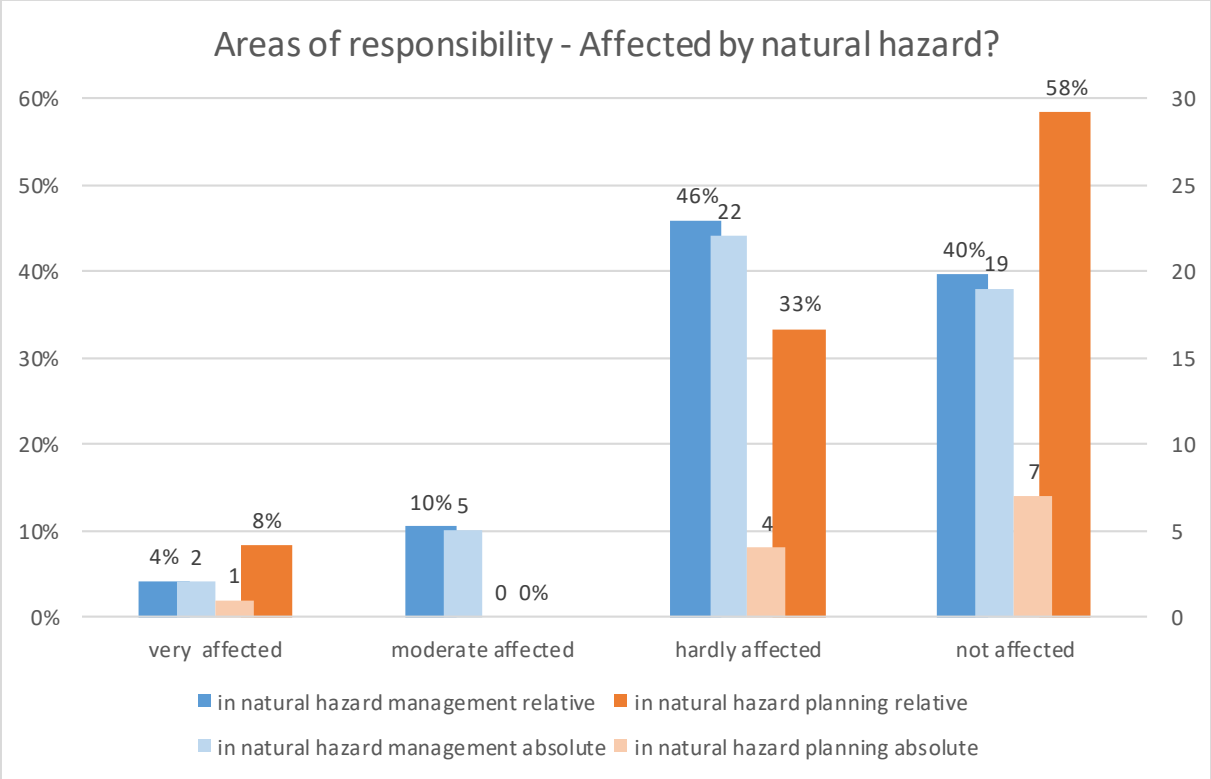

Figure 13: Figure showing how affected the areas of responsibility are by the natural hazard forest fires.

For forest fires the most participants in natural hazard management classified their areas of responsibility as hardly affected, second place as not affected, whereas participants in natural hazard planning classified them in reverse order. Some participants in natural hazard management classified their areas of responsibility as moderate and less as very affected. And just one participant in natural hazard planning classifies his areas of responsibility as very affected. This result could indicate that there is a good infrastructure of contingency planner and natural hazard manager, but only very rarely occurring disaster events.

Challenges, strengths and weaknesses from online survey

Data availability

The sub-category of data availability was examined in more detail according to various data types: Damage events, hazard warning maps / zone maps, hazard zone plans, safe zones and warning systems. In addition, conclusions could be drawn from some questions about the quality of the data and the structural quality and about the risk communication between natural hazard managers and natural hazard planners. For this evaluation, the following questions were bundled and evaluated according to the aspects described.

Documenting damage events

For the data type documenting damage events, questions 10B, 11, 12 and 13 were combined. It was rated as positive feedback if 12-16 of the 16 possible answers were positive, as moderate feedback if 7-11 answers were positive and as negative feedback if there were six or less positive answers. The questions asked about an existing local data bank of damage events, how the data is recorded and which / how many parameters are recorded.

Floods

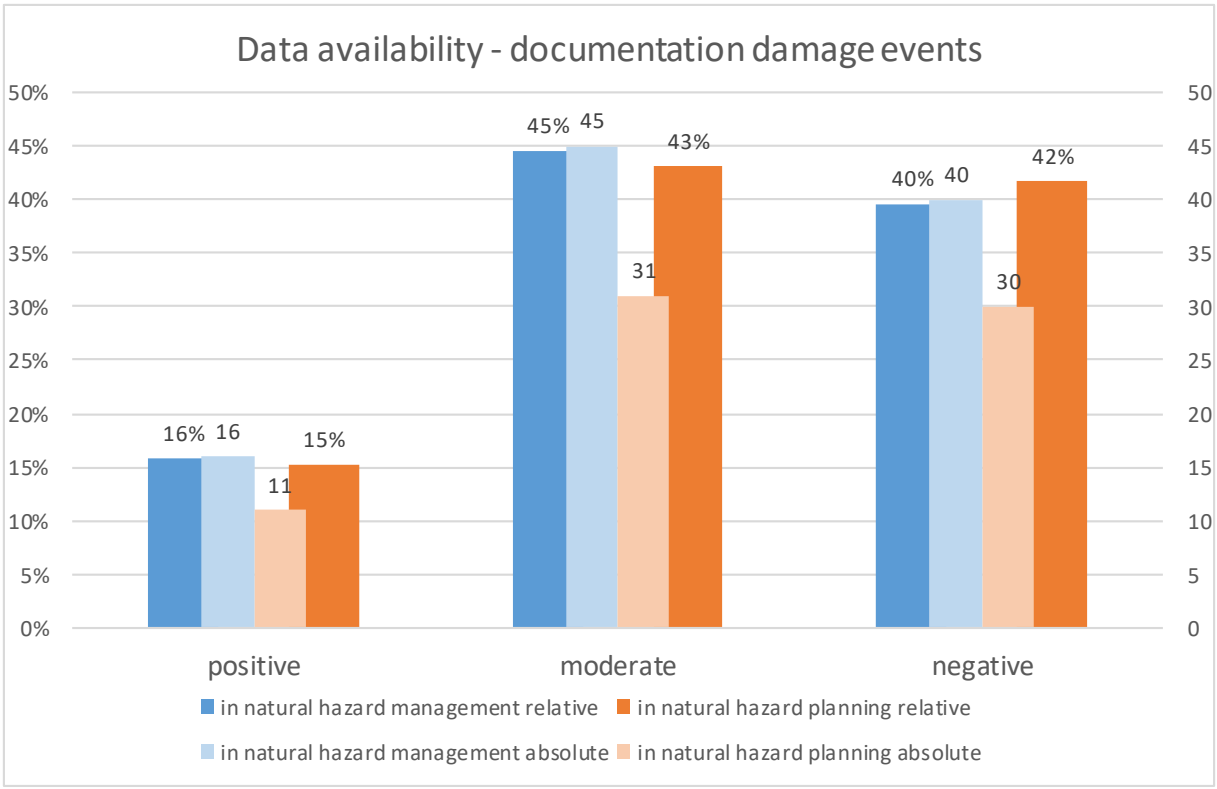

Figure 14: Evaluation of damage events documentation in connection with floods.

Within the natural hazard floods the data availability of damage events was mostly evaluated as moderate or negative. Only 16% (natural hazard management) and 15% (natural hazard planning) of the participants gave a positive feedback about the documentation of damage events. Therefore on this type of data is definitely room for improvement.

Avalanche / Ice avalanche

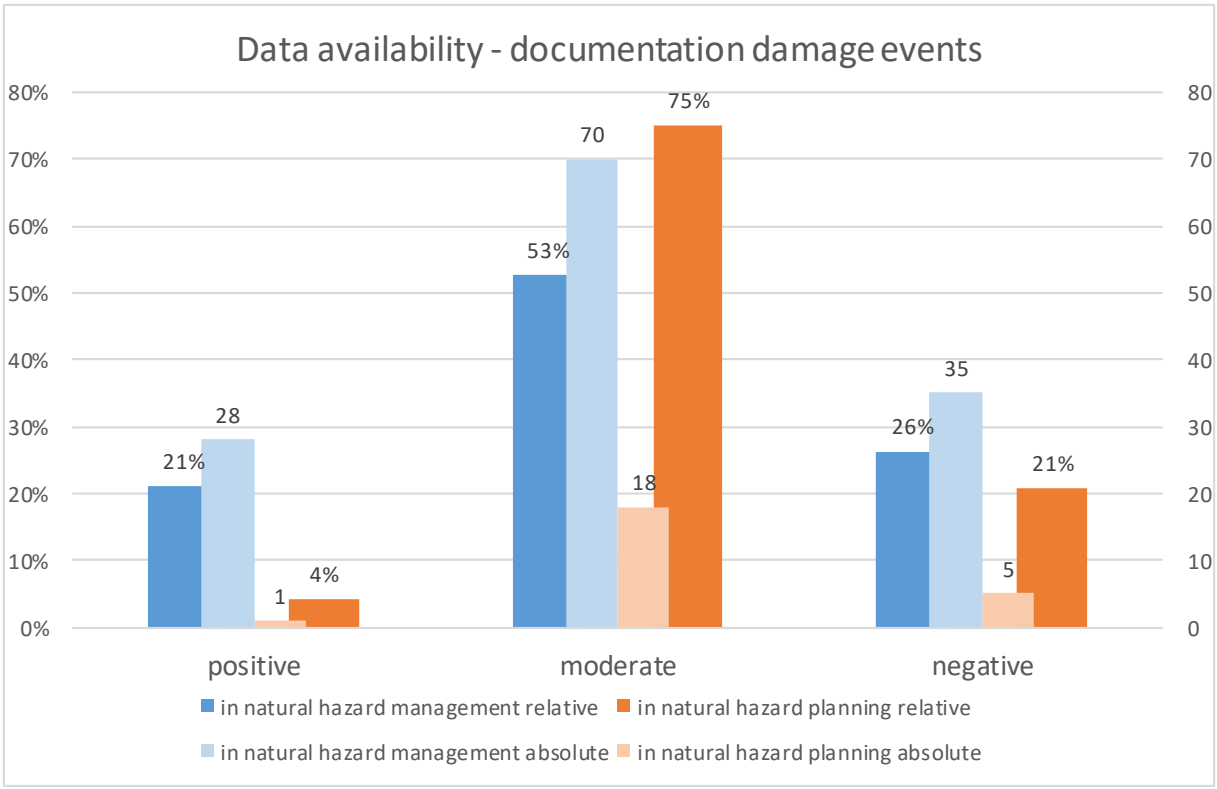

Figure 15: Evaluation of damage events documentation in connection with avalanches / ice avalanches.

The experts for avalanches / ice avalanches gave mostly moderate feedback about the documentation situation of damage events. The management rated it nearly equally positive and negative whereas planning gave more negative than positive feedback.

Soil slope failures

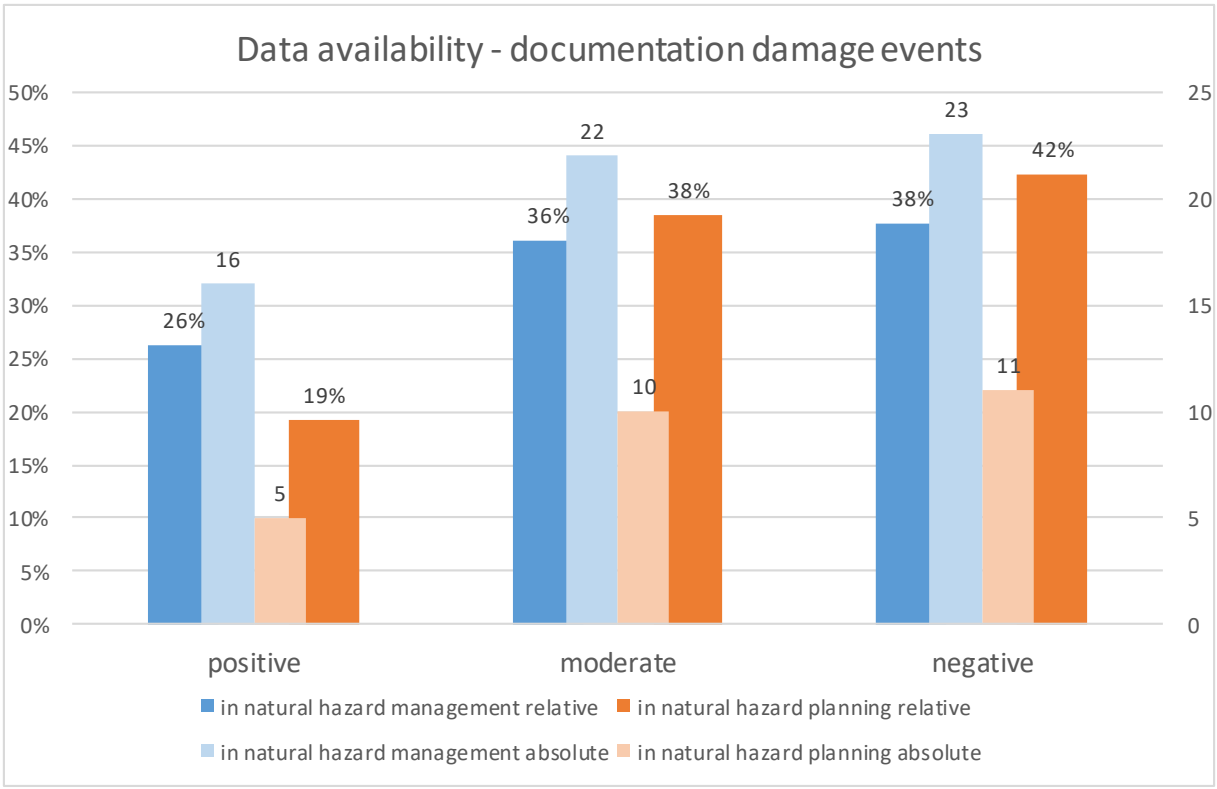

Figure 16: Evaluation of damage events documentation in connection with soil slope failures.

The management and planning rated the documentation of damage events nearly equally moderate and negative. Even it has the lowest percentage, the positive feedbacks were more than for other natural hazards.

Forest fire

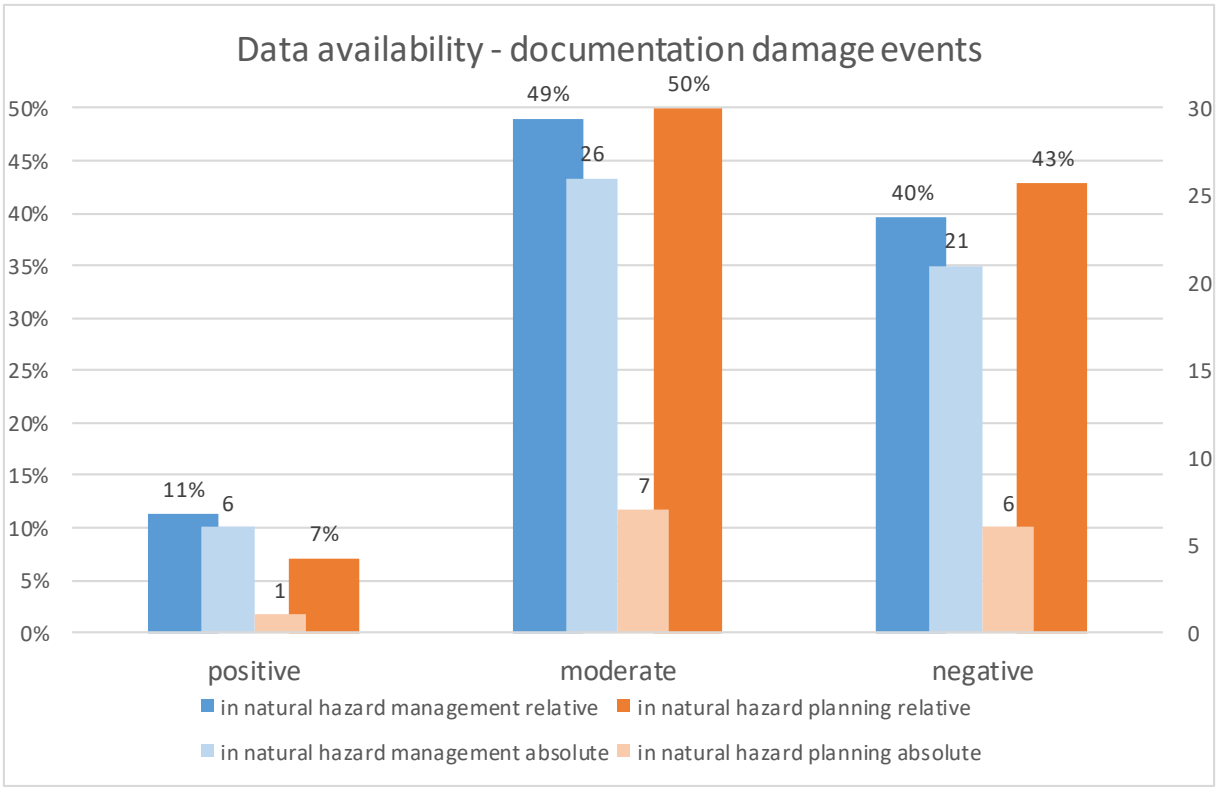

Figure 17: Evaluation of damage events documentation in connection with forest fires.

The experts for forest fires gave mostly moderate feedback about the documentation situation of damage events, but also the negative feedback had a high percentage. Only 11% (natural hazard management) and 7% (natural hazard planning) rated the data availability of damage events positive.

Hazard warning maps

For the evaluation of hazard warning maps, the existence of such maps was asked in question 15. For a statement about the quality of the hazard warning maps the bundle of questions 16a to 16F and 17 was categorized: 5-7 positive answers indicate positive feedback, 2-4 positive answers indicate moderate quality and one or no positive answer indicate negative feedback on hazard warning maps.

Floods

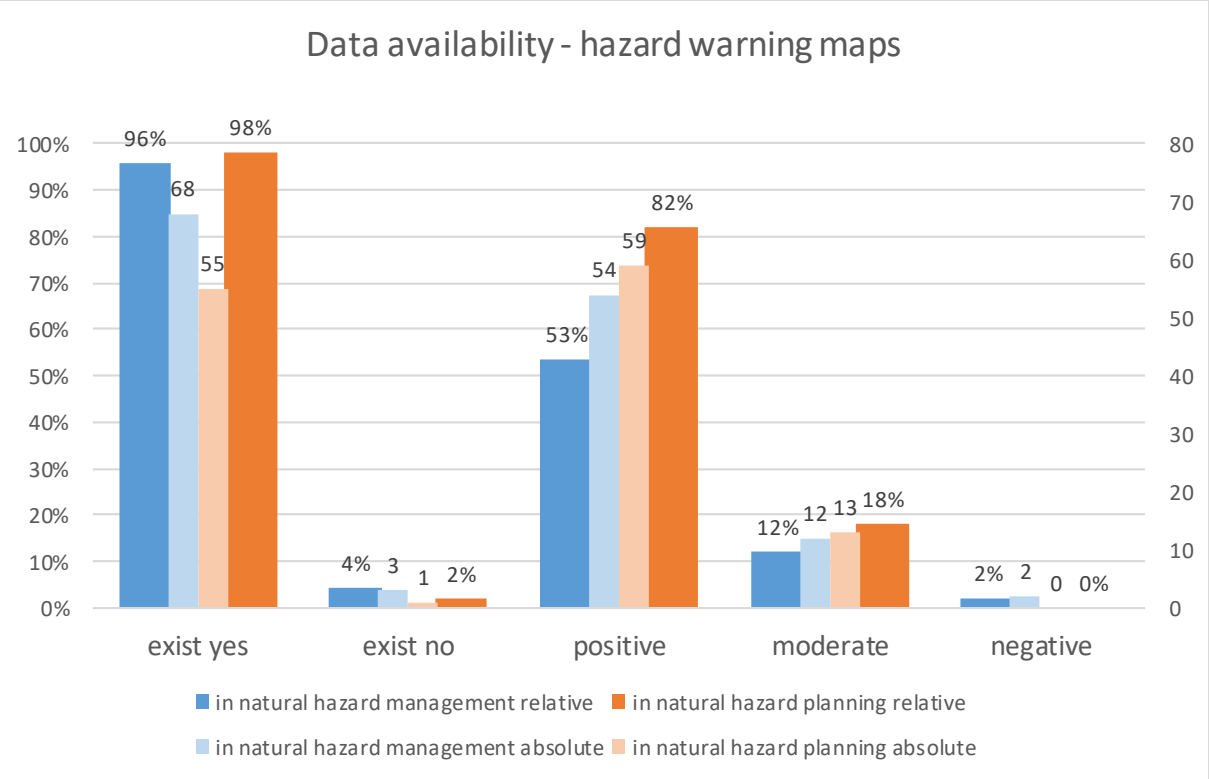

Figure 18: Evaluation of the existence and quality of hazard warning maps for floods.

A very high percentage answered, that warning maps exist and most of the participants evaluated them as positive, just some gave a moderate feedback on the hazard warning maps. The hazard warning maps for the natural hazard floods can be mentioned as best practice example.

Avalanche / Ice avalanche

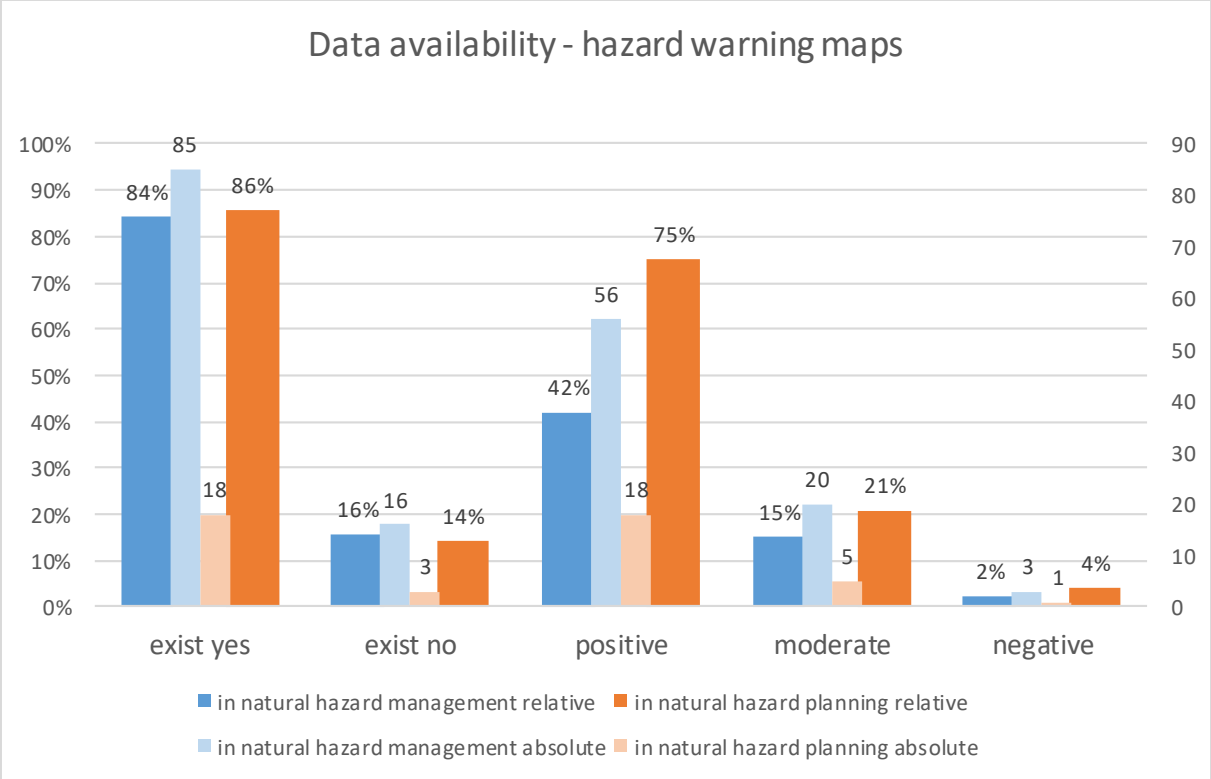

Figure 19: Evaluation of the existence and quality of hazard warning maps for avalanches / ice avalanches.

For the natural hazard avalanches / ice avalanches, 84% (in natural hazard management) and 86% (in natural hazard planning) of the participants answered that hazard warning maps exist and the feedback is mostly positive. Only 17% (in natural hazard management) and 25% (in natural hazard planning) have evaluated the hazard warning maps as moderate or negative.

Soil slope failures

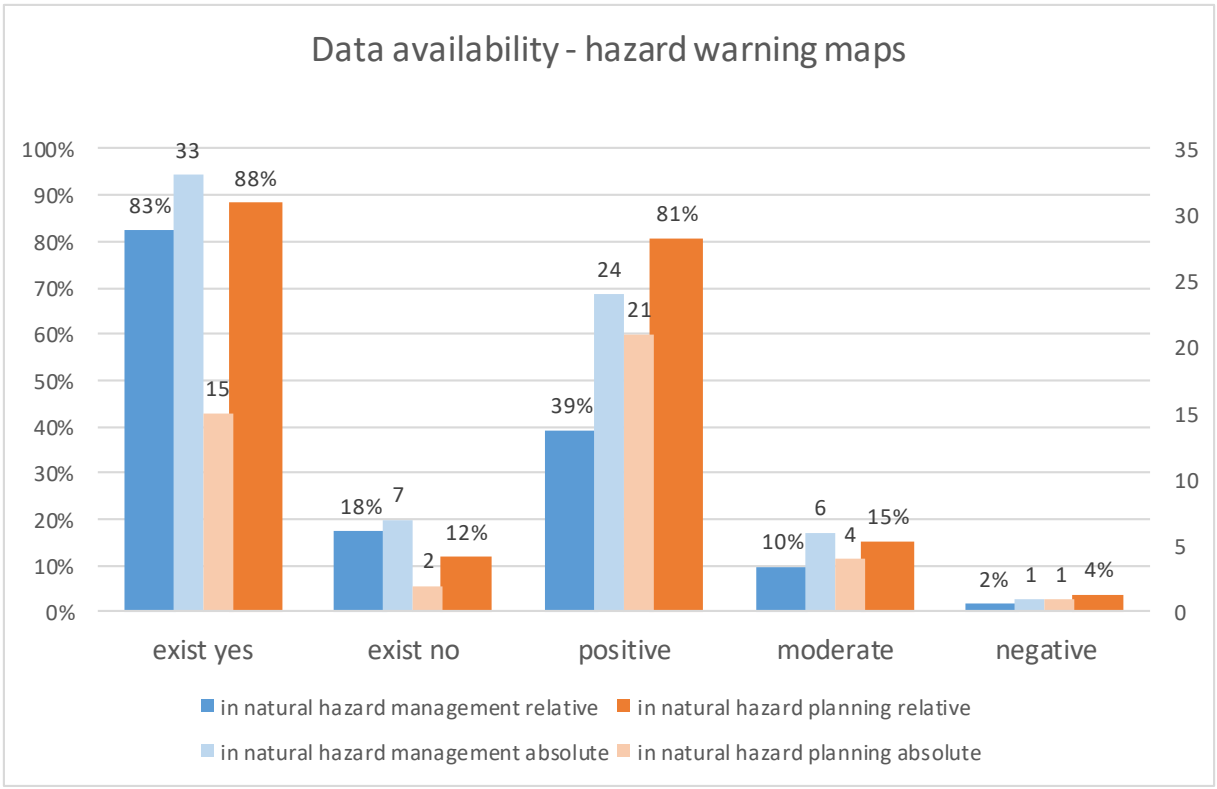

Figure 20: Evaluation of the existence and quality of hazard warning maps for soil slope failures.

Hazard warning maps for soil slope failures were rated quite similar to the maps for avalanches / ice avalanches. 83% and 88% answered that such maps exist and the feedback was mostly positive. Only 12% (in natural hazard management) and 19% (in natural hazard planning) evaluated the hazard warning maps as moderate or negative.

Forest fire

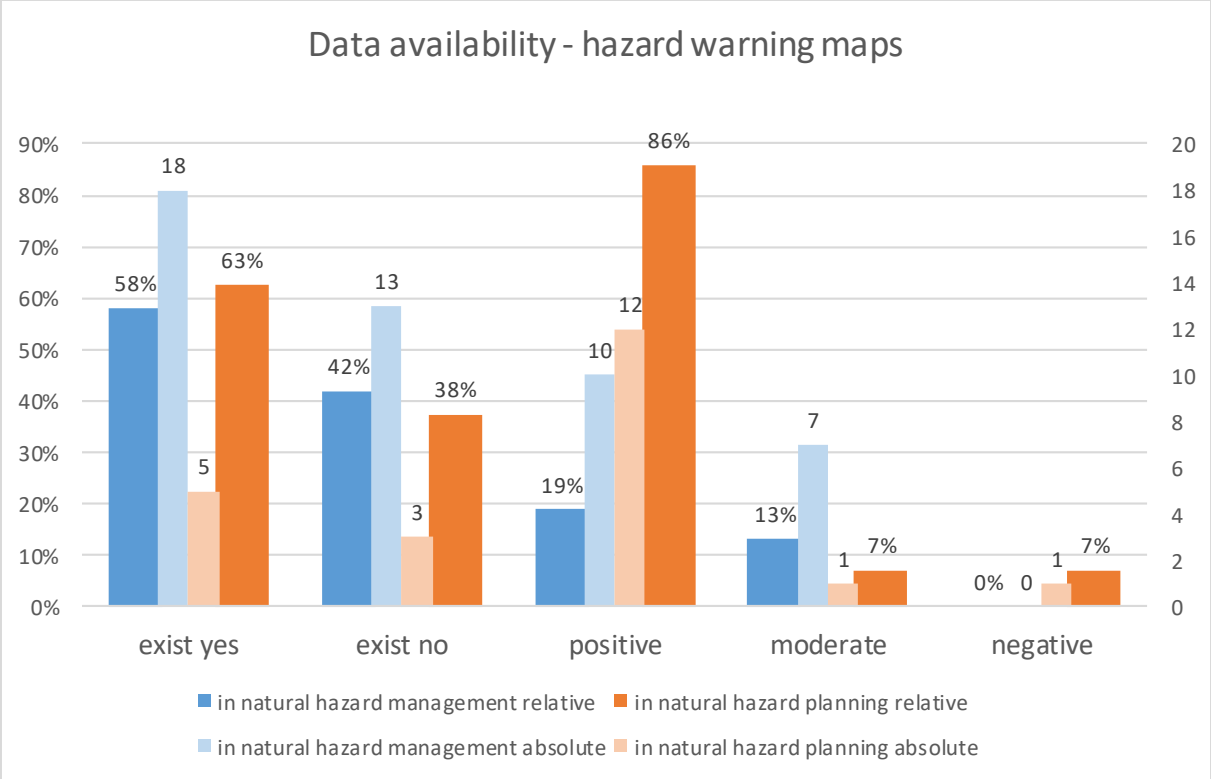

Figure 21: Evaluation of the existence and quality of hazard warning maps for forest fires.

For forest fires a higher percentage (42% and 38%) answered that hazard warning maps do not exist. There is definitely room for improvement and the need for more hazard warning maps. On the existing hazard warning maps the feedback was quite positive, only 13% and 14% of the participants evaluated them as moderate or negative.

Hazard zone maps

For statements about the data type hazard zone plans the questions 18, 19 and 20 were looked at. From questions 18 and 19 the following categorizes where defined: “exist and are available” when hazard zone plans exist and are analog or digital available, and “exist but are not available” when hazard zone plans exist but are not available or the participant didn’t know. Question 20 asked if hazard zone plans should be available online via GIS.

Floods

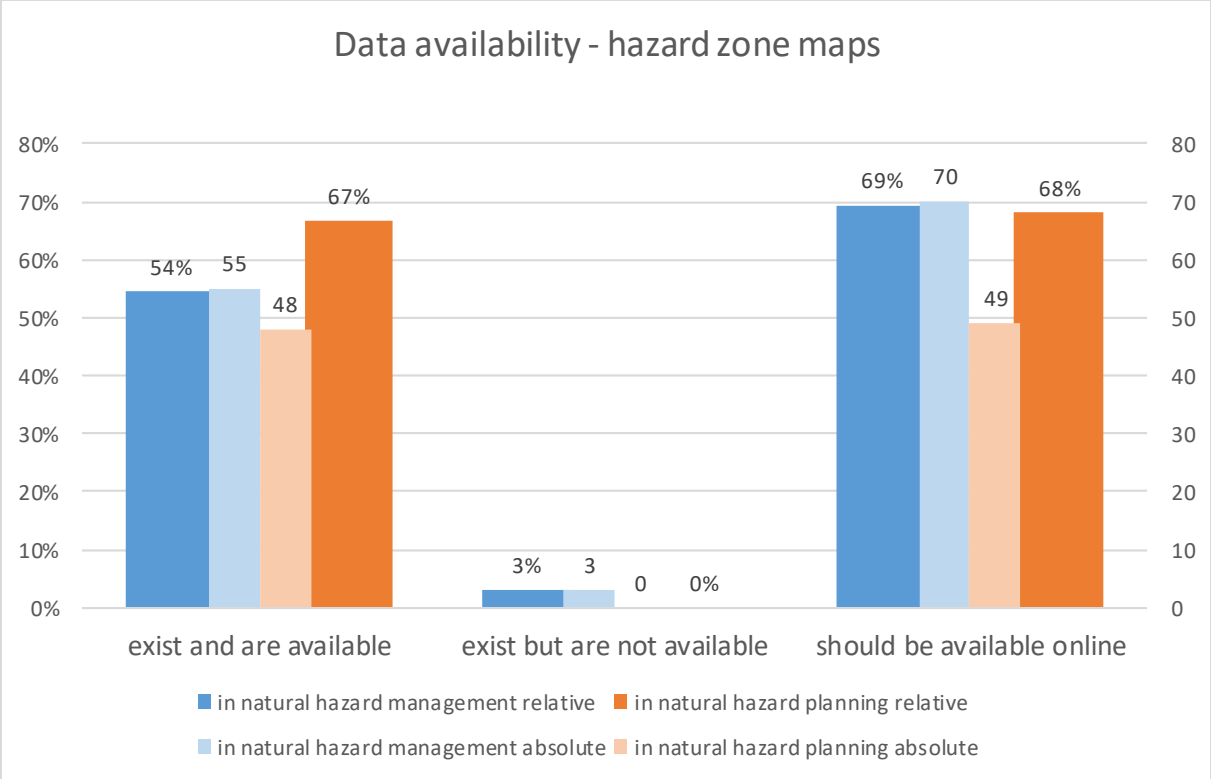

Figure 22: Availability of hazard zone maps current and in future for floods..

More than 50% of the participants answered that hazard zone maps exist and are available, but nearly 70% of natural hazard manager and natural hazard planers have the opinion that those hazard zone maps should be available online per GIS.

Avalanche / Ice avalanche

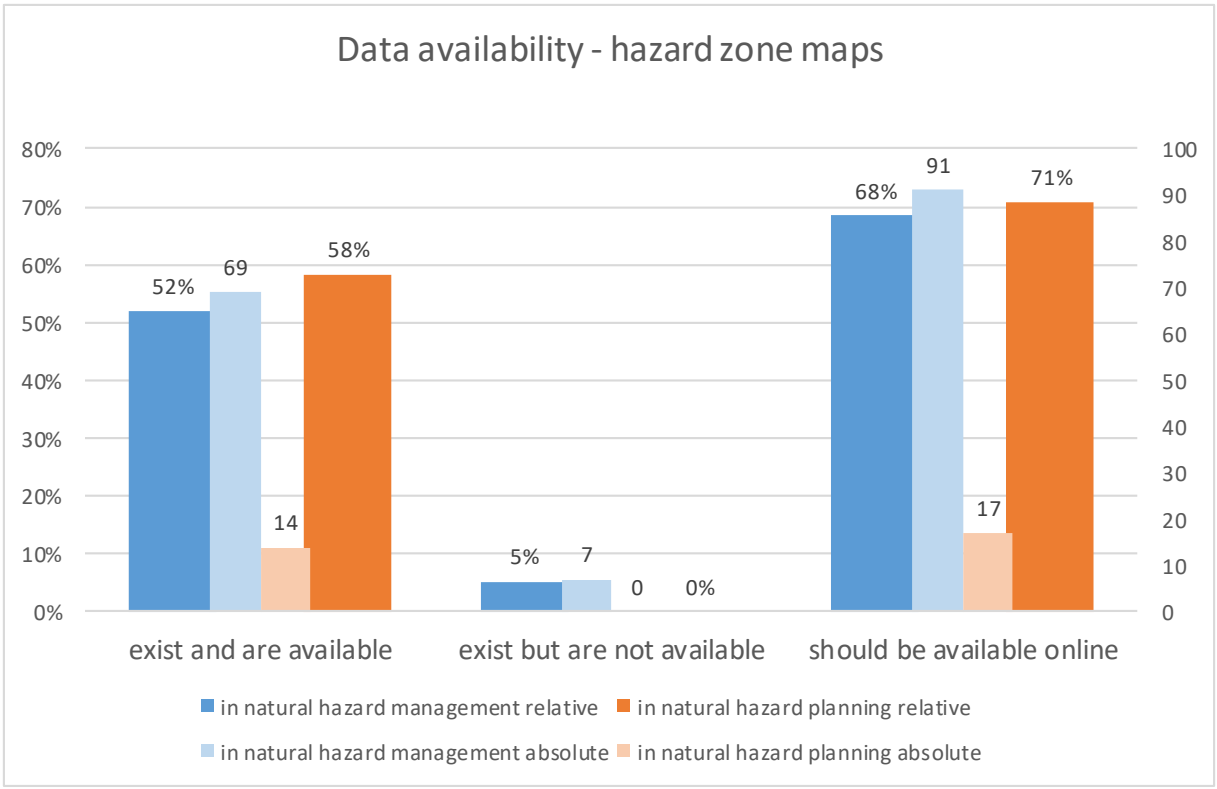

Figure 23: Availability of hazard zone maps current and in future for avalanches / ice avalanches.

More than 50% of the participants with focus on avalanches / ice avalanches answered that hazard zone maps exist and are available, but around 70% of natural hazard manager and natural hazard planers have the opinion that those hazard zone maps should be available online per GIS.

Soil slope failures

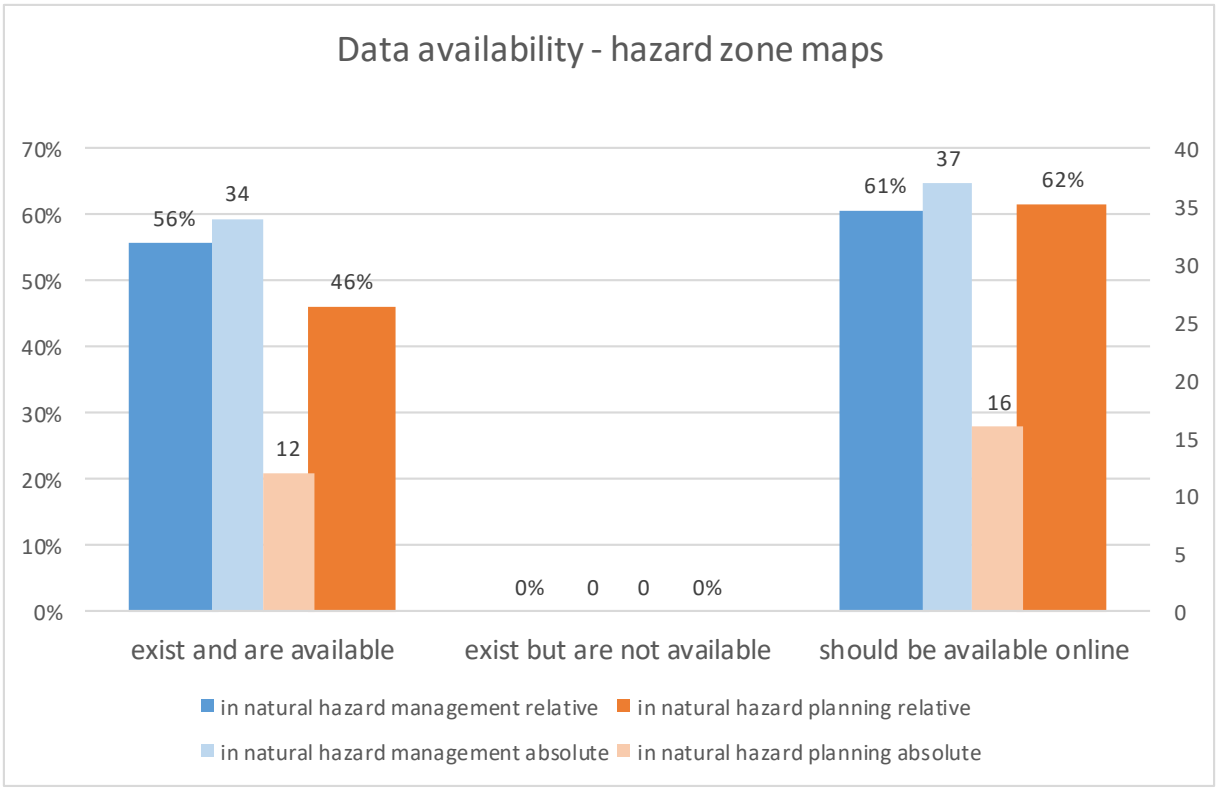

Figure 24: Availability of hazard zone maps current and in future for soil slope failures.

Within the natural hazard soil slope failures the answers show, that if hazard zone maps exist, they are digital or analog available, but for only around 50% of the cases such maps exist. 61% (in natural hazard management) and 62% (in natural hazard planning) of the participants would like these hazard zone maps online available per GIS.

Forest fire

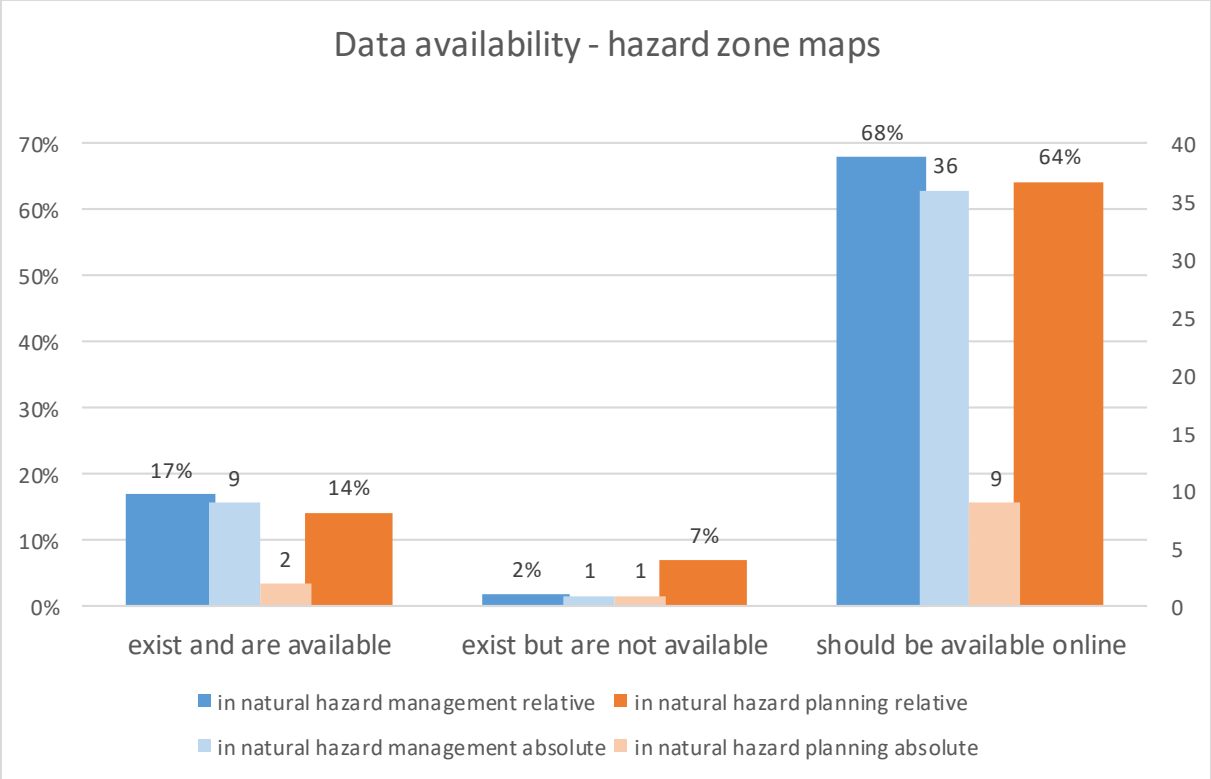

Figure 25: Availability of hazard zone maps current and in future for forest fires.

The answers about hazard zone maps show, that only in 20% of the cases such maps exist, which means that there is a lot of room open for development of hazard zone maps. More than 60% of the participants wish for hazard zone maps being online available via GIS.

Safe zones

Question 21 asked about the availability of safe zone documentation, which is shown in the following graphic:

Floods

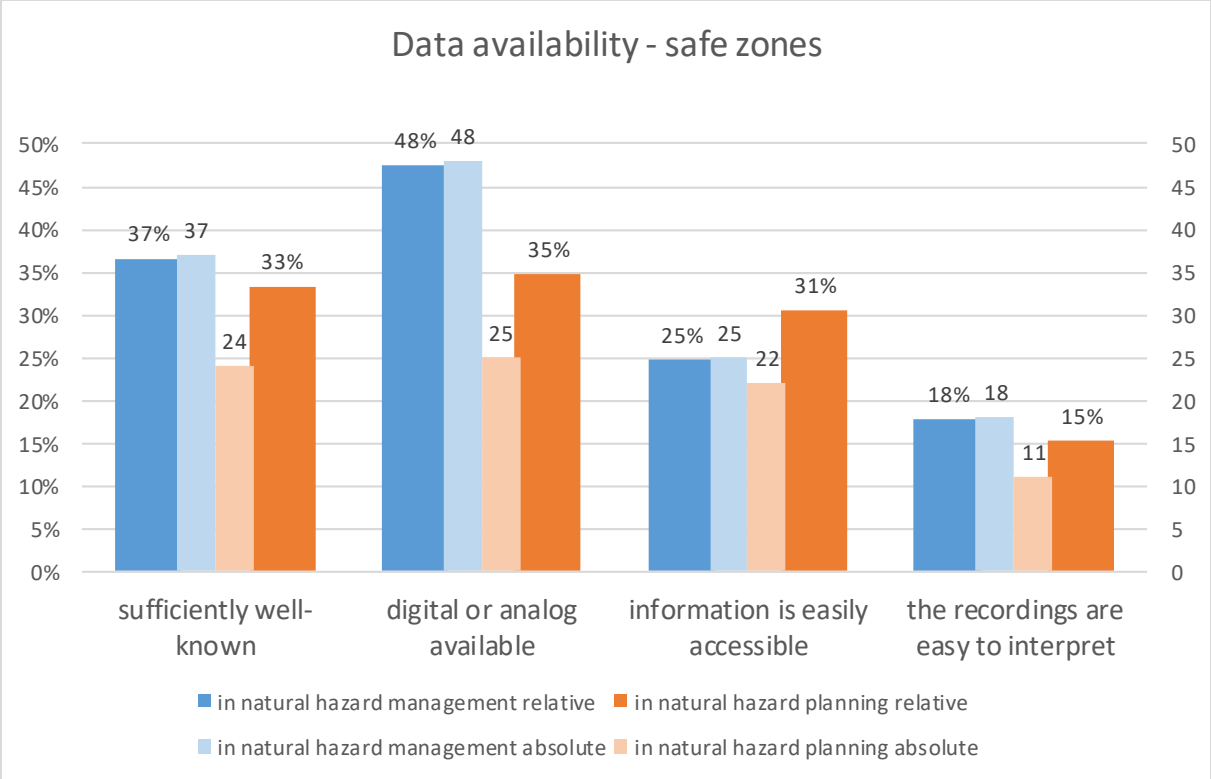

Figure 26: Evaluation of information about safe zones in connection with floods.

For floods, the results of this question show, that safe zones are less than 50% digital or analog available and even less than 40% are they sufficiently well-know. The information is not easily accessible and even then, the recordings are definitely not easy to interpret. Safe zones on the area of flood have a lot of room for improvement.

Avalanche / Ice avalanche

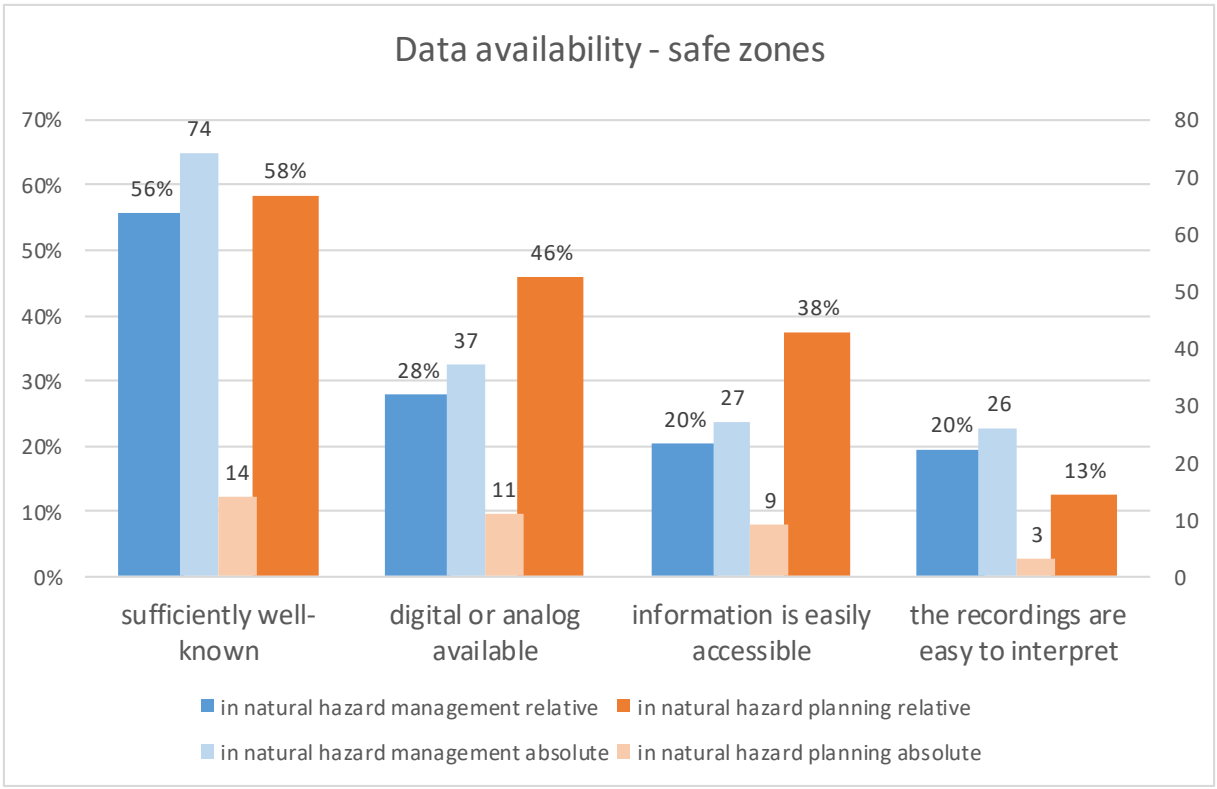

Figure 27: Evaluation of information about safe zones in connection with avalanches / ice avalanches.

Safe zones for avalanches / ice avalanches are sufficiently well-known (56% and 58%), but not as much digital or analog available. For more natural hazard planning the information about safe zones is easily accessible (38%) and digital or analog available (46%) than for natural hazard management (28% and 20%). Within both groups just very less participants think that the recordings are easy to interpret. Therefore, on this area more teaching and information to the responsible persons is needed.

Soil slope failures

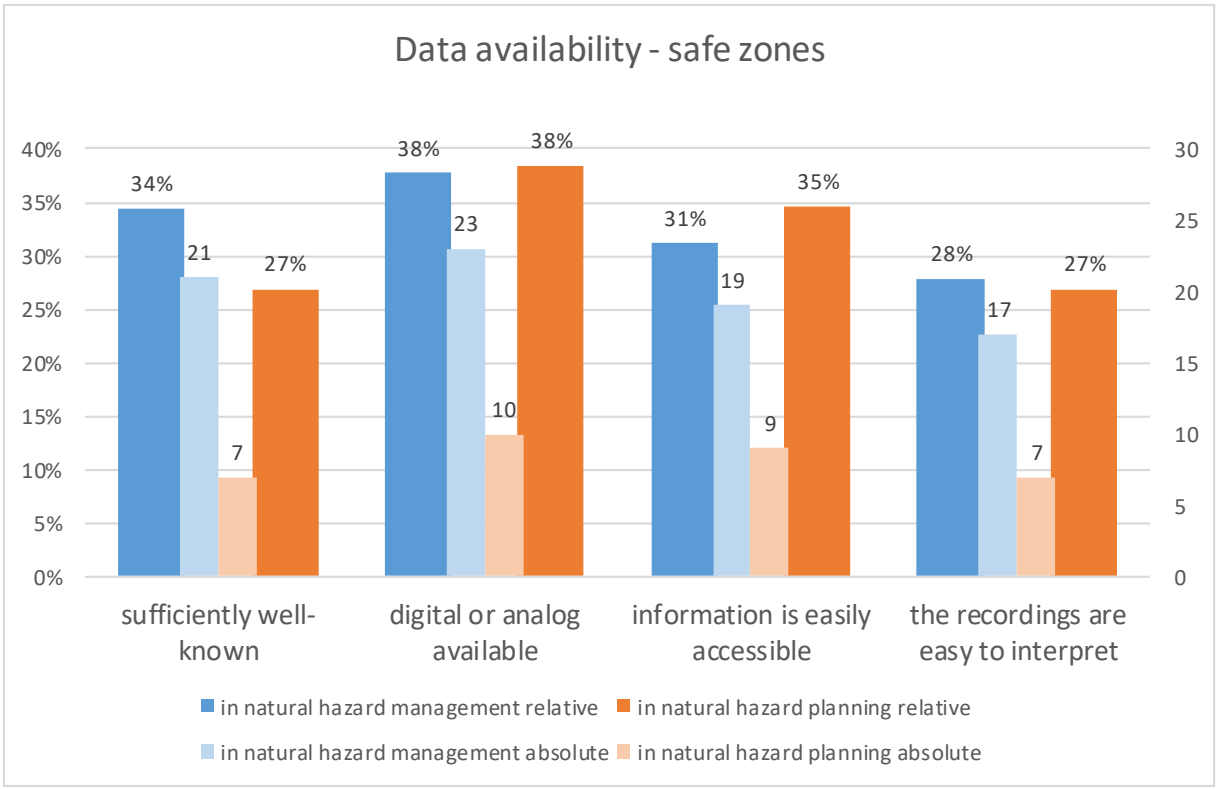

Figure 28: Evaluation of information about safe zones in connection with soil slope failures.

For soil slope failures all four asked qualities of the safe zones are rated quite equally, but quite low – under 40%. Therefore, the main statement is that safe zones are not sufficiently well-known in general, only by 34% in natural hazard management and only by 27% in natural hazard planning.

Forest fire

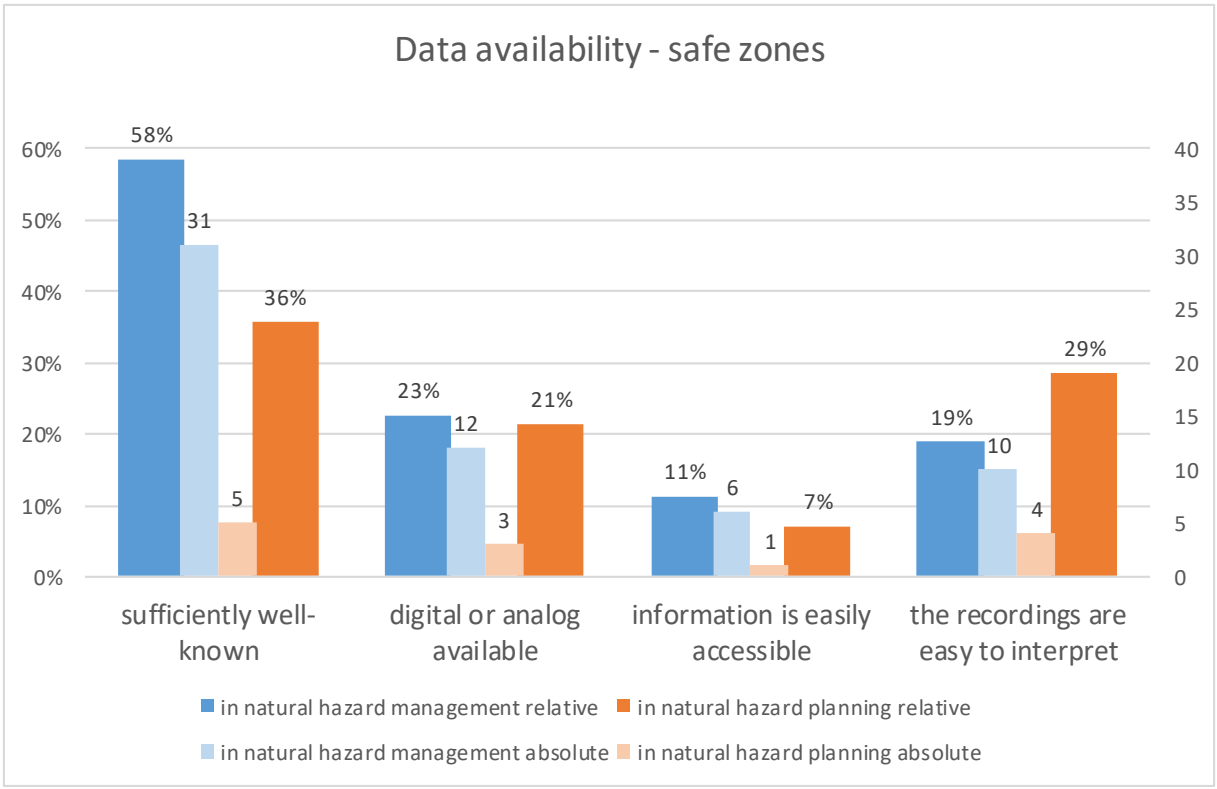

Figure 29: Evaluation of information about safe zones in connection with forest fires.

Safe zones for forest fires are sufficiently well-known by 58% for natural hazard management, but not very good available digital or analog, the recordings are not quite easy to interpret and the information is rather difficult accessible. In natural hazard planning 36% say that safe zones are sufficiently well-known, for 29% the recordings are easy to interpret, for 21% the information is digital or analog available, but for only 7% easily accessible.

In all four natural hazards the safe zones information should be improved and especially the availability of such information.

Early warning system

For a statement about the quality of the early warning systems, questions 24A to 24E were summarized and evaluated as follows: positive statement on the quality if 4 or 5 positive answers were given, moderate quality of the warning systems if 2 or 3 positive answers were given and negative statement, if 1 or less positive answers were given.

Floods

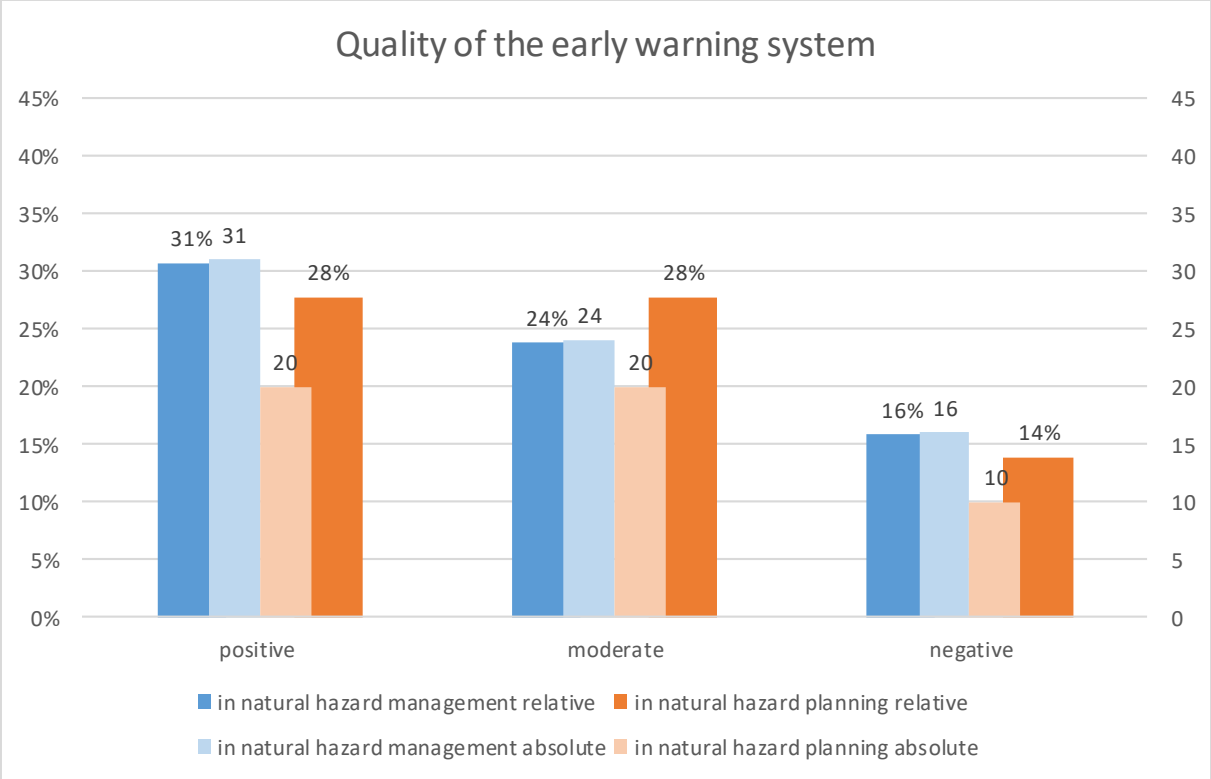

Figure 30: Quality of the early warning system for floods.

There is still clear potential for improvement in the early warning systems. Some functioning early warning systems are already in place, but the execution, warnings and alarms often still need to be optimized.

Avalanche / Ice avalanche

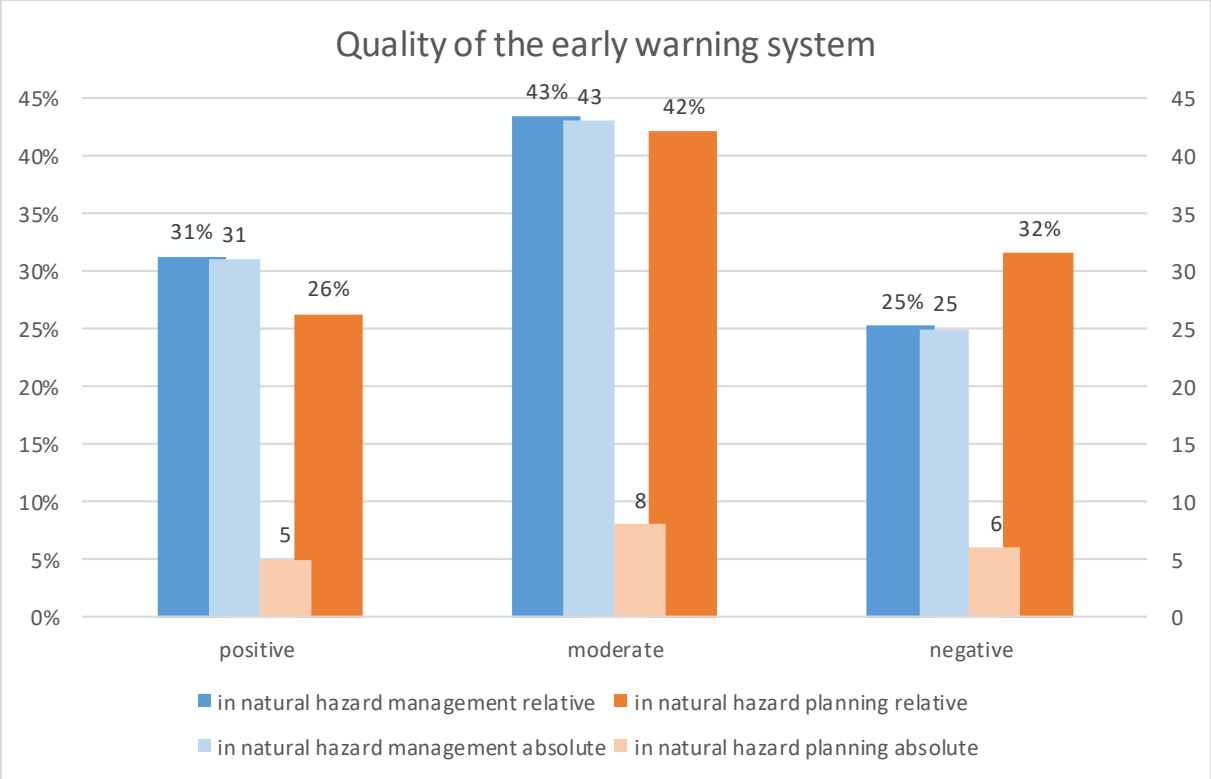

Figure 31: Quality of the early warning system for avalanches / ice avalanches.

The quality of the early warning systems for avalanches / ice avalanche is rated by 31% (natural hazard management) or 26% (natural hazard planning) as positive and by 43% / 42% as moderate. 25% / 32% gave negative feedback on the quality of the early warning systems.

Soil slope failures

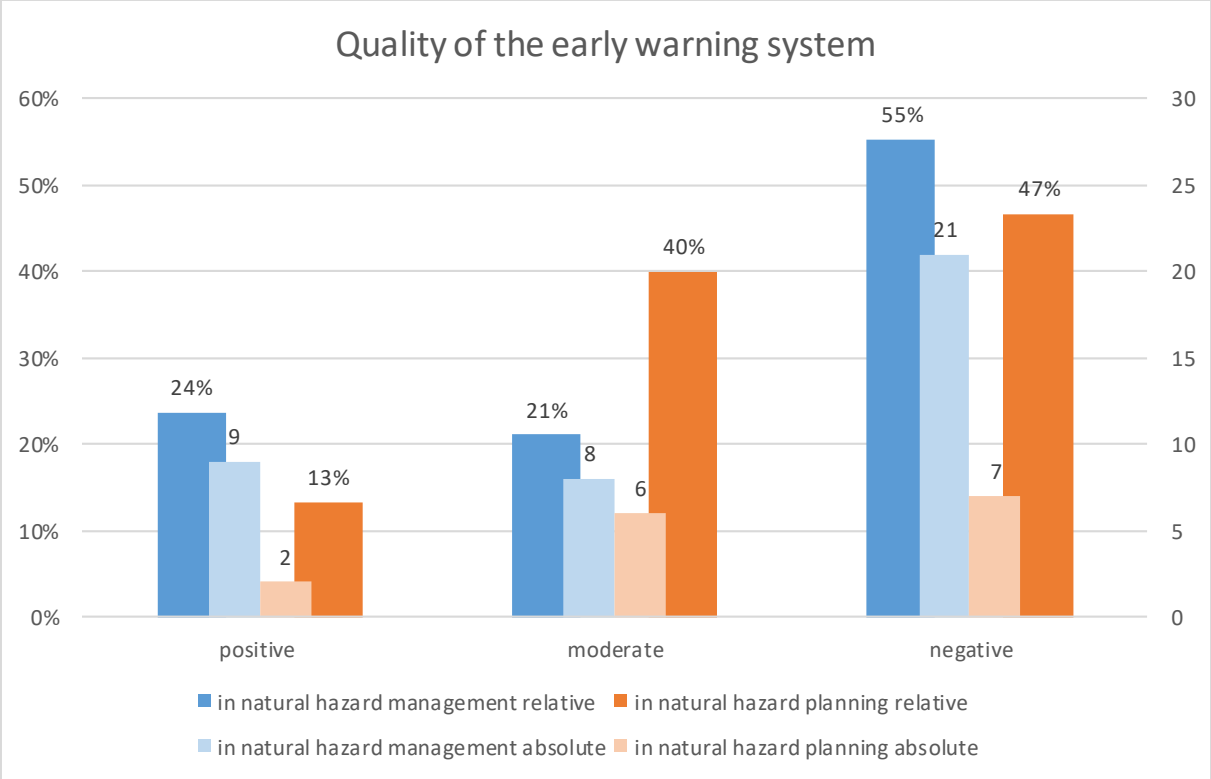

Figure 32: Quality of the early warning system for soil slope failures.

The results show, that 55% (natural hazard management) or 47% (natural hazard planning) of the participants with focus on soil slope failures gave a negative feedback on the quality of early warning system. Therefore, the quality of the early warning system for soil slope failures is rated worst in comparison with the other selected natural hazards in this survey.

Forest fire

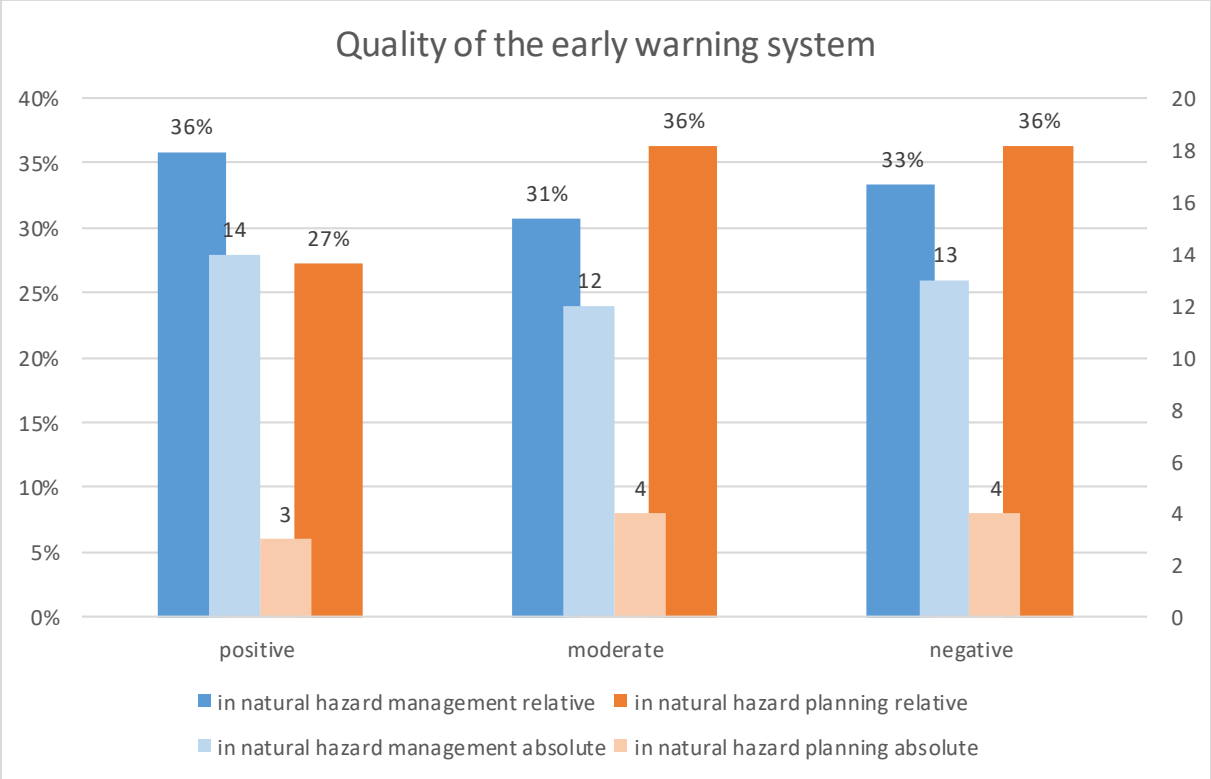

Figure 33: Quality of the early warning system for forest fires.

The results show a much divided opinion on the quality of the early warning systems for forest fires. In both areas of responsibility, in natural hazard management and in natural hazard planning, nearly the same number of participants gave positive, moderate or negative feedback.

Specific data and information

The data availability of very specific information was asked separately in question 14. The graphics show the results once from natural hazard manager and once from natural hazard planner.

Floods

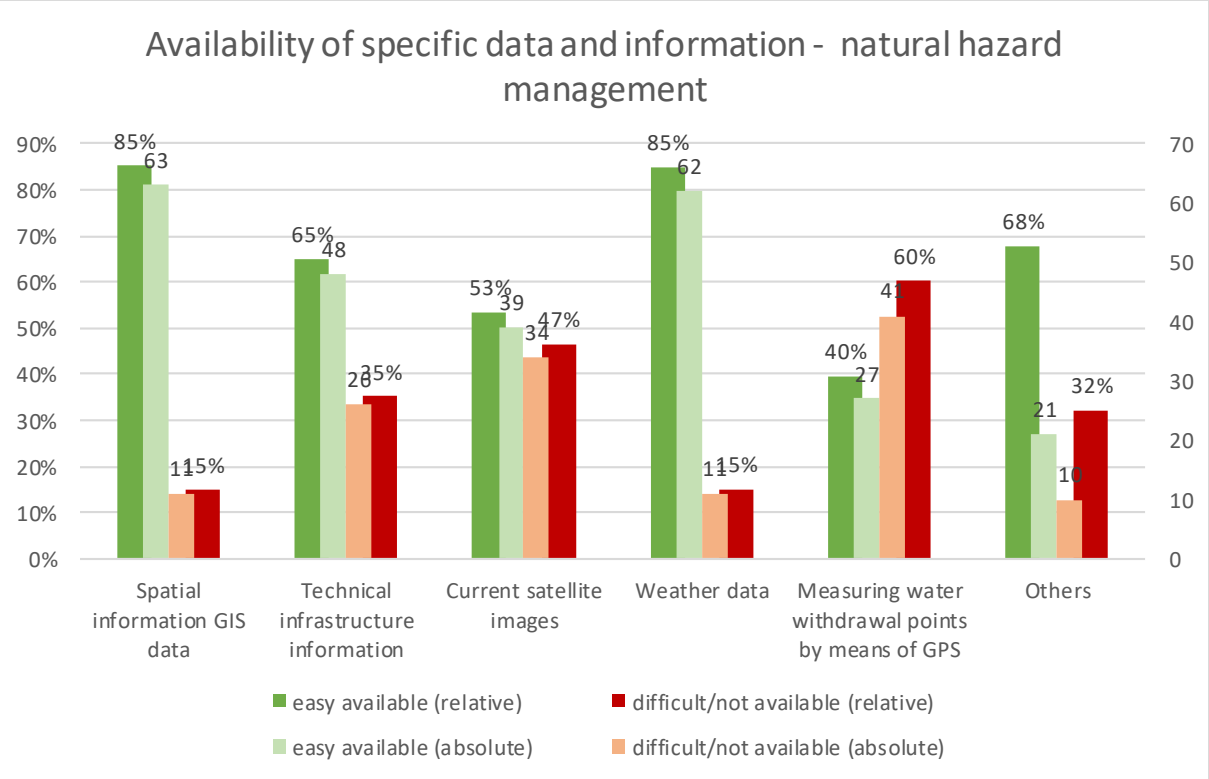

Figure 34: Availability of specific data and information from a flood management perspective.

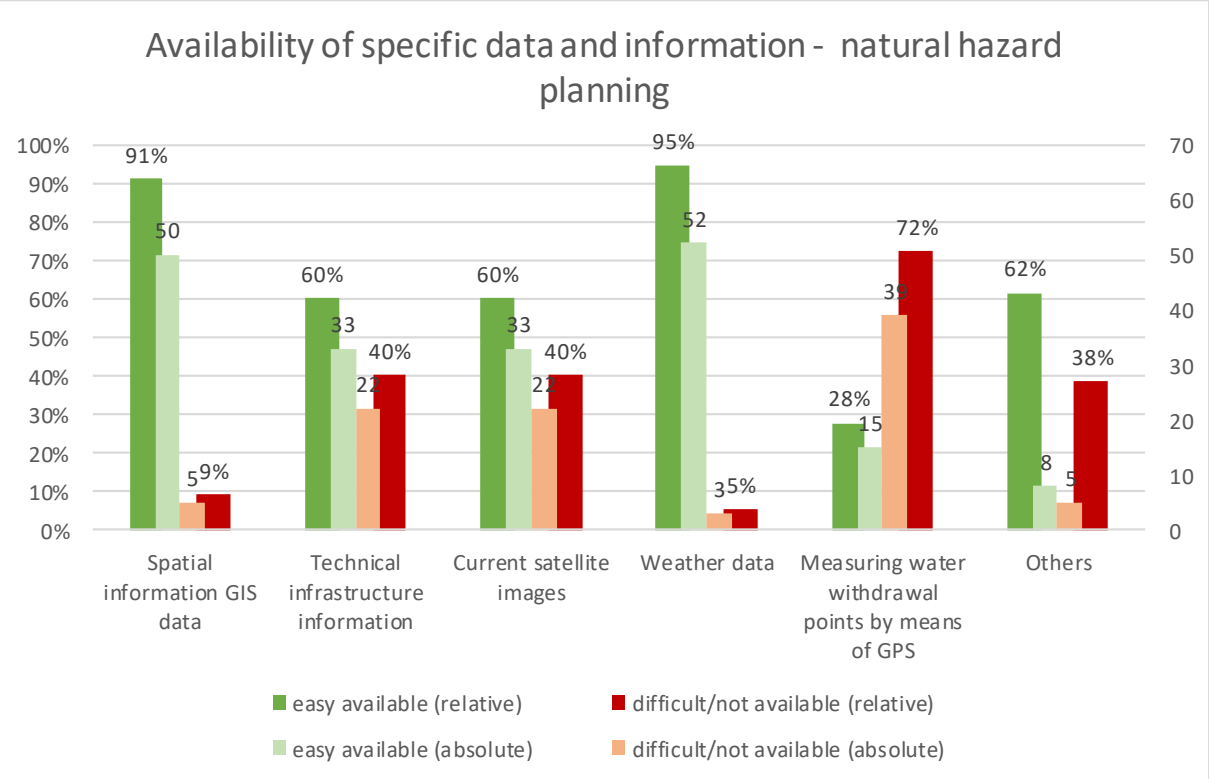

Figure 35: Availability of specific data and information from a flood planning perspective.

The opinion of natural hazard managers and natural hazard planners about the availability of specific data is basically the same. The spatial information GIS data and weather data are very easily available,

information about technical infrastructure and current satellite images are quite easily available, while measuring water withdrawal points by means of GPS are largely not or only with difficulty available.

In addition, the following other data was given by the participants and rated according to their availability. Easily available are flood pictures, flight images of the event perimeter, hydrographic gauges and measuring stations, level data (flow rate, water level), mobile high water level, radar data, historical data, water levels of the last floods, drainage profiles, meteorological stations, flood characteristics of the waters, operational plans for all relevant natural hazards, danger spots and mission data. Difficult to obtain are data of damage potential, digital flood and danger maps, data from water meter stations unfiltered and data on affected residents. Not available are water withdrawal points, level measuring points on small streams and monetary damage data.

Avalanche / Ice avalanche

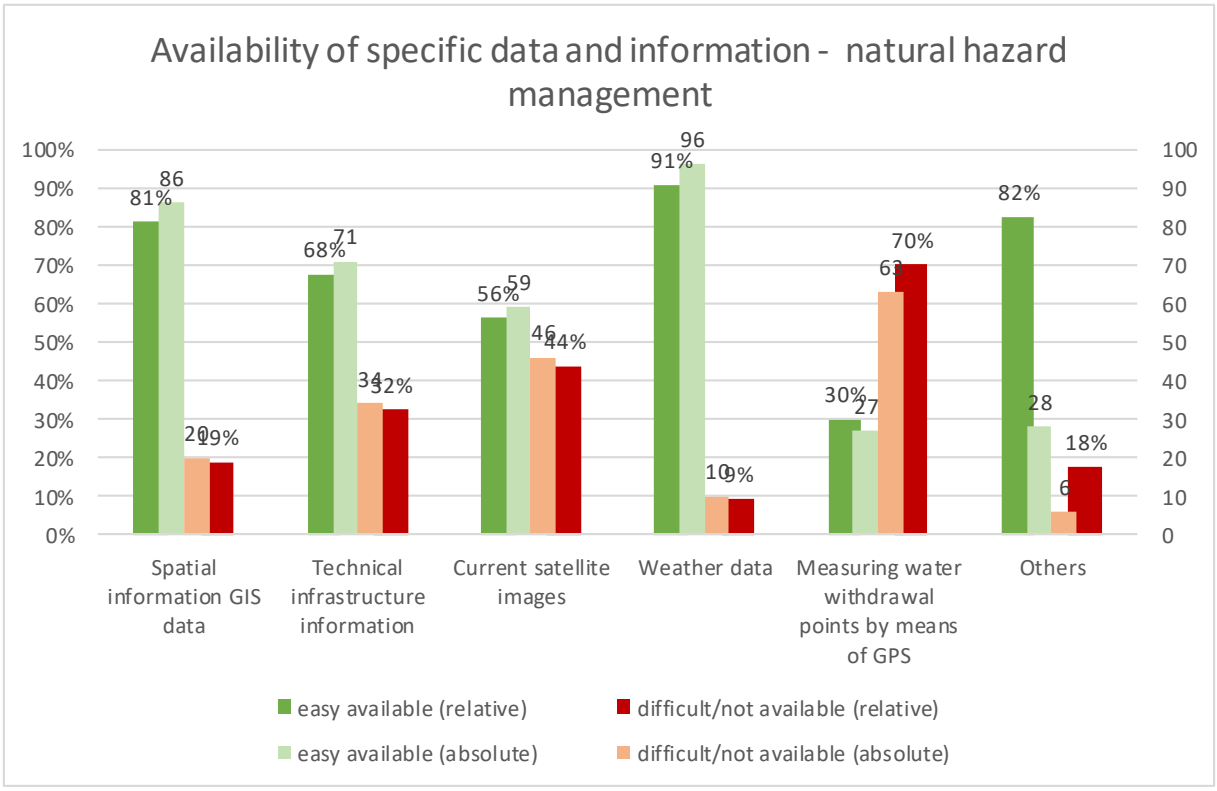

Figure 36: Availability of specific data and information from an avalanche / ice avalanche management perspective.

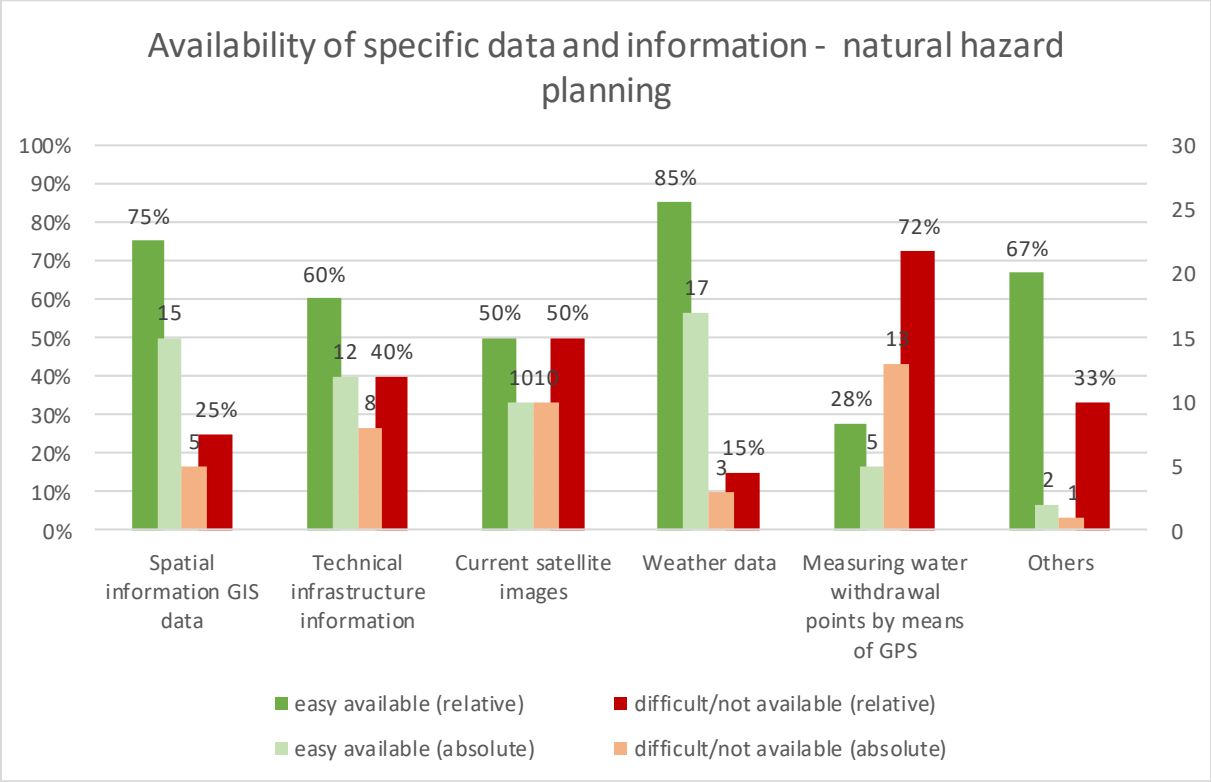

Figure 37: Availability of specific data and information from an avalanche / ice avalanche planning perspective.

Both, the participants in natural hazard management and in natural hazard planning, have basically the same opinion about the availability of specific data. Weather data, spatial information GIS data and technical infrastructure information are easy available, while the opinion on current satellite images is 50-50. Measuring water withdrawal points by means of GPS is difficult or not available.

In addition, the following other data was rated according to the availability: Easily available are snow height measurement, avalanche bulletins, hazard zone maps / avalanche register, cadaster of protective structures, weather and other data, historic events, observer, avalanche commission, snow profile, data of affected people and personal advice from ZAMG. Temporary protective structures (avalanches radar / triggering systems) were mentioned as difficult to obtain.

Soil slope failures

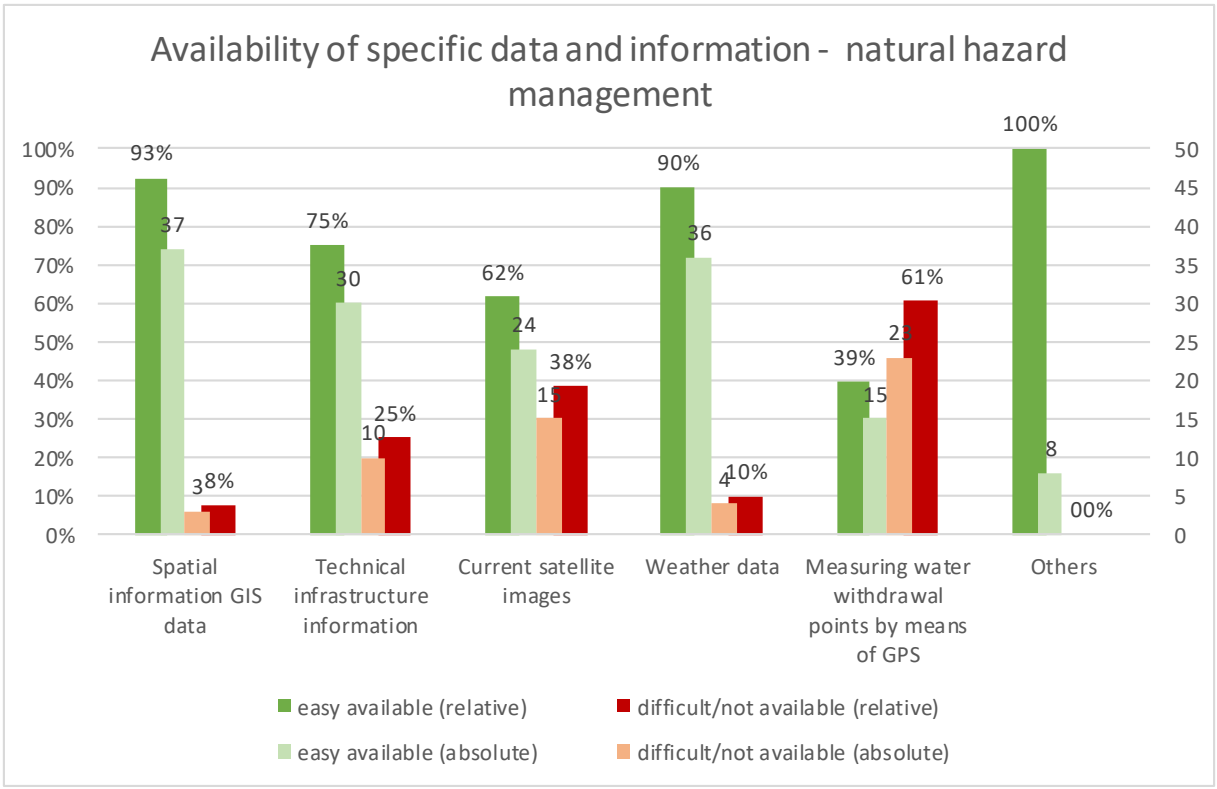

Figure 38: Availability of specific data and information from a soil slope failure management perspective.

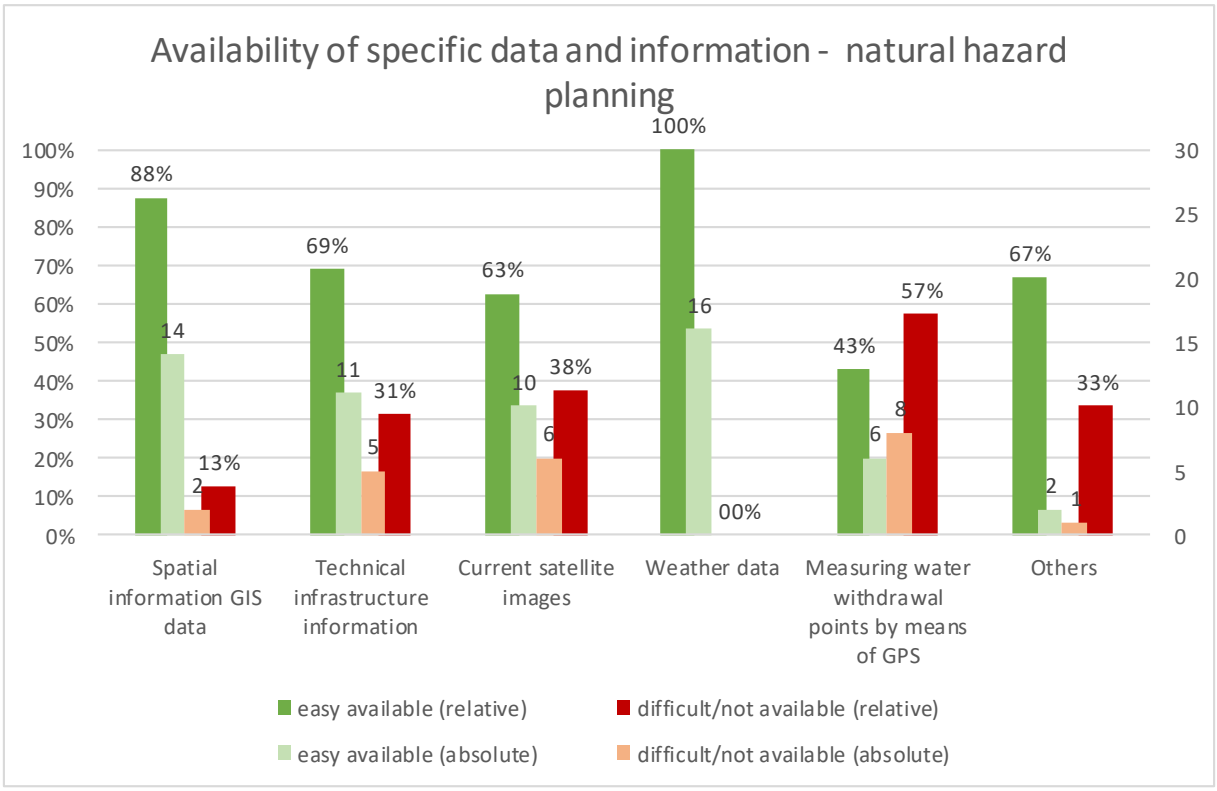

Figure 39: Availability of specific data and information from a soil slope failure planning perspective.

Natural hazard management and natural hazard planning agree on the availability of specific data for soil slope failures. Weather data, spatial information GIS data, technical infrastructure information and

current satellite images are easy available, measuring water withdrawal points by means of GPS are largely not or only with difficulty available.

In addition, the following other data was rated according to the availability: Easily available are aerial photographs, laser scan data, runoff in streams and rivers, snow data, flood plains, terrain movement data, pictures, videos and geological maps.

Forest fire

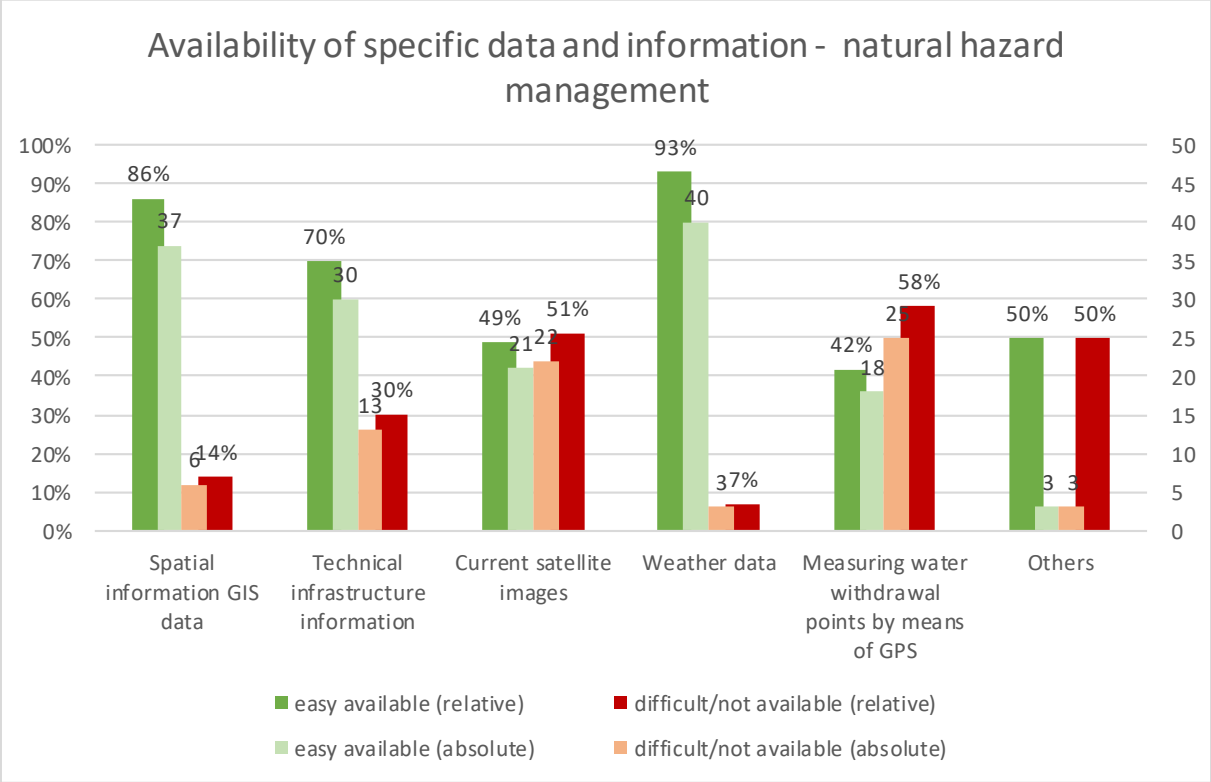

Figure 40: Availability of specific data and information from a forest fire management perspective.

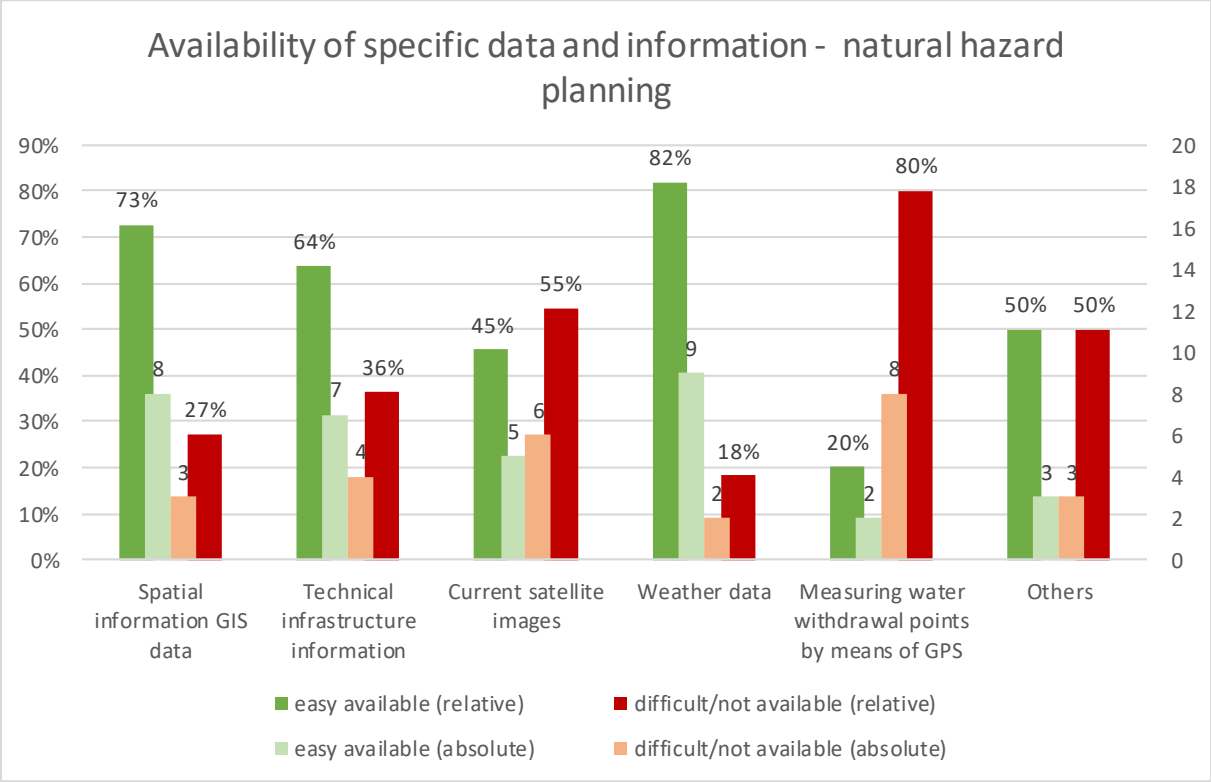

Figure 41: Availability of specific data and information from a forest fire planning perspective.

Within the natural hazard forest fires, managers and planners have quite the same opinion. The ranking of the easy available data is the same, but the percentages varies a little more than at the other natural hazards. 1. Weather data (93% management / 82% planning), 2. Spatial information GIS data (86% / 73%) and 3. Technical infrastructure information (70% / 64%). Current satellite images are scored quite similar easy available and difficult or not available. Whereas measuring water withdrawal points by means of GPS are mostly rated as difficult or not available, natural hazard planning even rates it with 80%.

In addition, the following other data was rated according to the availability: Easily available are helicopters, live images and thermal images. Difficult to obtain are data like contacts between organizations / responsible persons, firefighter data and canton data. Forest fire index for the mountains was mentioned as not available.

Data and information transfer

Question 31 analyzed the data and information transfer between contingency planning and operational management.

The question of the data and information exchange between natural hazard planners and natural hazard managers shows us the major shortcoming at this interface. As the fact of the unsatisfactory exchange was known in advance, this survey was started. These answers within the four natural hazards only confirms this feeling of the experts in the consortium. The data exchange was rated almost equally as good and in need of improvement. However, the feedback from the natural hazard managers is somewhat better than from the natural hazard planners for floods and avalanches / ice avalanches. Whereas for soil slope failures and forest fires the feedback from the natural hazard planners is a little bit better.

Floods

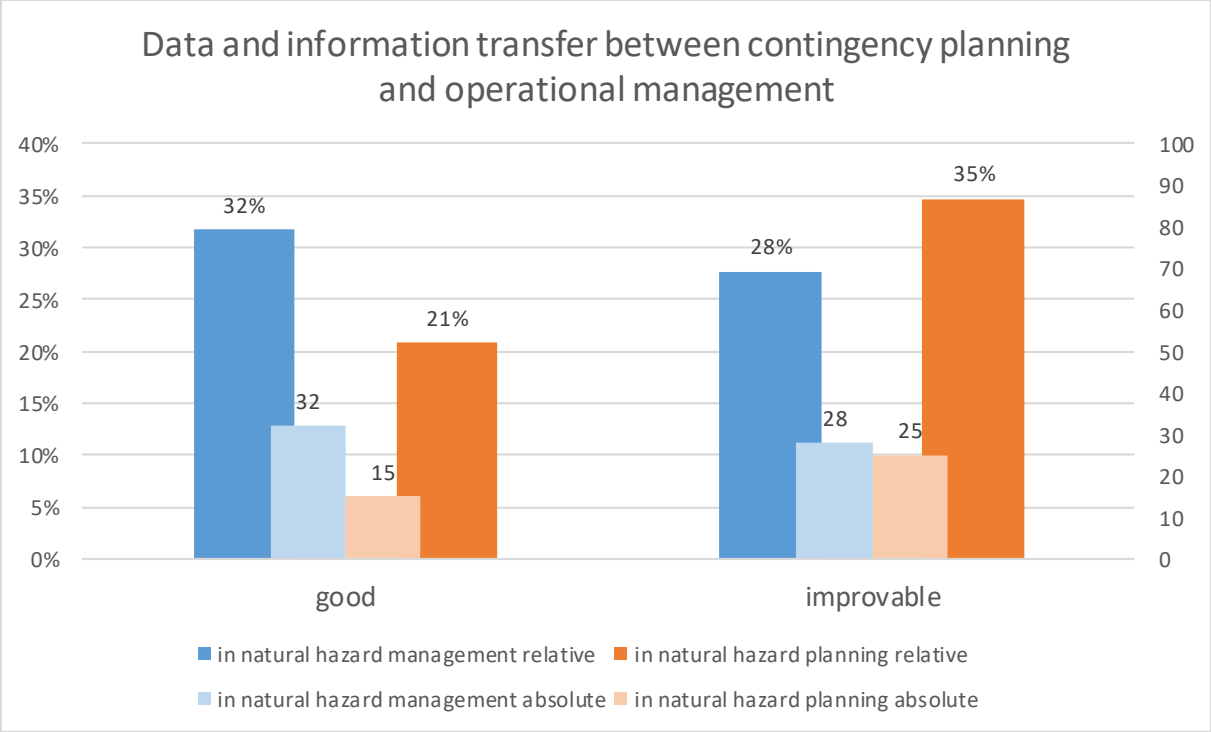

Figure 42: Data and information transfer between contingency planning and operational planning in floods.

Avalanche / Ice avalanche

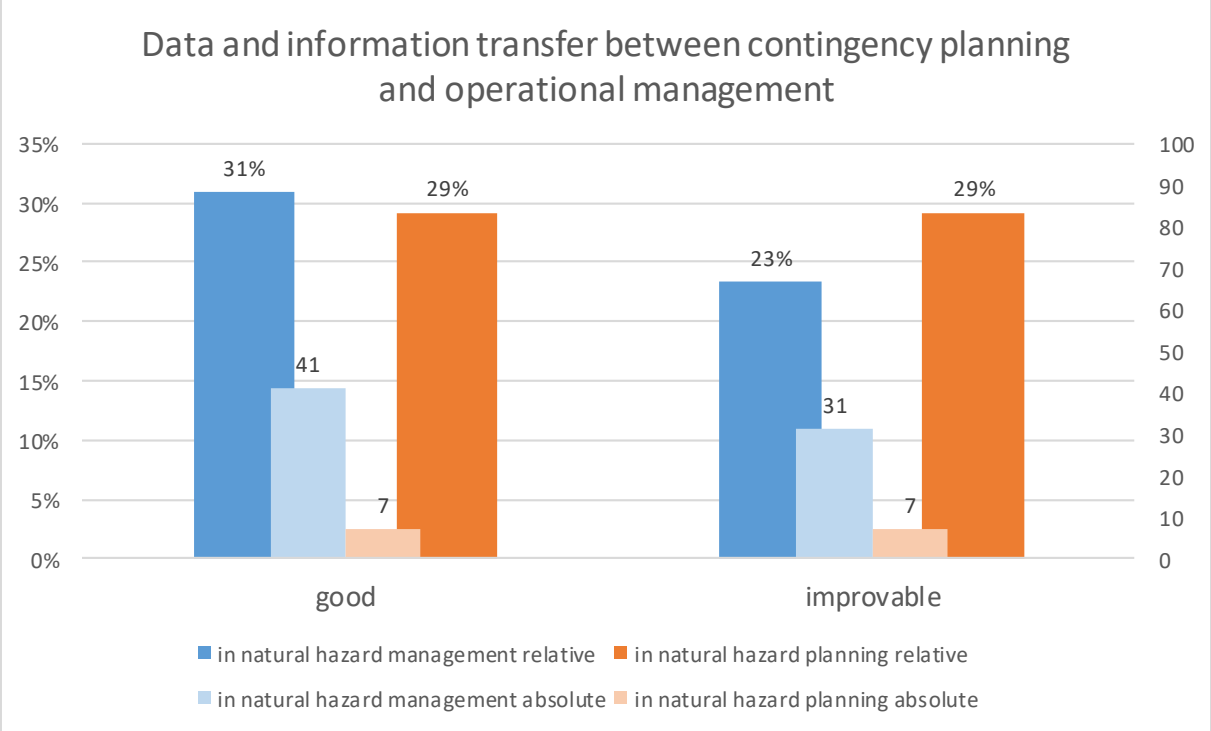

Figure 43: Data and information transfer between contingency planning and operational planning in avalanches / ice avalanches.

Soil slope failures

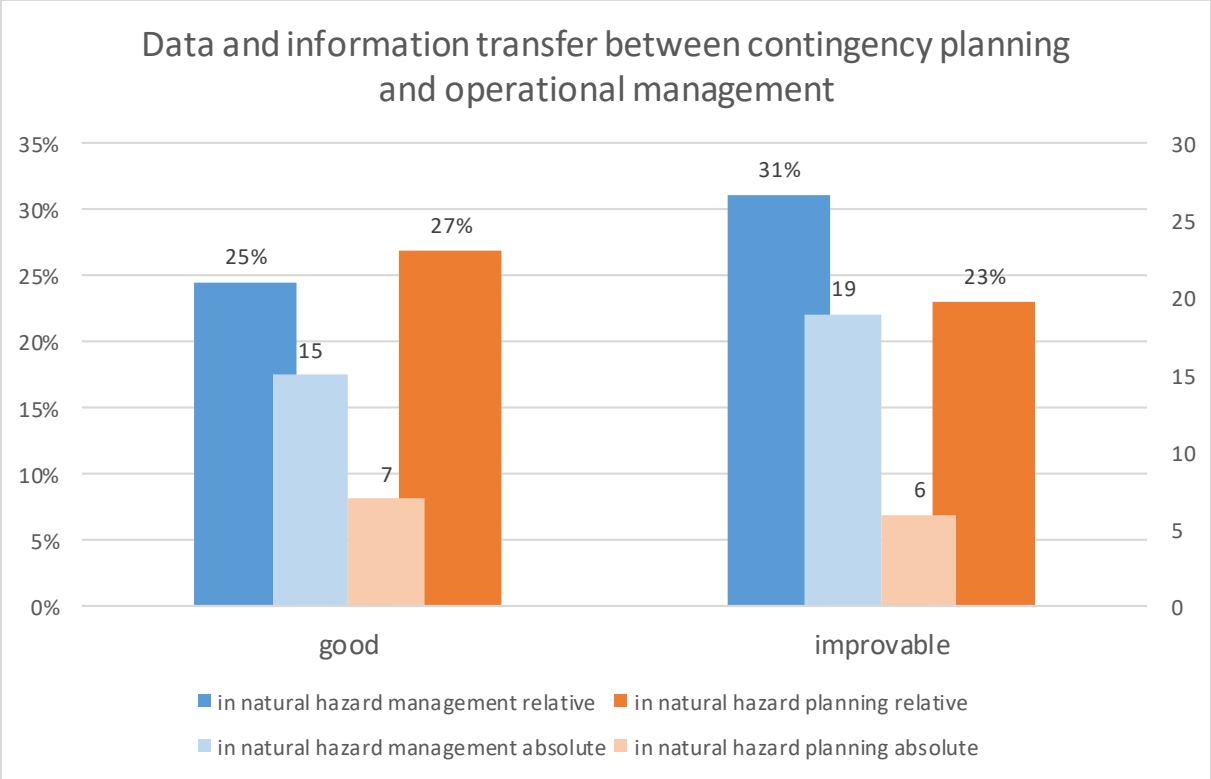

Figure 44: Data and information transfer between contingency planning and operational planning in soil slope failures.

Forest fire

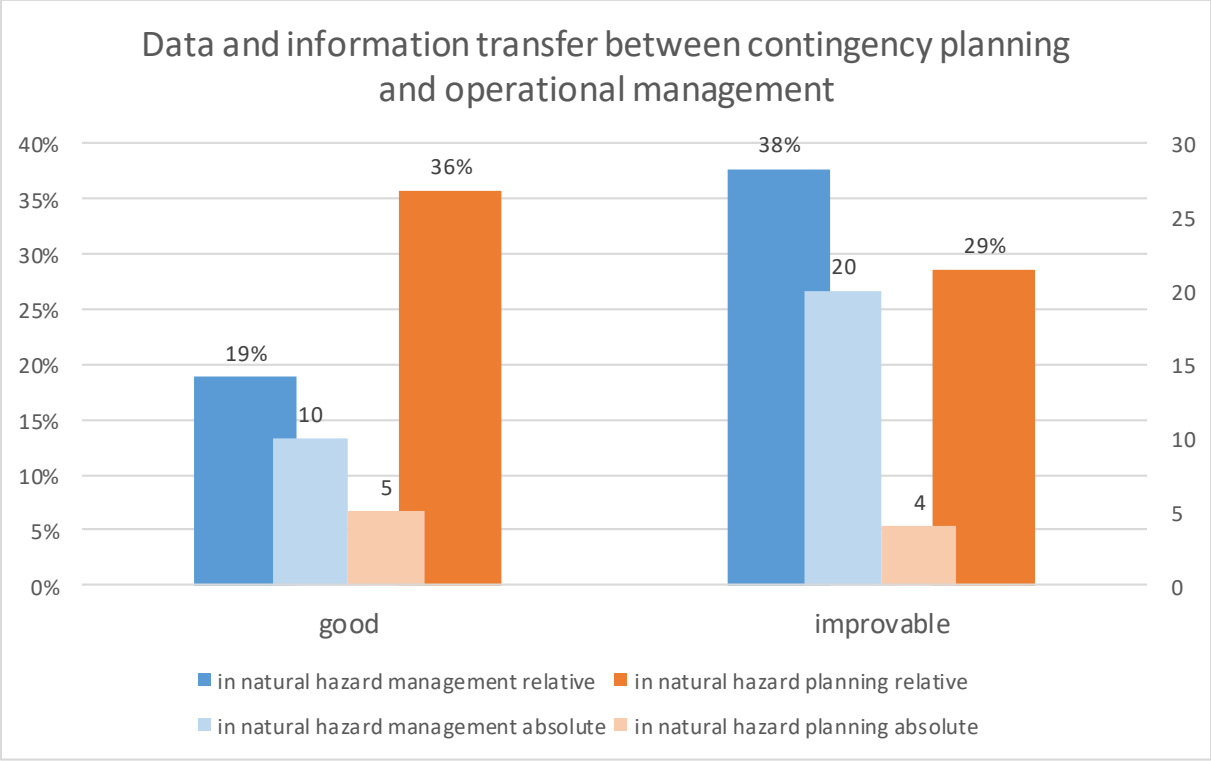

Figure 45: Data and information transfer between contingency planning and operational planning in forest fires.

Risk communication

Directly to the chapter on risk communication there were two questions with sub-questions (25A-25G and 26A-26E) which were answered by the participants. These 12 sub-questions and others from the other chapters, which refer to risk communication, have been summarized for three focus points.

First, the quality of the relationship between the emergency planners and emergency managers was considered. For this purpose, the sub-questions 25B, 25C, 25E-25G and 31A were summarized and divided into positive (4-6 positive answers), moderate (2 or 3 positive answers) and negative feedback (0 or 1 positive answer).

Another focus was the structural qualities, for which questions from the chapters Risk Communication and Structural Quality were combined: 26A-26E, 28A and 31C, 31D.

Thirdly, the focus was placed on the exchange of information between planner and manager and for this purpose the sub-questions 16B, 16D, 16E, 25A, 25D, 31B and 37A, 37B were summarized. For the last two focus points, the answers were rated as positive feedback if 6-8 answers were positive. With 3-5 positive answers it was rated as moderate and with 0-2 positive answers as negative feedback.

Floods

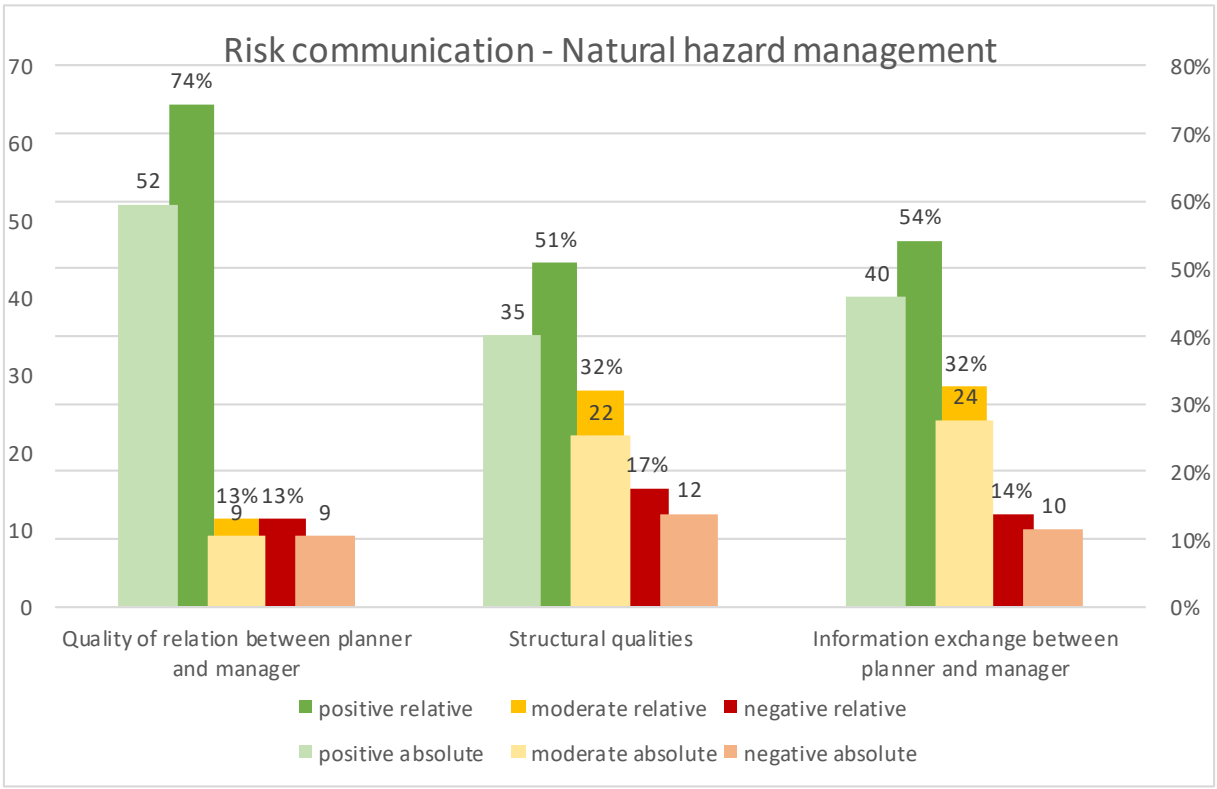

Figure 46: Three focus points of risk communication from a flood management perspective.

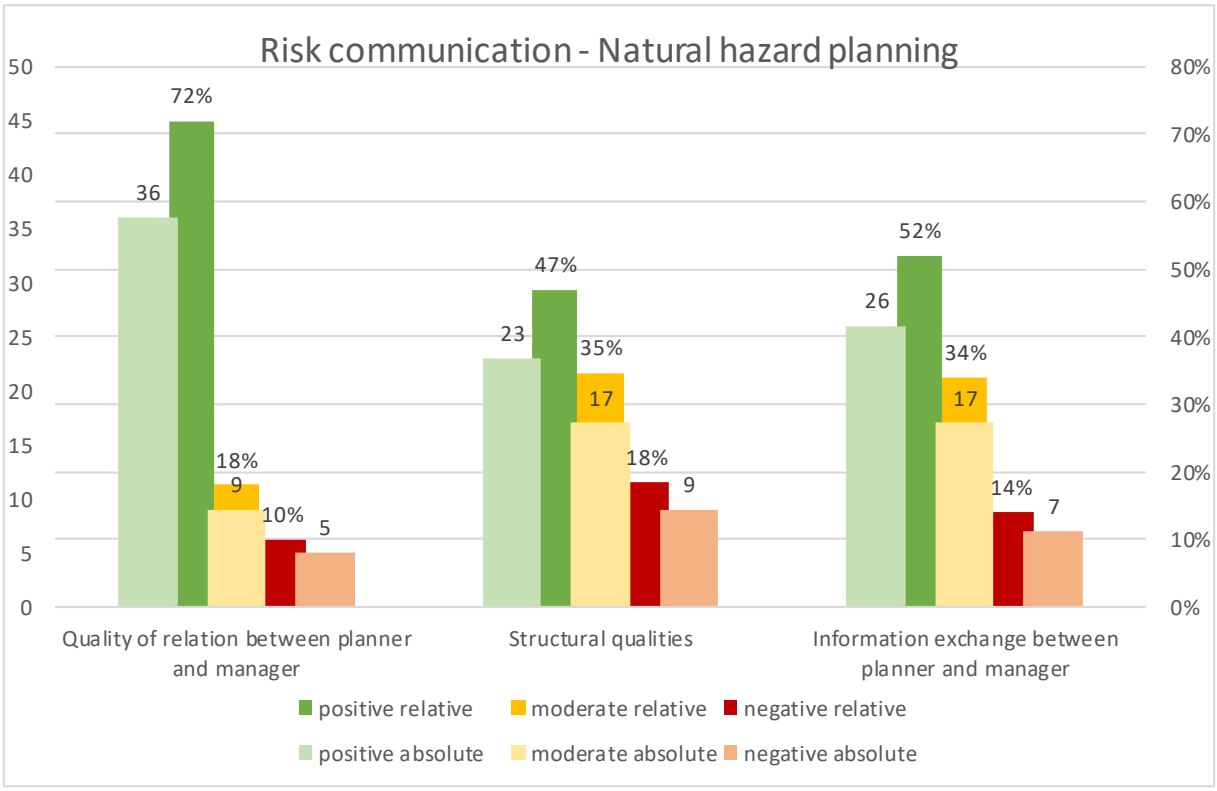

Figure 47: Three focus points of risk communication from a flood planning perspective.

In the natural hazard flood all three focus points of risk communication were rated mainly positive by both expert groups. The quality of relation between planner and manger got the most positive feedback from both the natural hazard management and the natural hazard planning. The structural qualities were rated mainly positive, but quite a percentage of participants rated this aspect of risk communication as moderate or even negative. Moreover, for the information exchange between planner and manager the result was similar. The opinion of planner and manager experts of floods are quite similar and see room for improvement especially on the structural qualities and the information exchange.

Avalanche / Ice avalanche

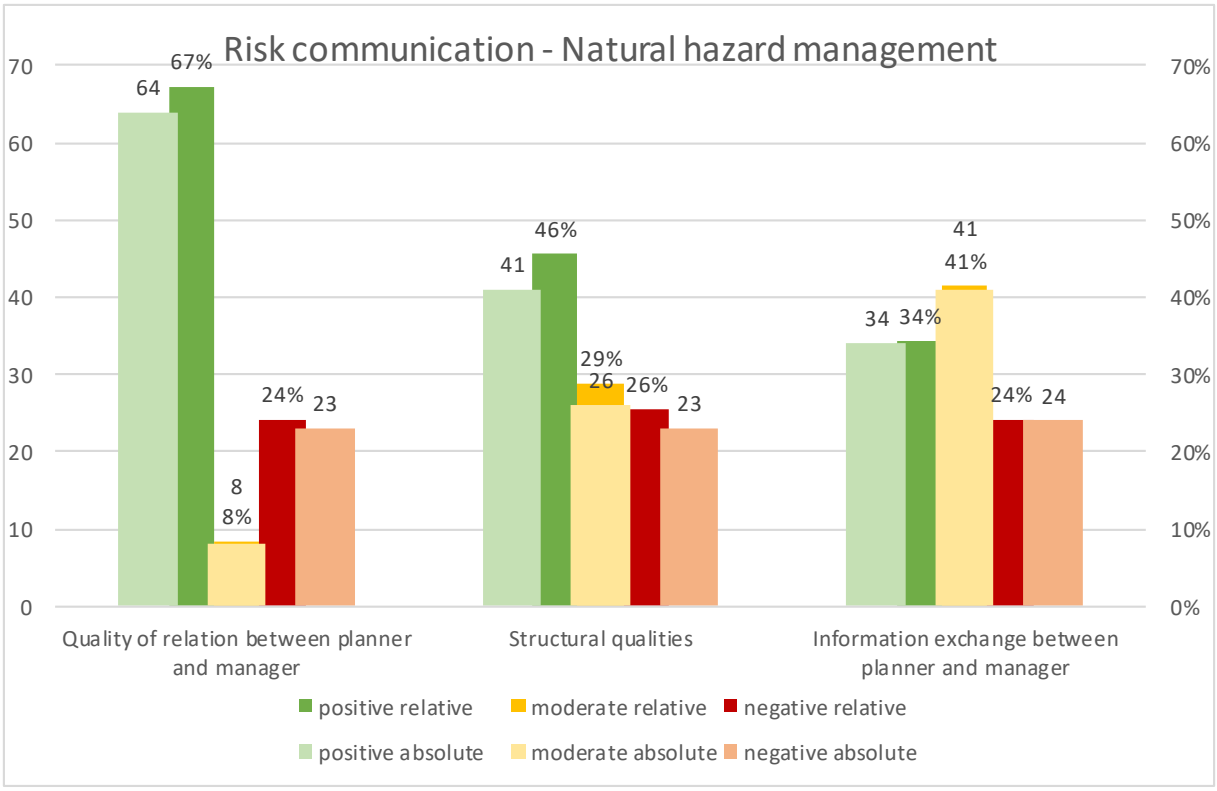

Figure 48: Three focus points of risk communication from an avalanche / ice avalanche management perspective.

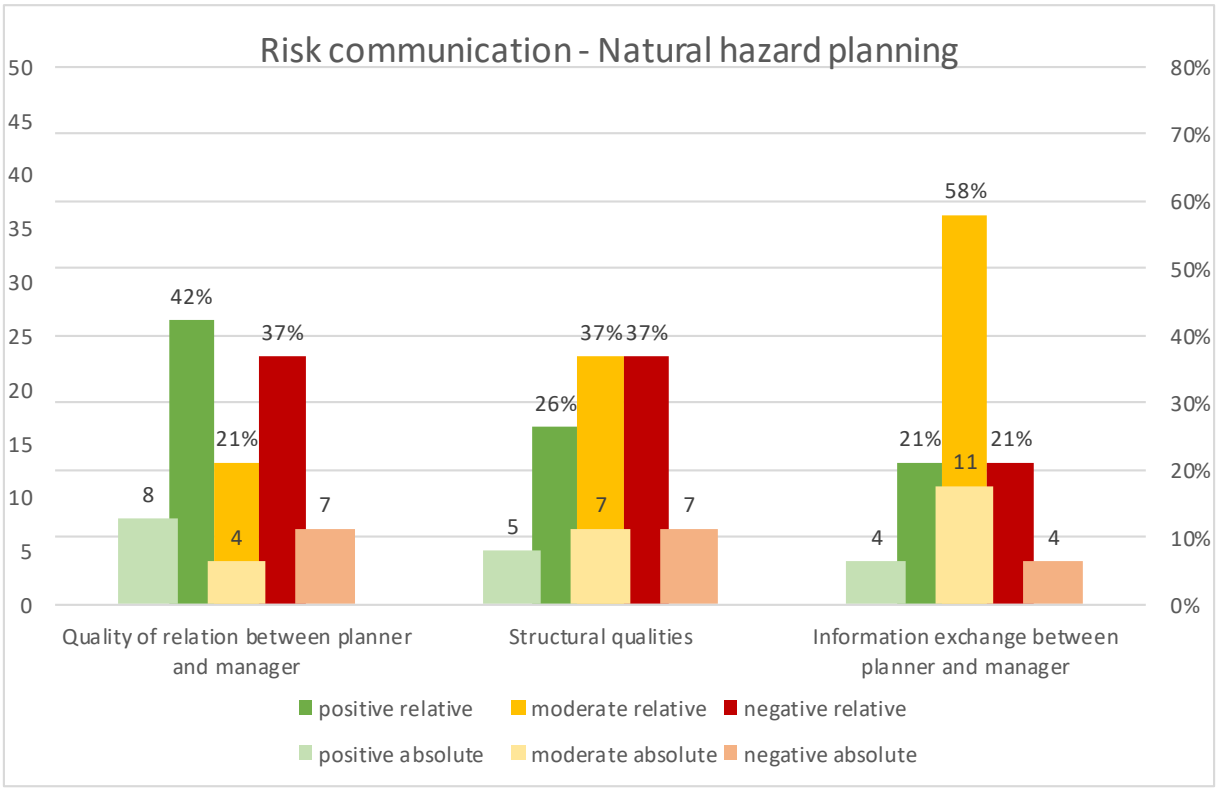

Figure 49: Three focus points of risk communication from an avalanche / ice avalanche planning perspective.

Natural hazard management rated the risk communication better than natural hazard planning. The quality of relation between planner and manager got 67% positive feedback from the manager and

only 42% from the planner. Within the planners was also a significant percentage (37%) of negative feedback for that aspect of risk communication. Natural hazard management rated the structural qualities positive by 46% while natural hazard planning rated it with moderate and negative respectively by 37%. The information exchange between planner and manager was rated moderate by both expert groups, but also in this case the planners votes were worse.

Soil slope failures

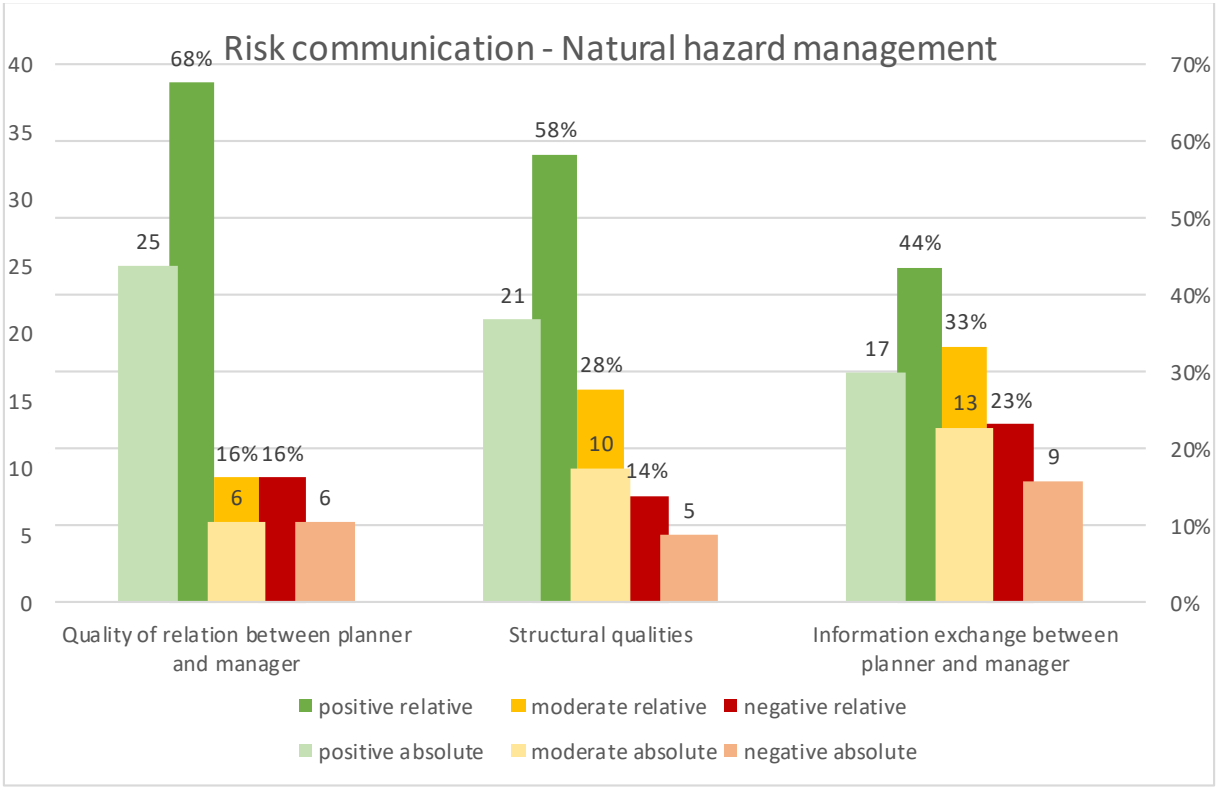

Figure 50: Three focus points of risk communication from a soil slope failure management perspective.

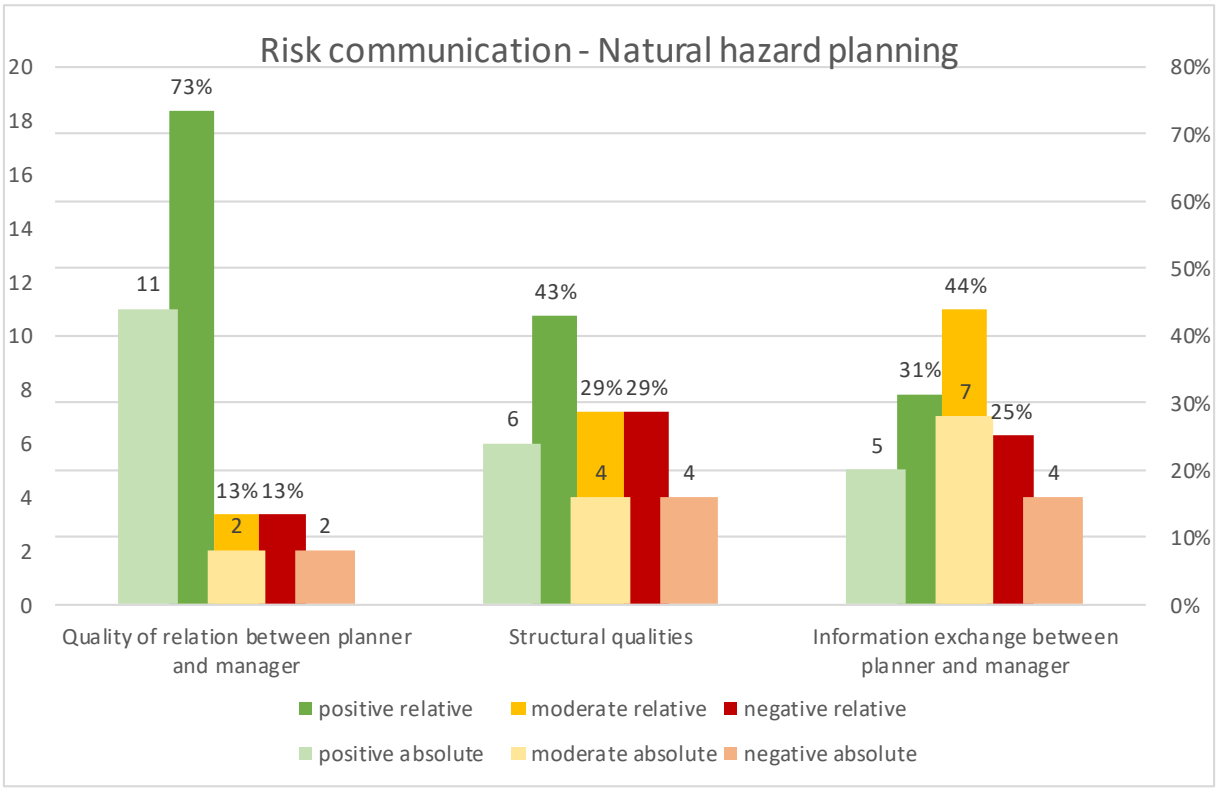

Figure 51: Three focus points of risk communication from a soil slope failure planning perspective.

General the risk communication within soil slope failure got a positive feedback. The quality of relation between planner and manager got positive feedback by 68% of natural hazard management and 73% of natural hazard planning. The structural qualities were better from the view of managers than form the view of planners, but got mainly positive feedback. Natural hazard management rated the information exchange between planner and manager positive by 44% while natural hazard planning rated it mainly moderate by 44%. These results show that the planning experts would like to expand the information exchange between them and the management.

Forest fire

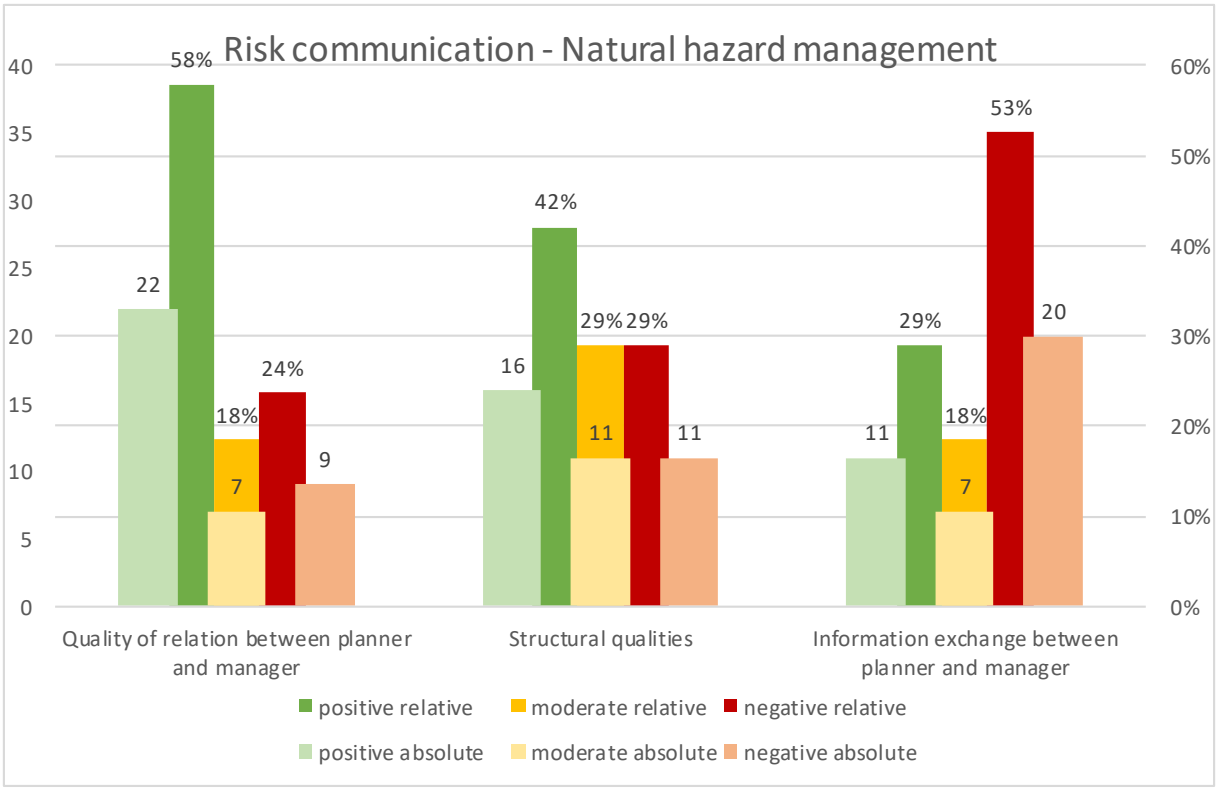

Figure 52: Three focus points of risk communication from a forest fire management perspective.

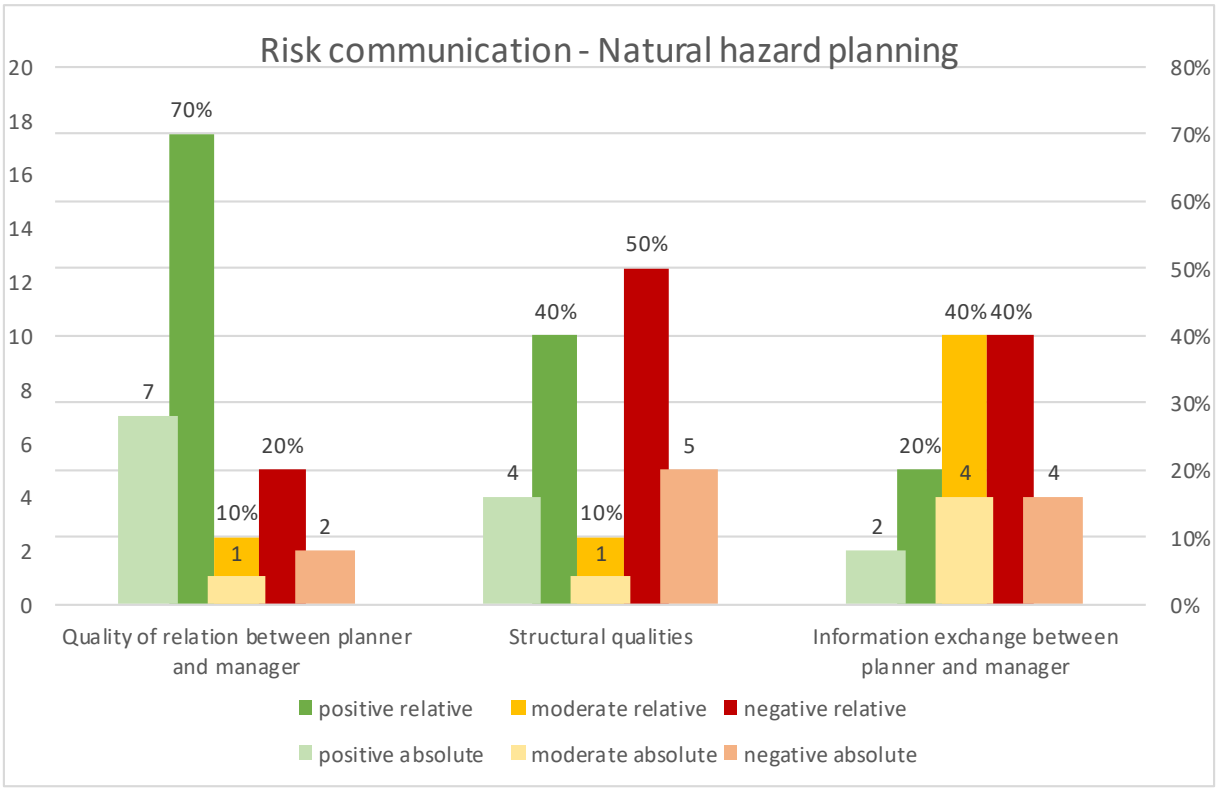

Figure 53: Three focus points of risk communication from a forest fire planning perspective.

Within the natural hazard forest fire the quality of relation between planner and manager got very positive feedback with 58% (natural hazard management) and 70% (natural hazard planning). On the

other hand, both expert groups mostly rated the information exchange between planner and manager negative or moderate. Natural hazard management gave this aspect 57% negative feedback and natural hazard planning rated it moderate and negative with 40% in both cases. This aspect of risk communication needs improvement for both expert groups.

Natural hazard management rated the structural qualities positive with 42% while 50% of natural hazard planning exerts gave a negative feedback to this aspect of risk communication.

Structural quality

Information on the structural quality can already be found in the focus on structural qualities of the chapter on risk communication, as specifically the qualities or structural obstacles for well-functioning risk communication between planners and managers were queried. Here, the structural quality within the disaster management as well as the contingency planning will be discussed and the quality of emergency plans and protective measures will be evaluated.

Floods

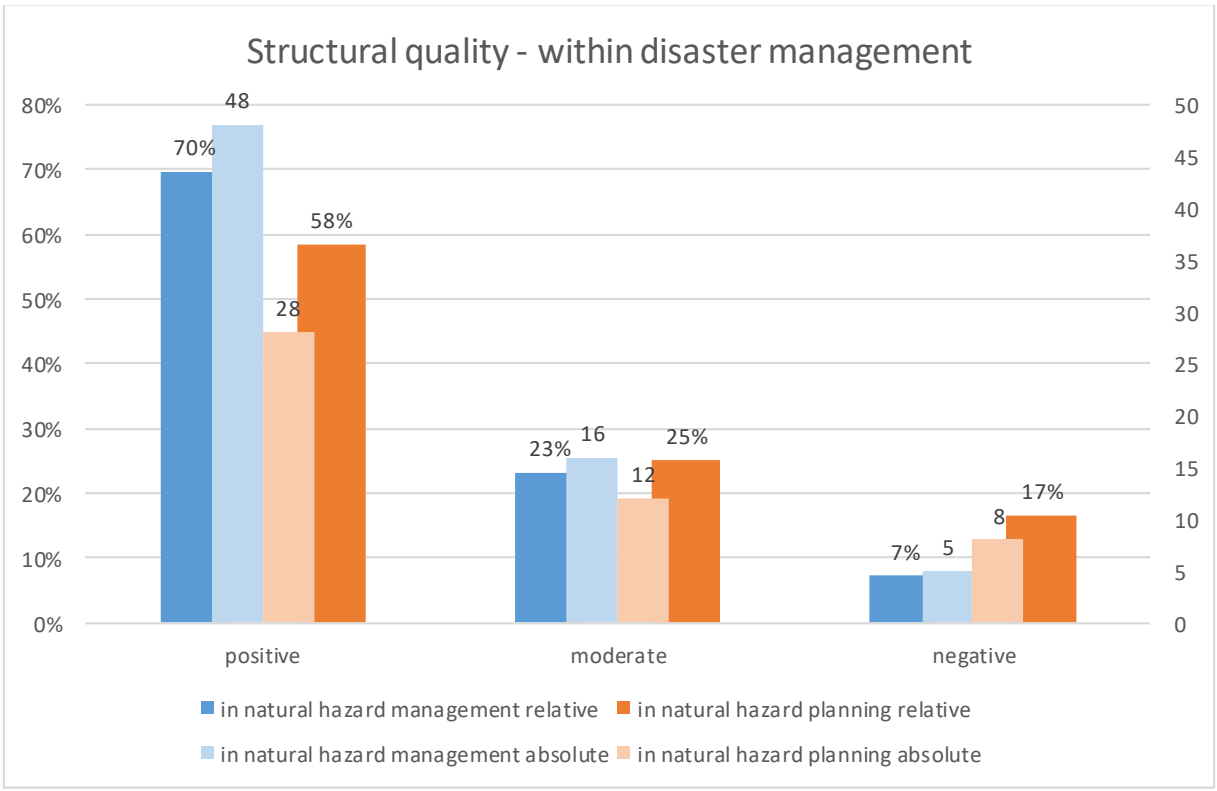

Figure 54: Evaluation of structural quality within flood management.

This evaluation shows that the quality within the natural hazard management is rated worse from the outside, i.e. by the natural hazard planners, than from the inner circle itself. But it is also rated quite positive from both sides of the experts.

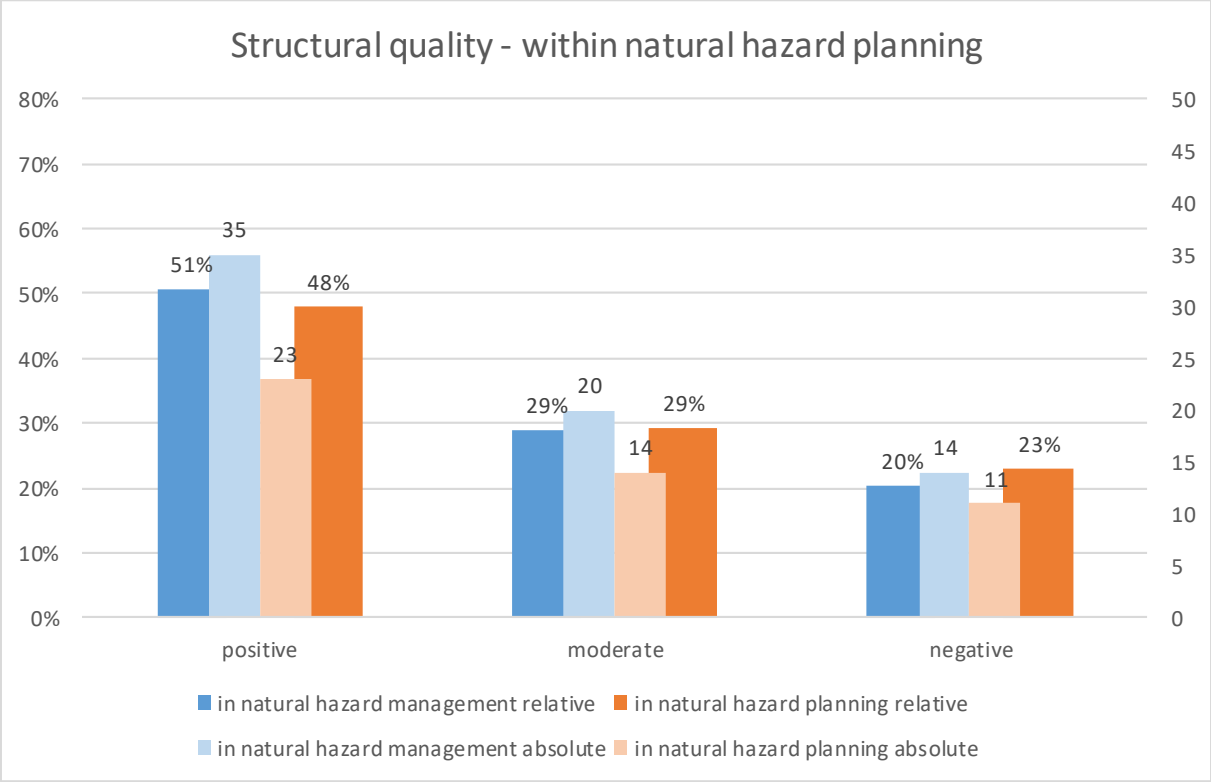

Figure 55: Evaluation of structural quality within flood planning.

The structural quality within natural hazard planning is seen similar from natural hazard management and natural hazard planning. It is rated quite positive altogether, even not that high than for the structural quality within natural hazard management.

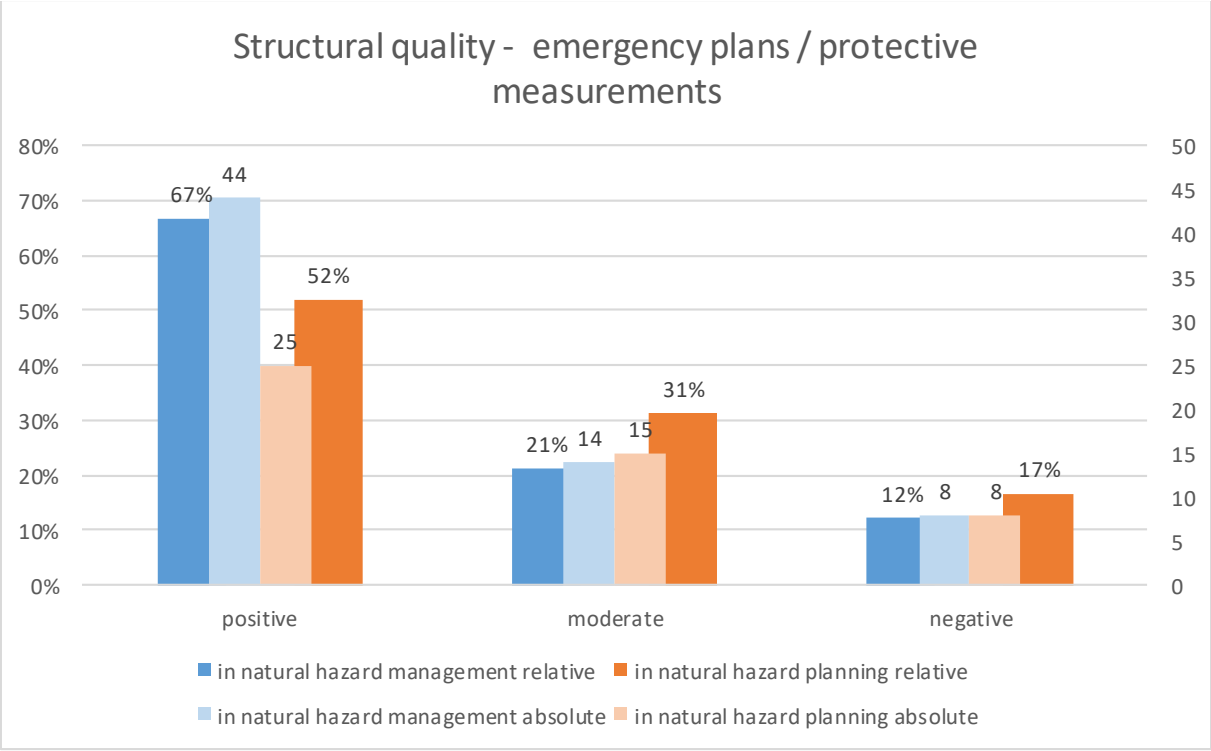

Figure 56: Evaluation of structural quality of emergency plans and protective measurements for floods.

Natural hazard planners rated the existing emergency plans and protective measures worse than the natural hazard managers. This fact may indicate the different availability and accessibility for planners and managers of such plans.

Avalanche / Ice avalanche

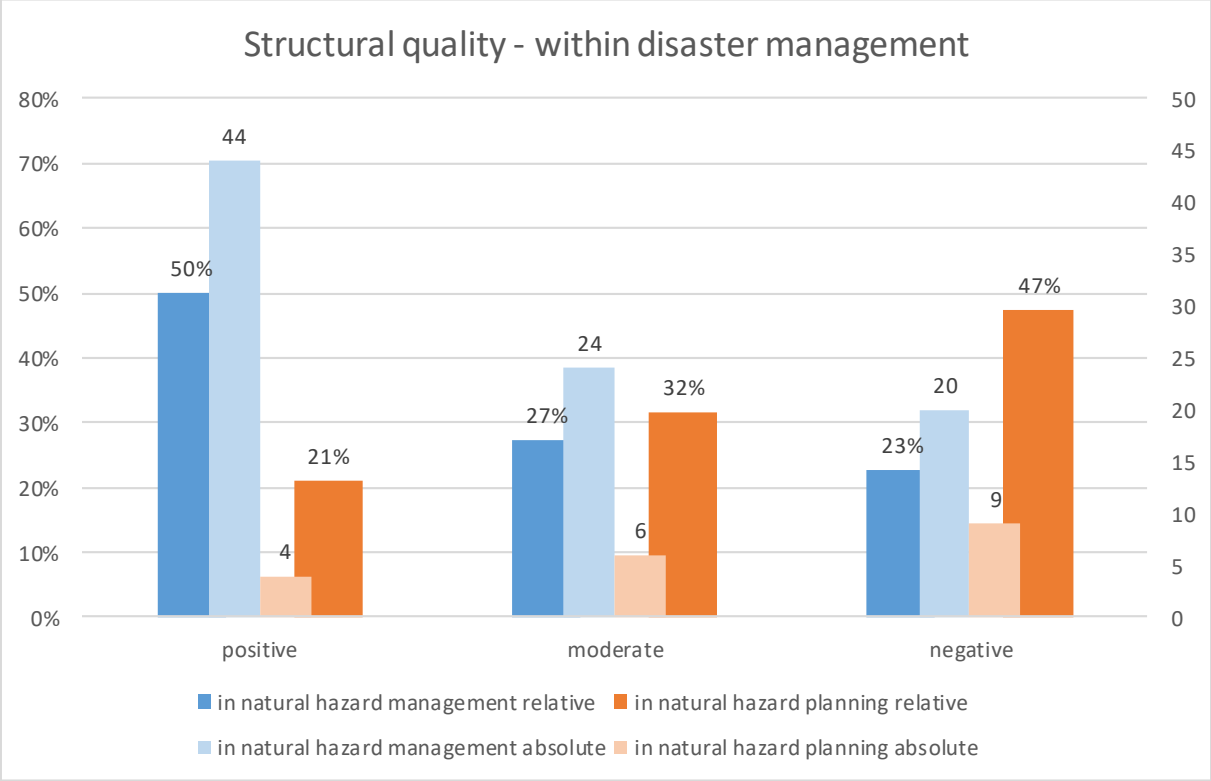

Figure 57: Evaluation of structural quality within avalanche / ice avalanche management.

Natural hazard management rated the structural quality within their group much more positive than natural hazard planning did it.

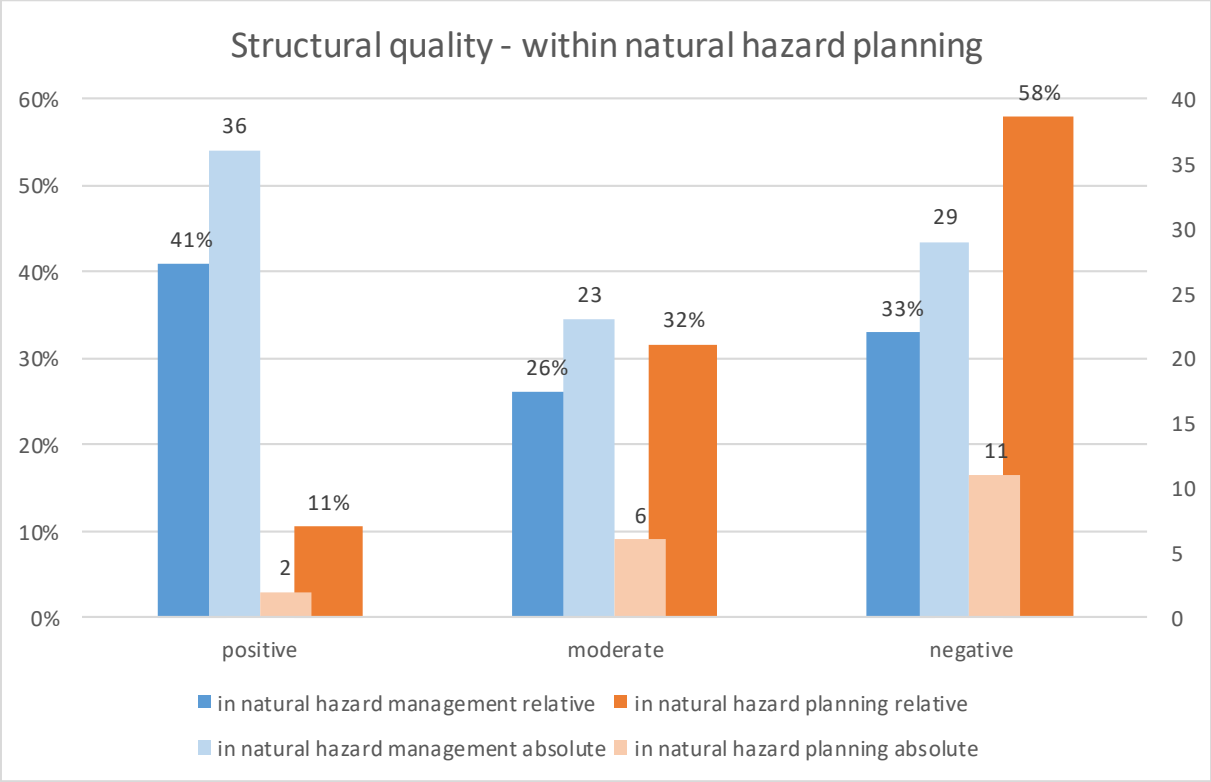

Figure 58: Evaluation of structural quality within avalanche / ice avalanche planning.

The structural quality within natural hazard planning is rated better from the outside, from natural hazard manager, than from the inside. Comparing the two former results, one can think, that natural hazard planning is more critical and discontent with the structural quality than natural hazard management.

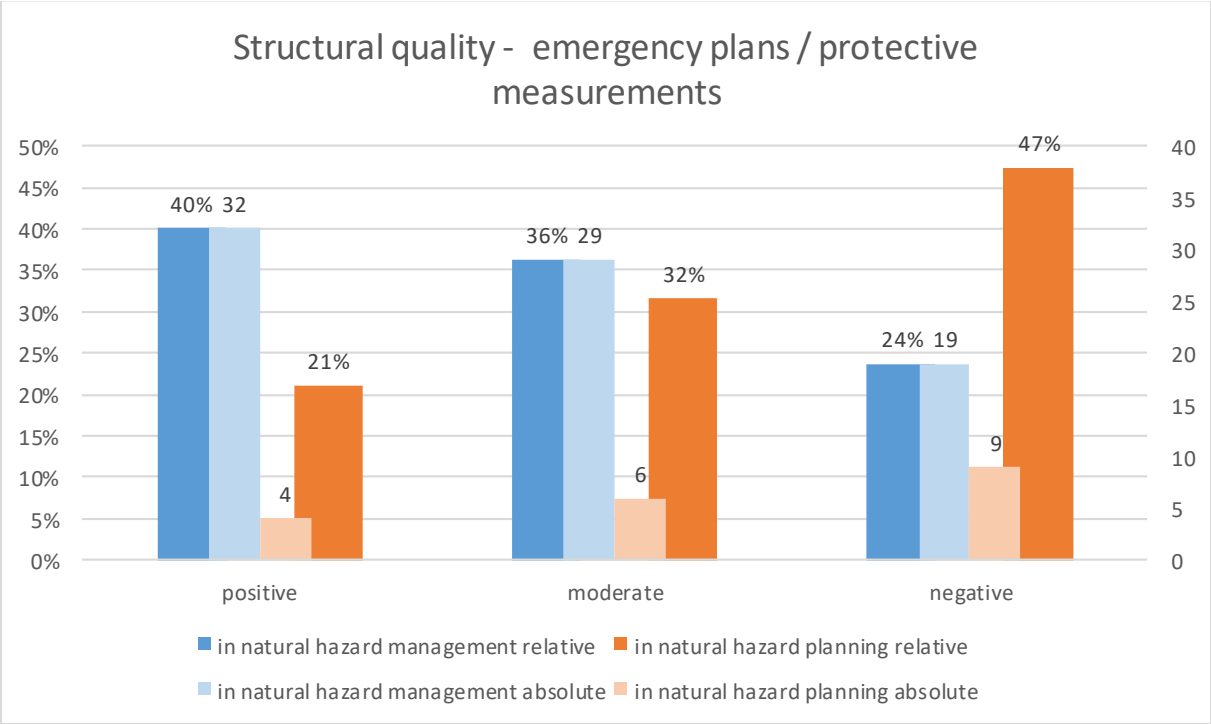

Figure 59: Evaluation of structural quality of emergency plans and protective measurements for avalanches / ice avalanches.

The structural quality of emergency plans and protective measurements for avalanches / ice avalanches are rated worse by natural hazard planning than by natural hazard management.

Soil slope failures

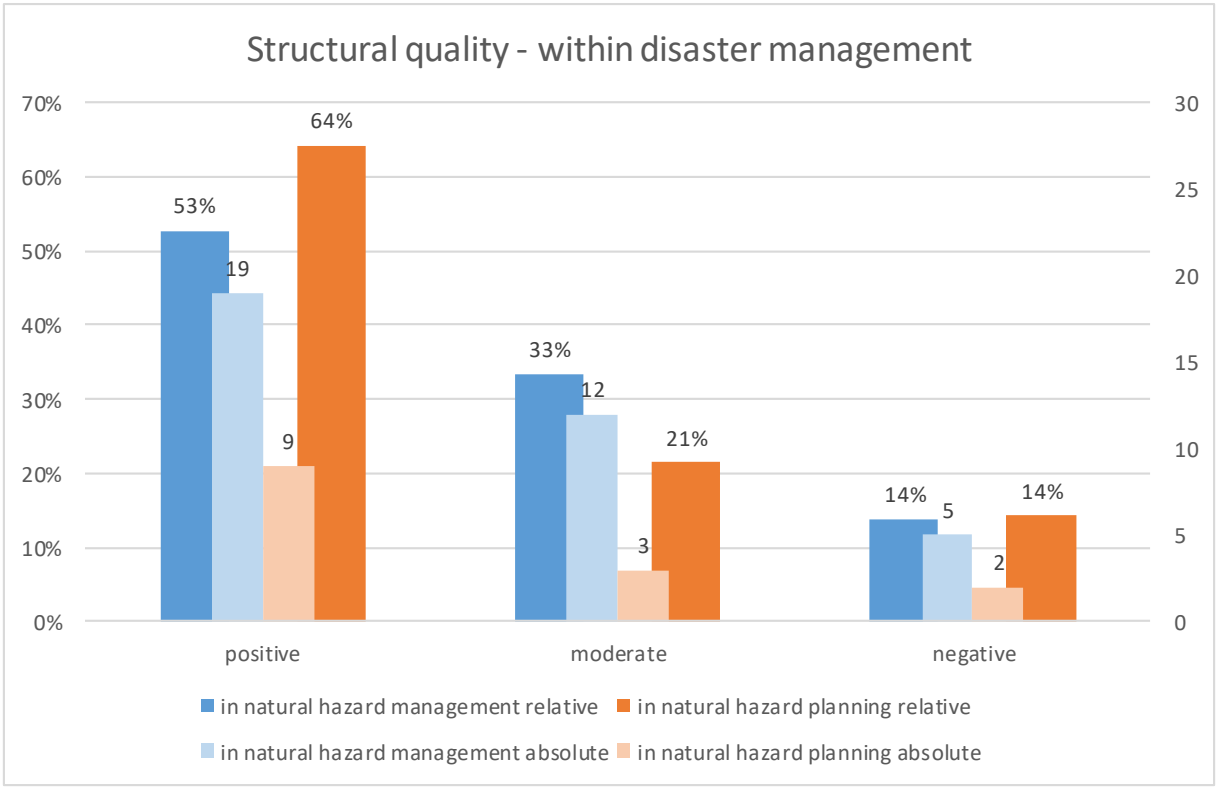

Figure 60: Evaluation of structural quality within soil slope failure management.

The structural quality within disaster management was rated very positive from managers and planners.

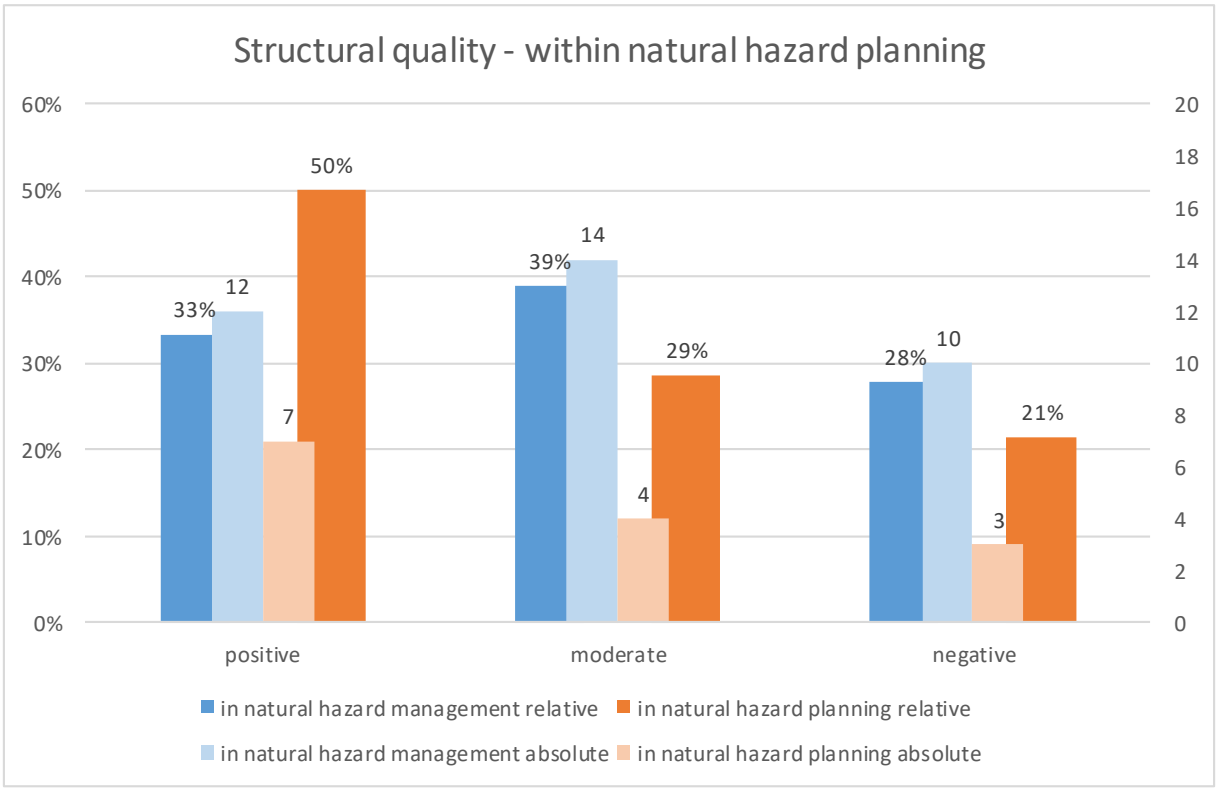

Figure 61: Evaluation of structural quality within soil slope failure planning.

The structural quality got very positive feedback from the natural hazard planners and rather moderate feedback from natural hazard management. Therefore, the concerned group rated the structural quality better than the outside group.

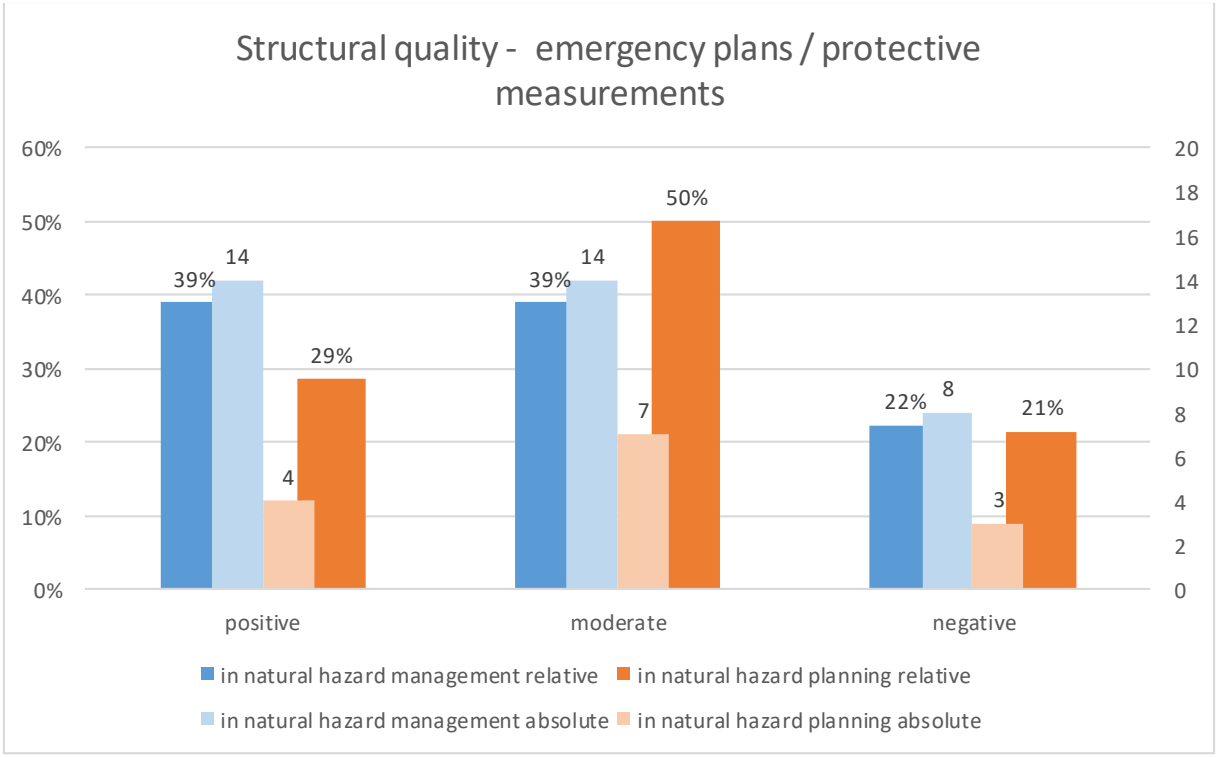

Figure 62: Evaluation of structural quality of emergency plans and protective measurements for soil slope failures.

The structural quality of emergency plans and protective measurements for soil slope failures was rated mainly moderate by natural hazard planning and management.

Forest fire

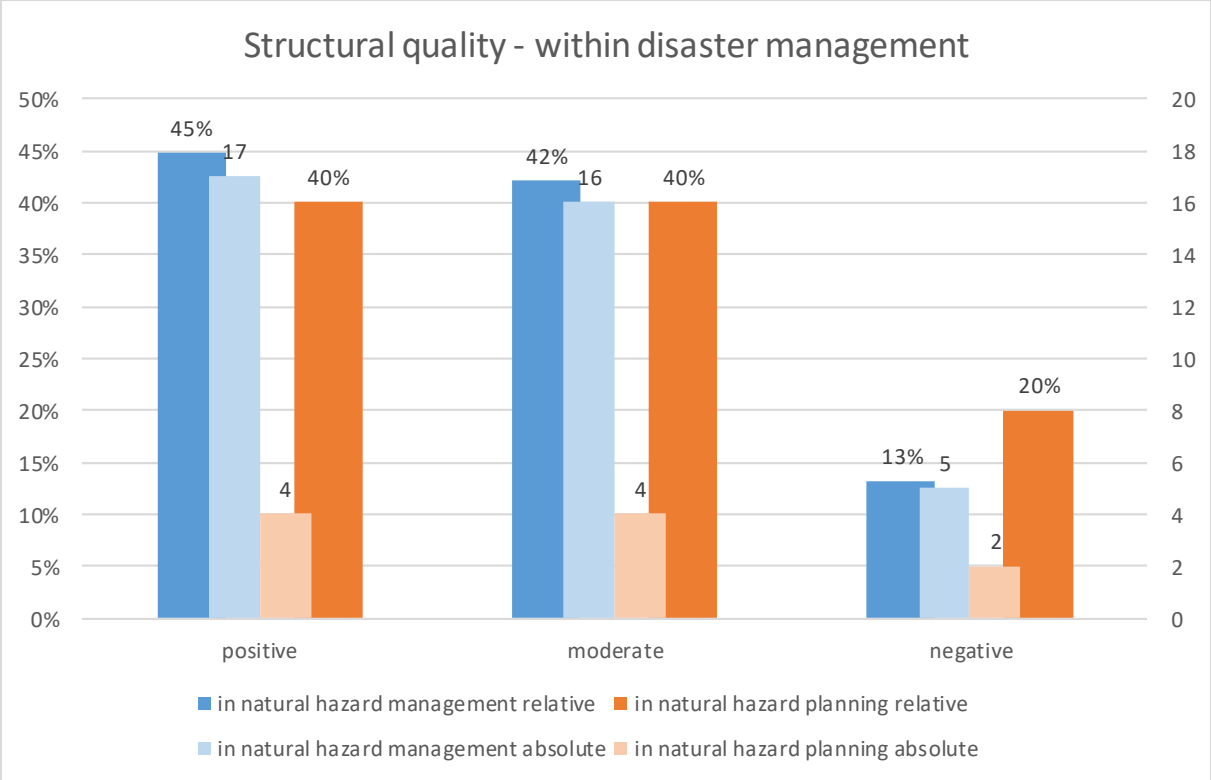

Figure 63: Evaluation of structural quality within forest fire management.

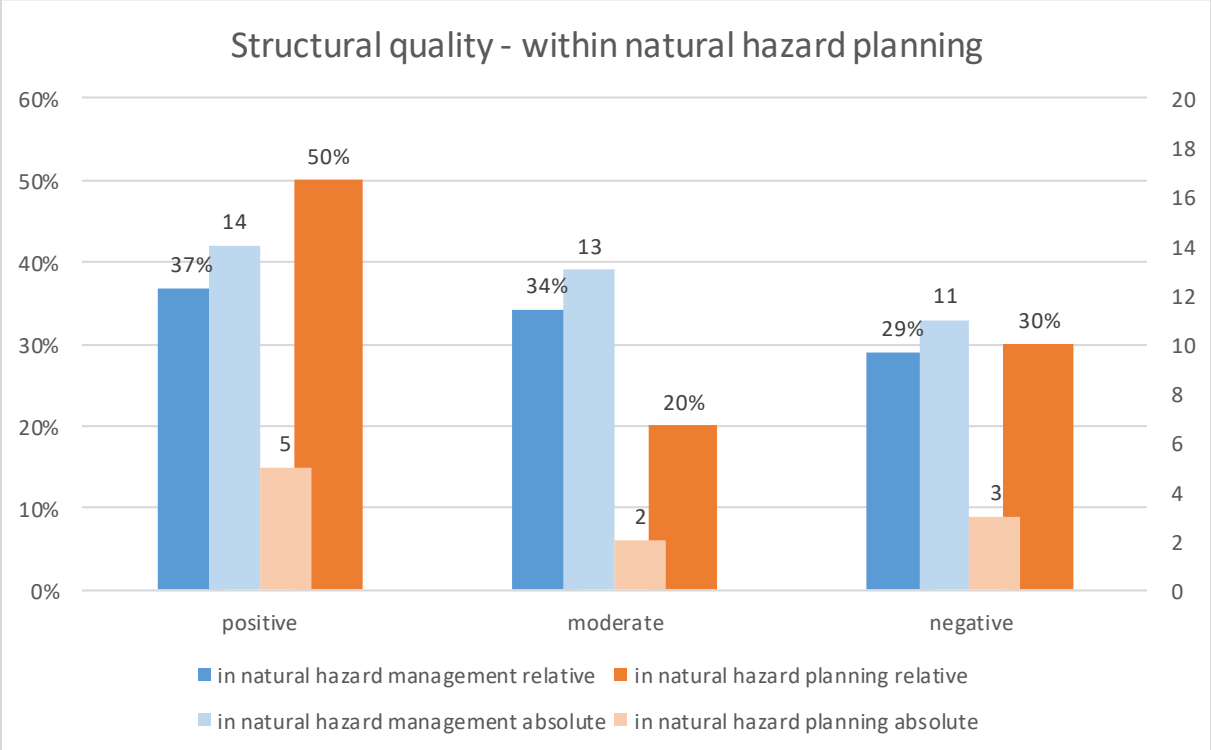

Figure 64: Evaluation of structural quality within forest fire planning.

In both cases the concerned group rated the structural quality within their area of responsibility better than the outside group. The structural quality within disaster management got very good feedback: 45% or 40% rated it as positive and 42% or 40% of the participants rated it as moderate. The results show that 50% of natural hazard planning gave positive feedback on the structural quality within natural hazard planning, 20% moderate feedback and 30% negative feedback. Here is definitely room for improvement.

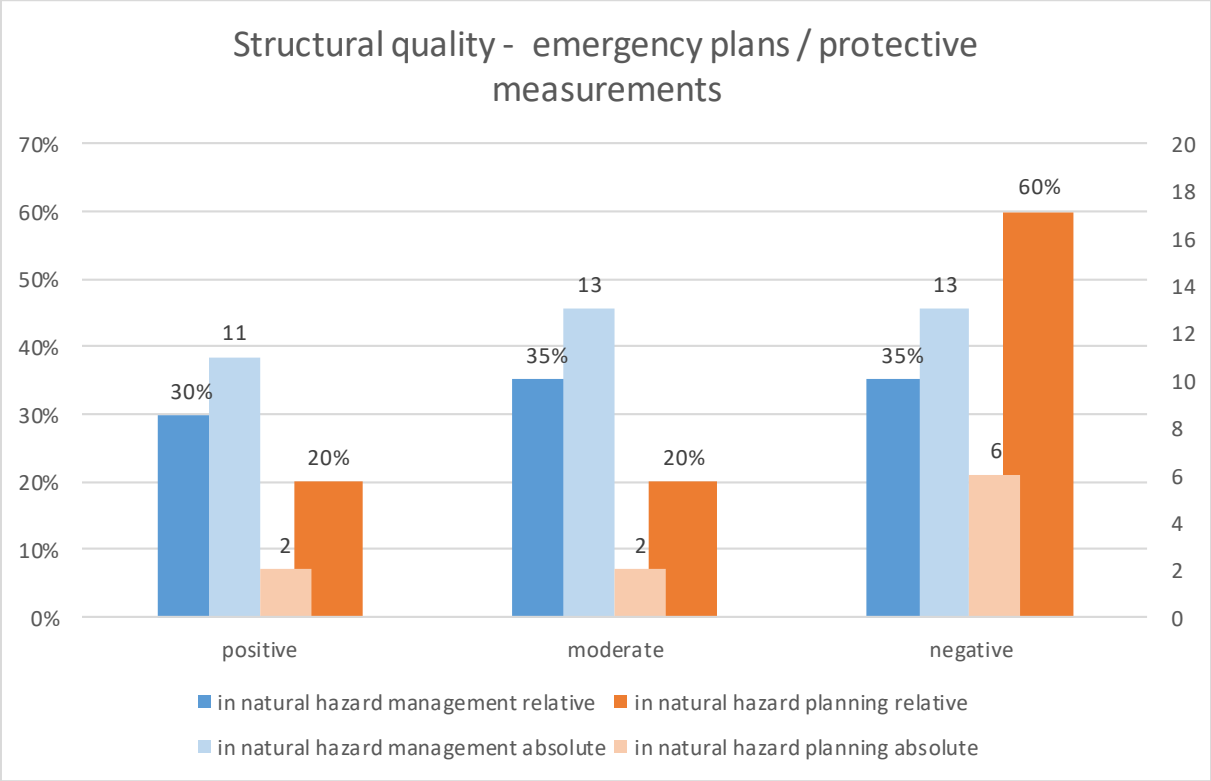

Figure 65: Evaluation of structural quality of emergency plans and protective measurements for forest fires.

The structural quality of emergency plans and protective measurements of forest fires got negative feedback from most of the participants on this natural hazard. There is a lot of room for improvement on the emergency plans and protective measurements.

Material resources

The material resources were specifically queried for each natural hazard, for which individual questions were also designed. In addition to the selection questions, the participants were also asked in their own words about the lack of input material. These evaluations are listed and explained here as a result of the graphical evaluation of the selection questions.

Floods

In the case of flooding, permanent structural or technical measures such as retention basins, river bank walls or dams were asked for in the respective area of responsibility. If there are any, the assessment was asked whether there were enough. The second focus was placed on the need for temporary measures in addition to the permanent ones and if these were necessary, whether they would be available in the area of responsibility in the event of an incident.

Question 29A in this subcategory was also evaluated for the questions in the chapter on material resources. It was evaluated whether there was a clear inventory management for the material in order to be able to better assess the existing possibilities in the event of an emergency.

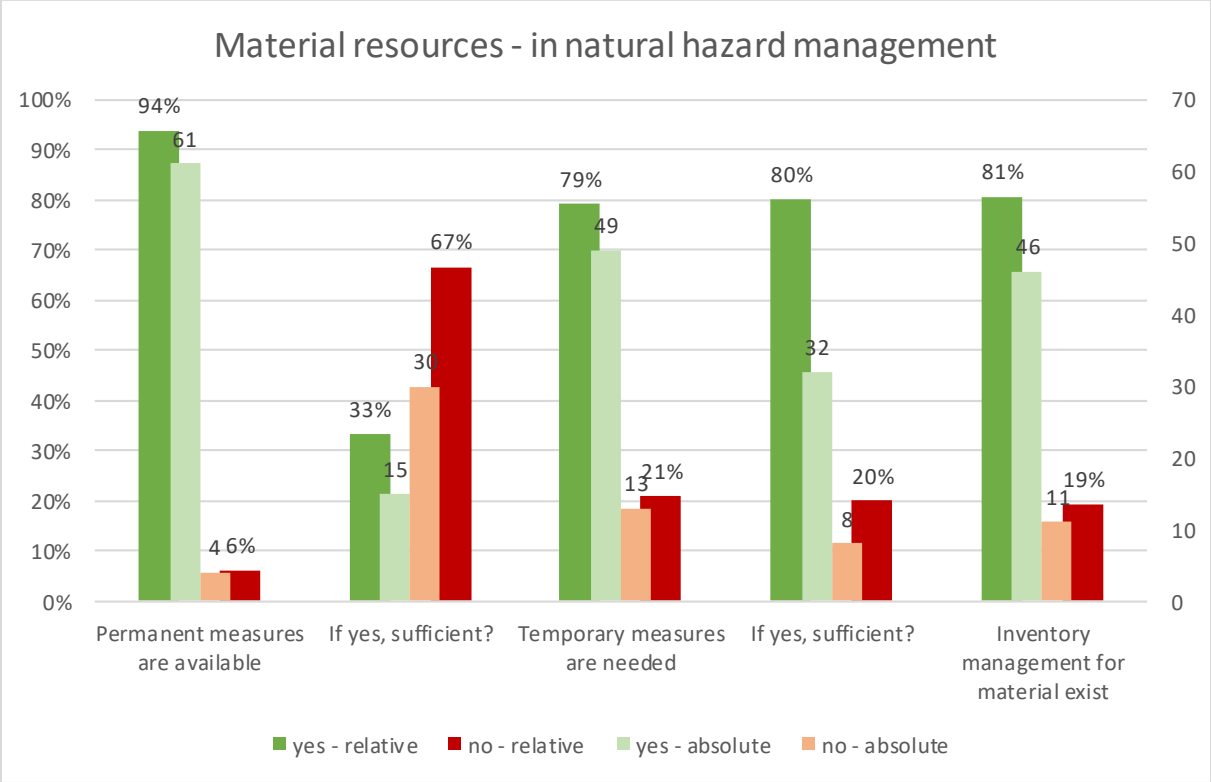

Figure 66: Evaluation of material resources from a flood management perspective.

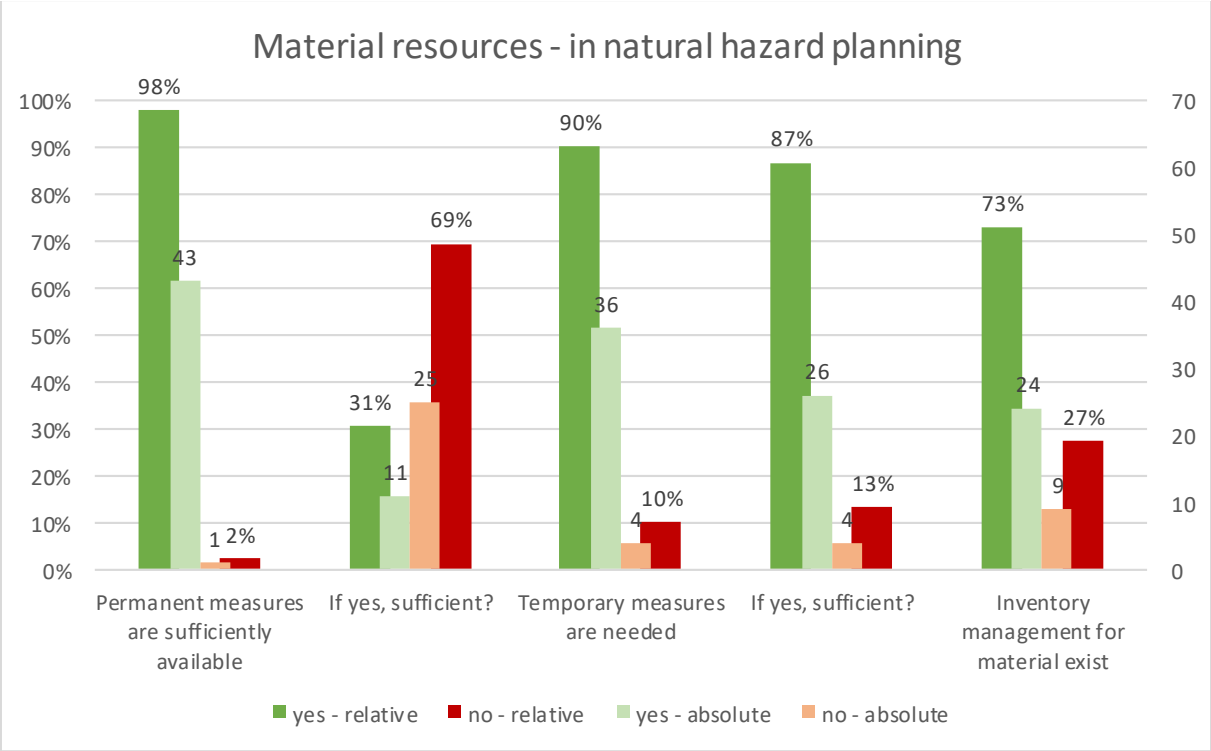

Figure 67: Evaluation of material resources from a flood planning perspective.

When asked about material resources, the natural hazard planners and natural hazard managers agreed quite well. Overall, there exist sufficient permanent measures, but these were often classified as inadequate. Temporary measures, on the other hand, are a little less necessary, but when they are necessary, they are also sufficiently available. In general, the natural hazard managers organized the inventory of materials a little more satisfactorily than the natural hazard planners. One can highlight this in both cases as a best practice example.

When asked about the missing input materials, the following comments were made:

- The acquisition and maintenance of operational resources is a matter for the municipal fire brigades. The cantonal fire brigade inspectorate has centrally stored large resources (heavy pumps, etc.) which can be used according to priorities in the event of an incident.
- The input material for the individual process sources / operational plans is usually stored on site. Supplementary general material is stored centrally.
- basic flood protection
- What is not there will be organized
- We don't miss anything, but flood protection is a task that will never end.
- Mobile flood barriers, flood bag, sludge pumps, etc.
- arranged areas for the installation of barriers, flood barriers, embankments and dams, retentions, non-return shells
- half-mounted prefabricated partitions
- High water mobile / segmental flood barriers, flood bag, etc.

Thus, (mobile) flood barriers were requested several times, twice flood sack and once each landscape areas for the installation of barriers, anti-pole prefabricated partition walls, embankments and dams as well as retention and sludge pumps were named.

Avalanche / Ice avalanche

The experts for avalanches / ice avalanches were asked if structural / technical permanent and temporary measures for protection are sufficiently available in the area of their responsibility.

Question 29A in subcategory structural quality was also evaluated for the questions in the chapter on material resources. It was evaluated whether a clear inventory management for the material is in order.

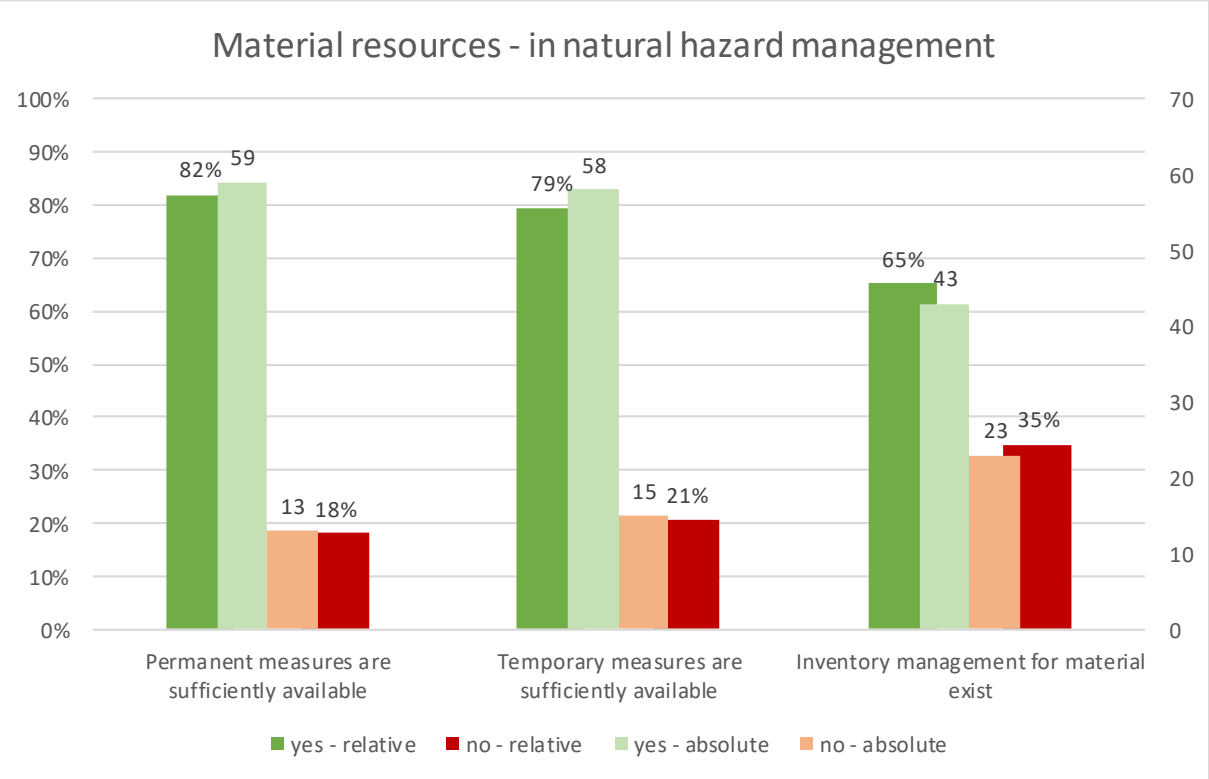

Figure 68: Evaluation of material resources from an avalanche / ice avalanche management perspective.

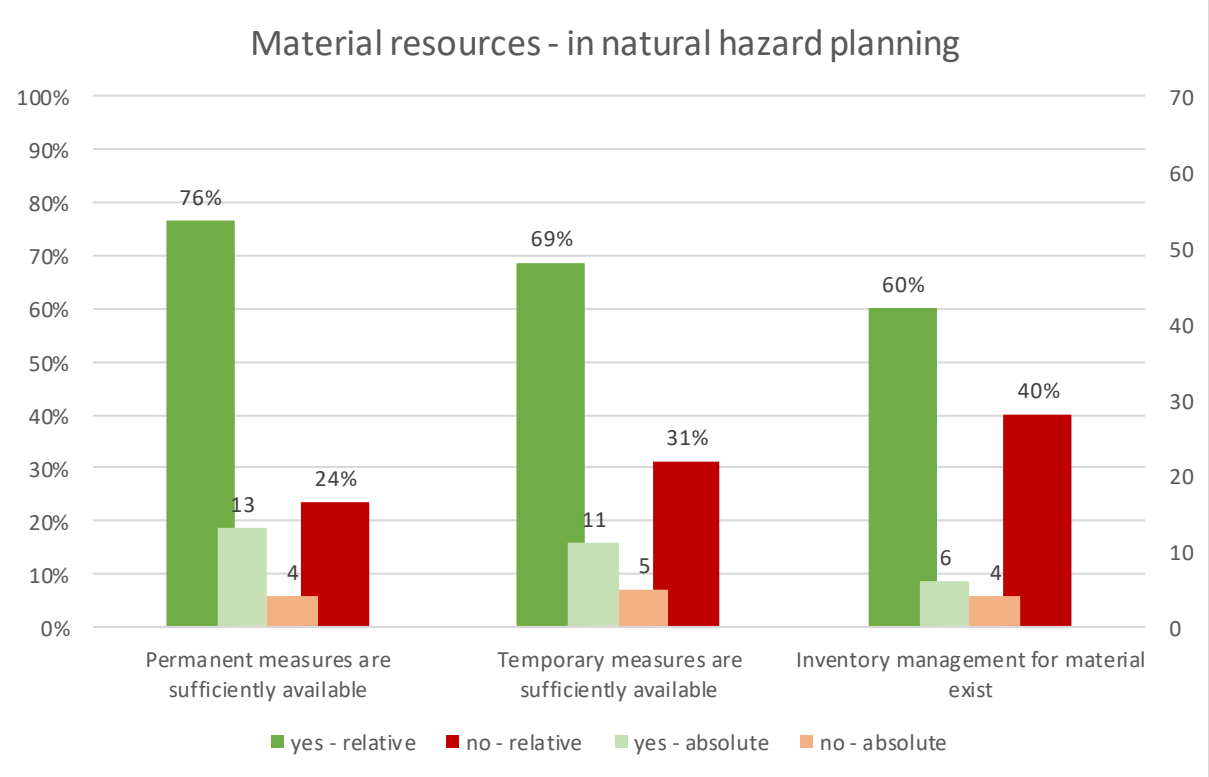

Figure 69: Evaluation of material resources from an avalanche / ice avalanche planning perspective.

The results show that a high percentage of natural hazard management and planning agrees to have sufficiently available permanent and temporary measures. However, the temporary measures are not

as positive rated as the permanent measures. About the inventory management for material 35% or 40% of the participants said that it does not exist.

When asked about the missing input materials, the experts made the following comments:

- Equipment (avalanche transceiver, probe, shovel, radio, snow cover investigation)
- temporary avalanche protection (road barriers, artificial release systems)
- permanent avalanche protection (avalanche barriers)
- Data (weather station, avalanche maps)
- Personnel (explosives officer)

Most of these comments were mentioned more than once, temporary avalanche protection was mentioned five times, equipment and data was mentioned three times.

Soil slope failures

In the case of soil slope failures, the questions asked about the sufficiently availability of permanent or temporary measures for protection. Besides some specific questions were asked like if there exist retention areas or if the retention spaces are sufficient. In addition, it was asked if the experts have the necessary input material in case of damage.

Question 29A from chapter structural quality asked about the existence of a clear inventory management for the material and was additionally evaluated for the questions in the chapter on material resources.

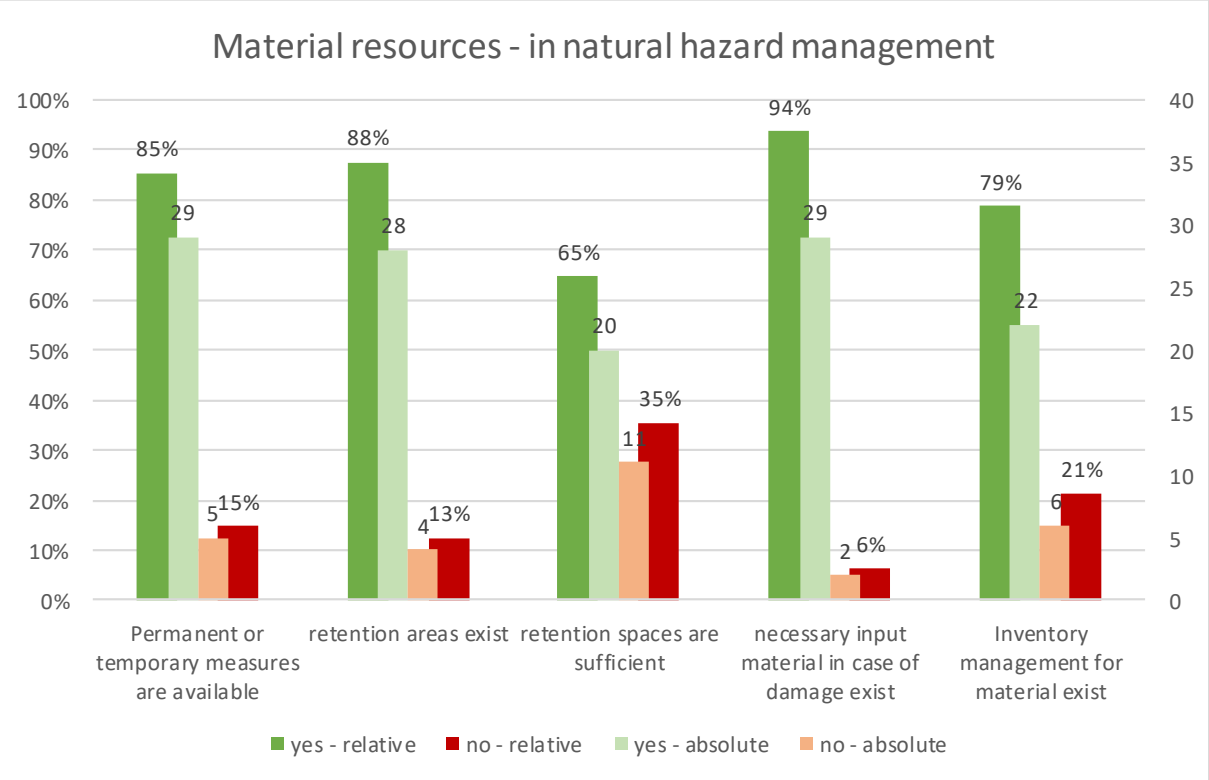

Figure 70: Evaluation of material resources from a soil slope failure management perspective.

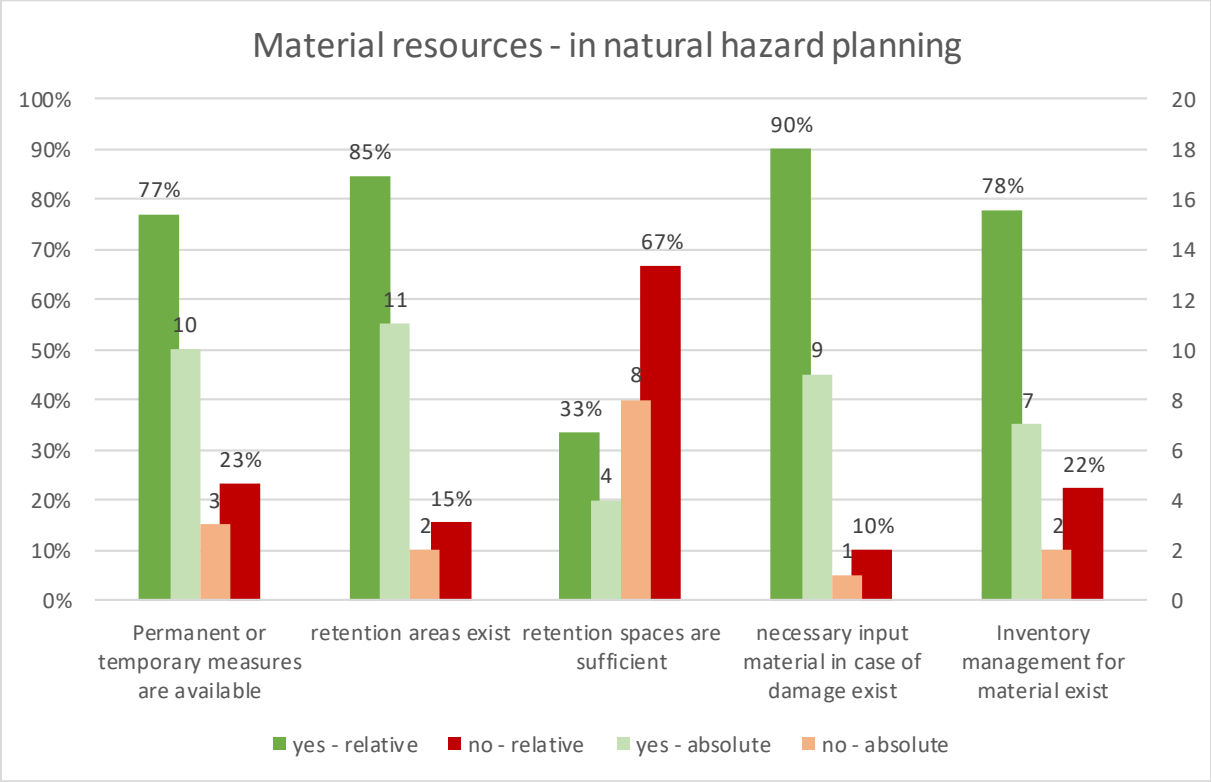

Figure 71: Evaluation of material resources from a soil slope failure planning perspective.

A high percentage of experts answered that permanent or temporary measures are available and that retention areas exist. On the question, if retention spaces are sufficient natural hazard management and natural hazard planning did not agree. While 65% of the experts in natural hazard management thought that the retention spaces are sufficient, 67% of the experts in natural hazard planning said that the retention spaces are not sufficient. This wide disagreement is surprising and raises the question why these two experts groups have such different opinions. Are their needs that different?

On the questions about the existence of necessary input material in case of damage and inventory management for material both experts groups gave to a very high percentage positive feedback.

When asked about missing material only once drones were reported.

Forest fire

The experts for forest fire were asked in this chapter if they have the necessary technical firefighting resources like helicopters, fire engines, etc. Additionally it was asked if they have special forest fire brigades and special protective equipment for forest fire events.

Question 29A from chapter structural quality asked about the existence of a clear inventory management for the material and was additionally evaluated for the questions in the chapter on material resources.

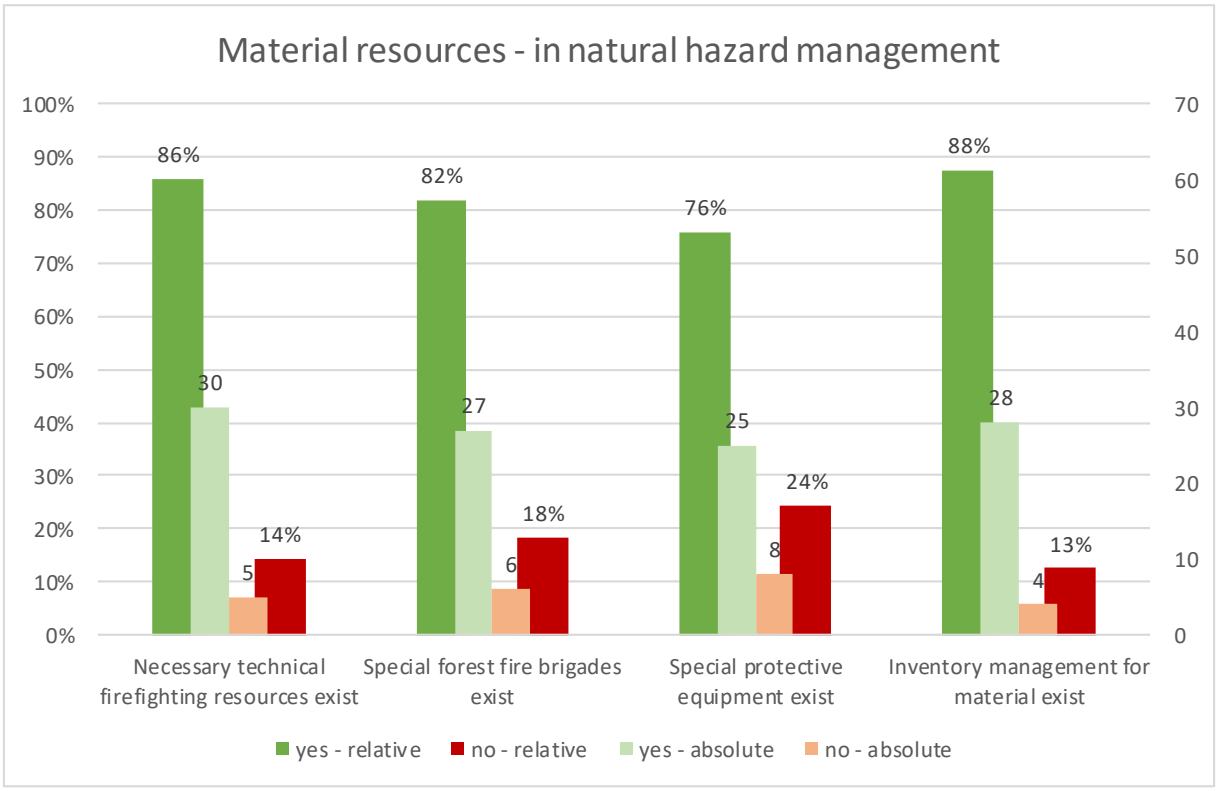

Figure 72: Evaluation of material resources from a forest fire management perspective.

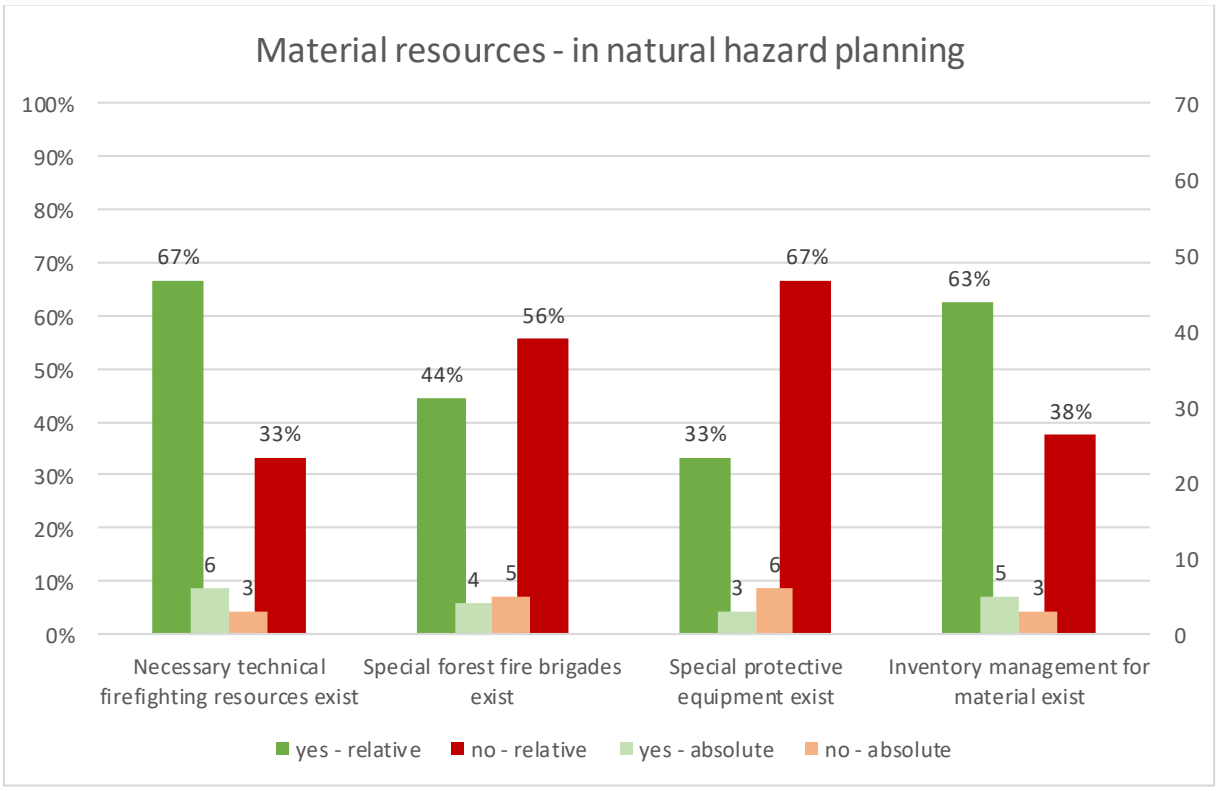

Figure 73: Evaluation of material resources from a forest fire planning perspective.

At the question about the existence of necessary technical firefighting resources and an inventory management for material, the experts in natural hazard management and planning answered mostly with yes. At the questions about the existence of special forest fire brigades and special protective

equipment, the opinions differed very much. Natural hazard management said that those things exist, while a significant part of the participants in natural hazard planning disagreed (56% and 67%). This wide disagreement on those two questions is surprising and raises the question why these two experts groups have such different opinions. Do the natural hazard planner not have the full knowledge about the available material or do these two expert groups have such different needs and expectations in their equipment?

When asked about the missing input materials, the experts made the following comments:

- Special fire trucks (suitable for forests, mountains)
- Material for small fires and extinguishing work
- Protective clothing for forest fires
- Heat-resistant safety ropes
- Platforms for stabling cargo in the field
- Sprinkler system
- Helicopters
- Communication

Most of these comments were mentioned more than once, special fire trucks was mentioned four times for example.

Human resources

Six questions with a total of 19 sub-questions were asked about human resources, whereby the question focused on experience-based knowledge (here specifically on know-how and training), willingness to learn and staff availability.

For the evaluation of practical knowledge - know-how, five sub-questions (35A-C, 37D and 37G) were summarized and divided into three categories: positive (4 or 5 positive answers), moderate (2 or 3 positive answers) and negative (0 or 1 positive answer).

The questions 36A-C, 37E-F and 37J were summarized to get results about practical knowledge concerning the training within the chapter human resources. The categories for that evaluation were: positive (4-6 positive answers), moderate (2 or 3 positive answers) and negative (0 or 1 positive answer).

The questioning about willingness to learn summarized four sub-questions (37A-C and 37H) and divided the results into three categories: positive (3 or 4 positive answers), moderate (2 positive answers) and negative for 0 or 1 positive answer.

In addition, the questions about cross-border cooperation were considered and evaluated separately. Both, the current situation of cross-border cooperation and the need or desire for cross-border cooperation were asked: In my area of responsibility cross-border trainings take place (37J). In my area of responsibility there is a need for cross-border operations (37I).

Floods

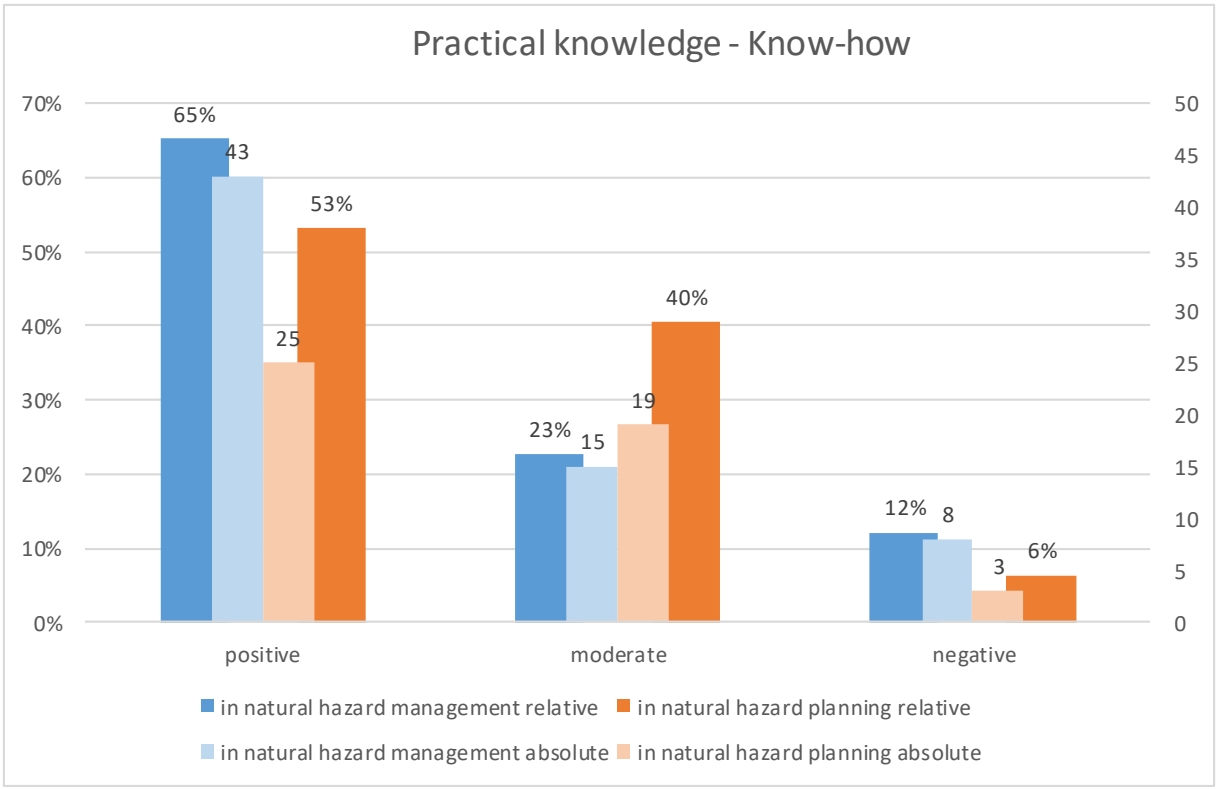

Figure 74: Practical knowledge due to know-how within the natural hazard floods.

65% (in natural hazard managements) and 53% (in natural hazard planning) rated the experience-based knowledge of experts concerning actual disaster operations positive, while further 40% of planners rated it as moderate. This human resource is a good example for working practical knowledge but has for sure room for improvement among the natural hazard planners.

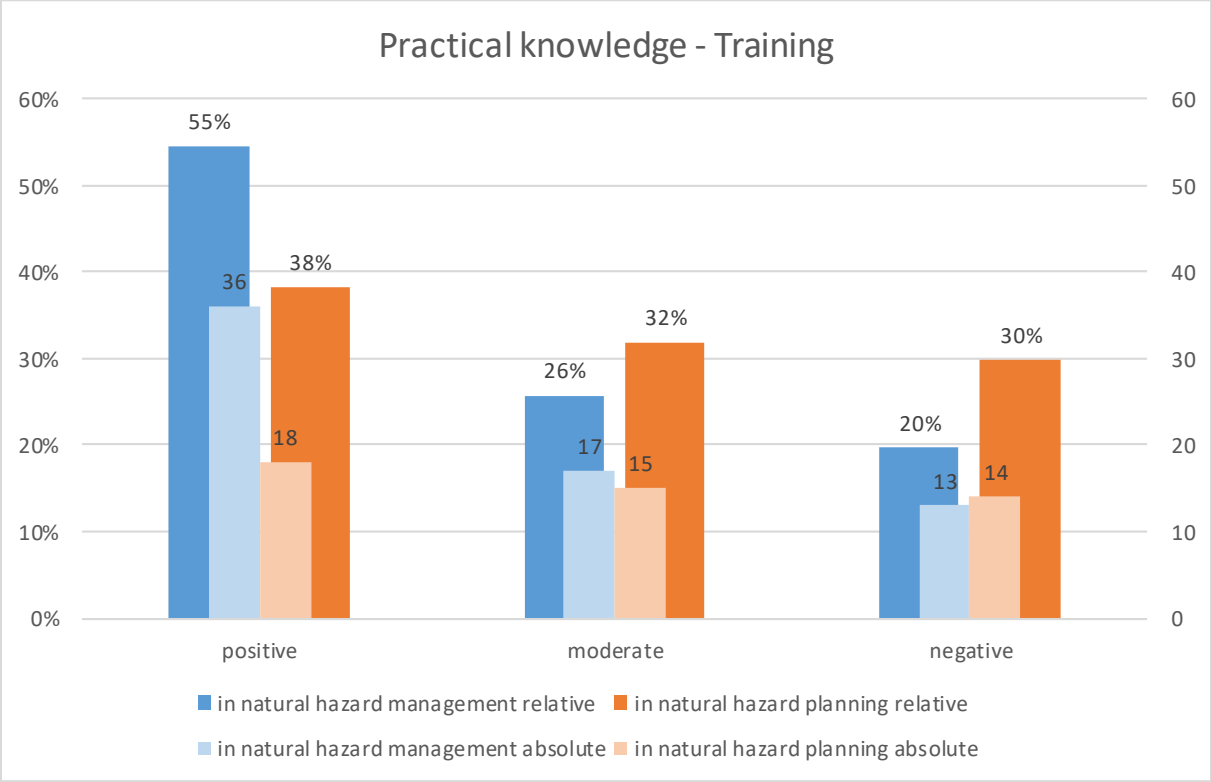

Figure 75: Practical knowledge due to training within the natural hazard floods.

When evaluating the experience gained with regard to training, the natural hazard managers gave significantly better feedback than the natural hazard planners, which indicates their more intensive involvement in the handling of the disaster response and in the trainings of such. However, there is still great potential for improvement here, as 20% and 30% gave negative feedback on the training conditions.

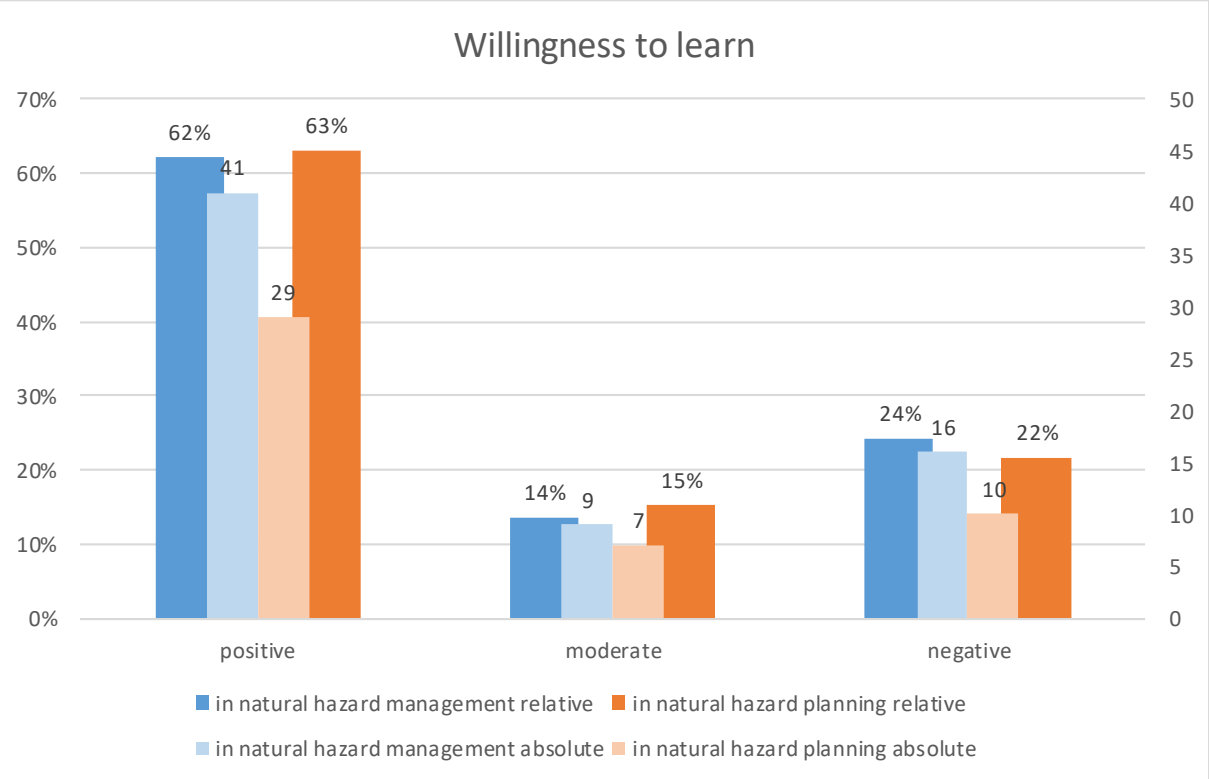

Figure 76: Evaluation of the willingness to learn of the flood experts.

The result of the willingness to learn evaluation was astonishing. There is a high willingness to learn among the participants, which in turn suggests a desired expansion of the further training opportunities. The positive thing is that if there were more training options, the willingness to accept the offer is quite high.

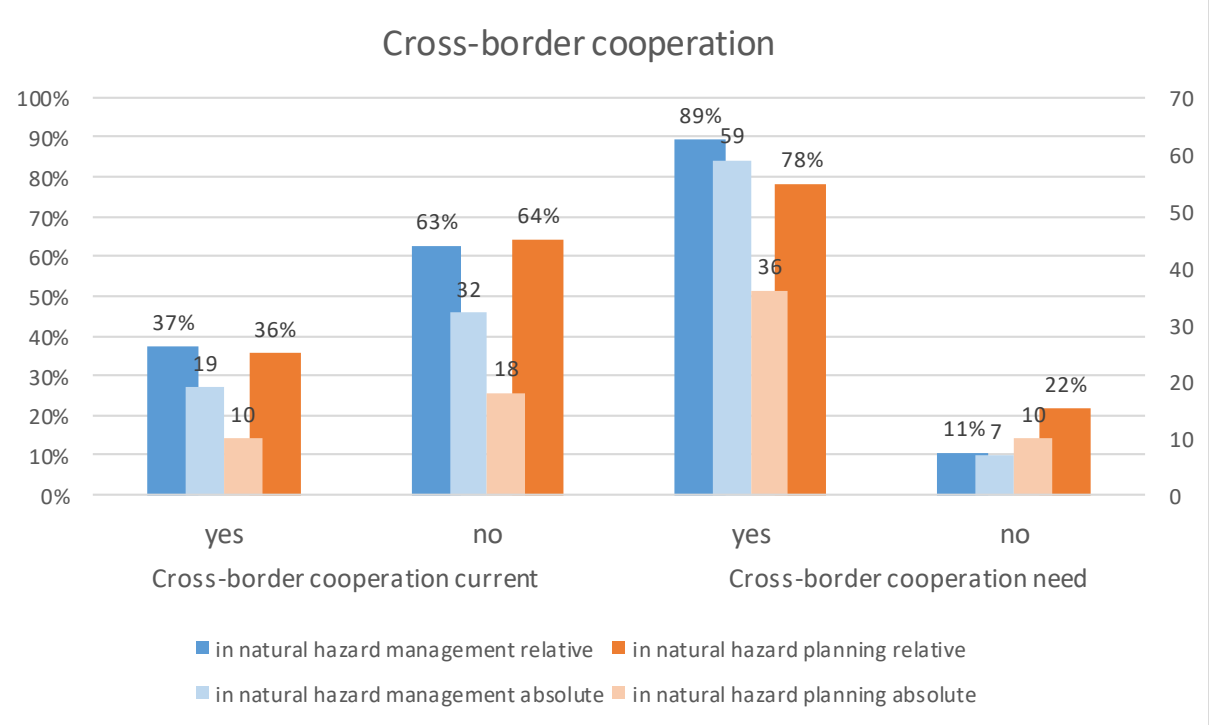

Figure 77: Availability of cross-border cooperation current and needed for flood experts.

The evaluation shows that there are only a few examples of cross-border training in the natural hazard forest fire, but that there is still a great need for more exchange between the countries.

Summarized together with the evaluation of the willingness to learn, the results show that more training and exchange between the countries would be welcome and would be accepted as a further training opportunity.

Avalanche / Ice avalanche

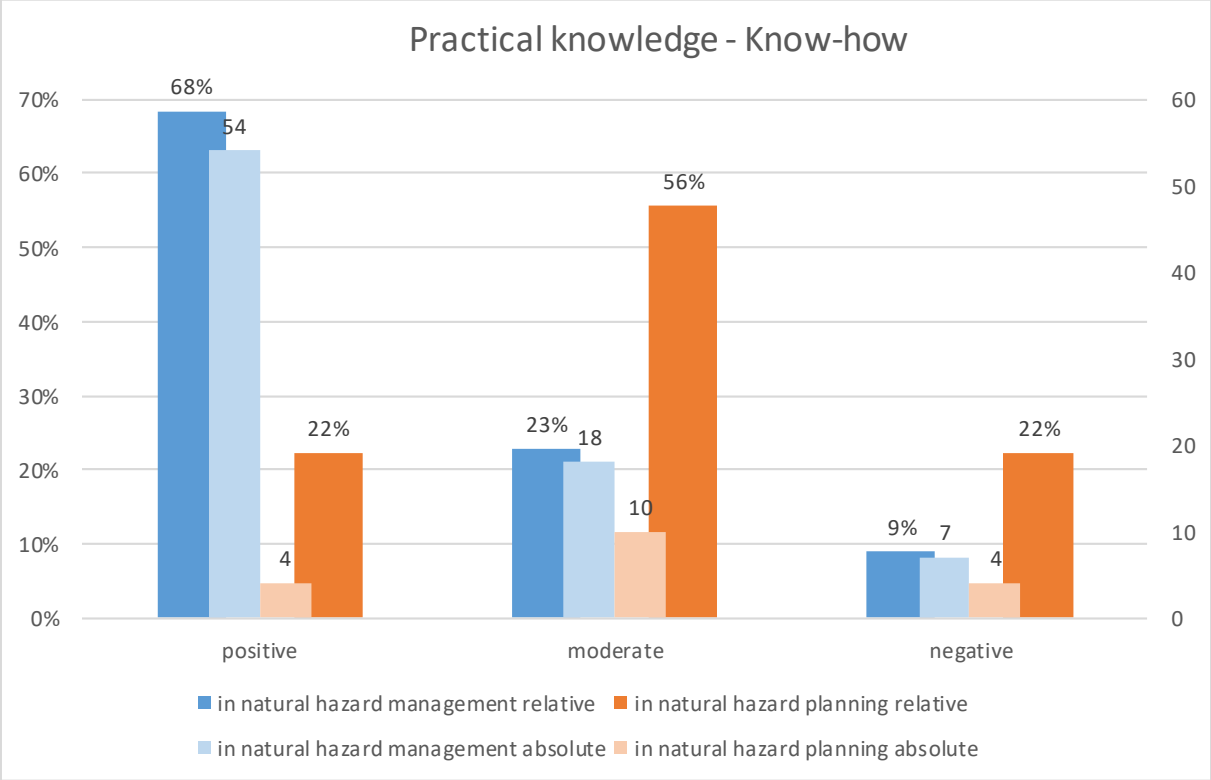

Figure 78: Practical knowledge due to know-how within the natural hazard avalanches / ice avalanches.

68% of the experts in natural hazard managements rated the experience-based knowledge of experts concerning actual disaster operations positive, while 56% of planners rated it as moderate. This human resource is a good example for the different perspectives on the processes in handling natural disaster situations.

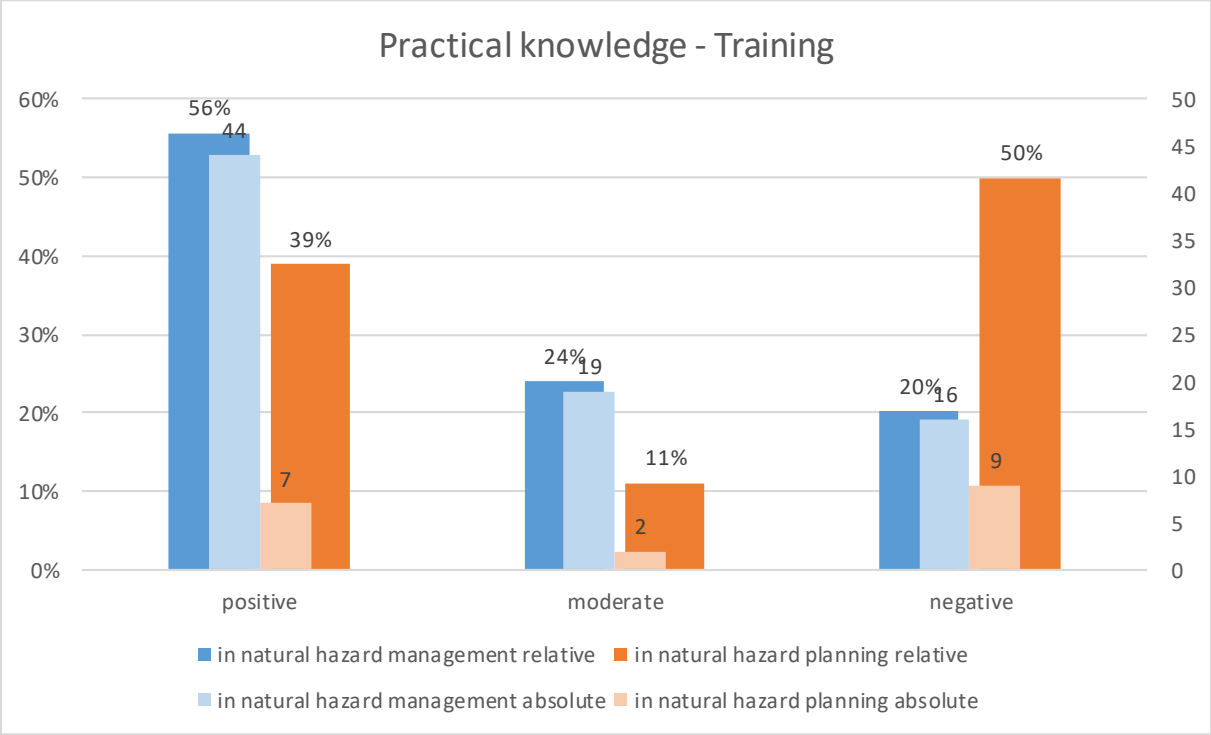

Figure 79: Practical knowledge due to training within the natural hazard avalanches / ice avalanches.

The practical knowledge with focus on the trainings got quite positive feedback from the management (56% positive and 24% moderate) while natural hazard planning rated it by 50% negative. This result indicates, that there are too less trainings specifically for experts in natural hazard planning available and not enough opportunities to train disaster situations.

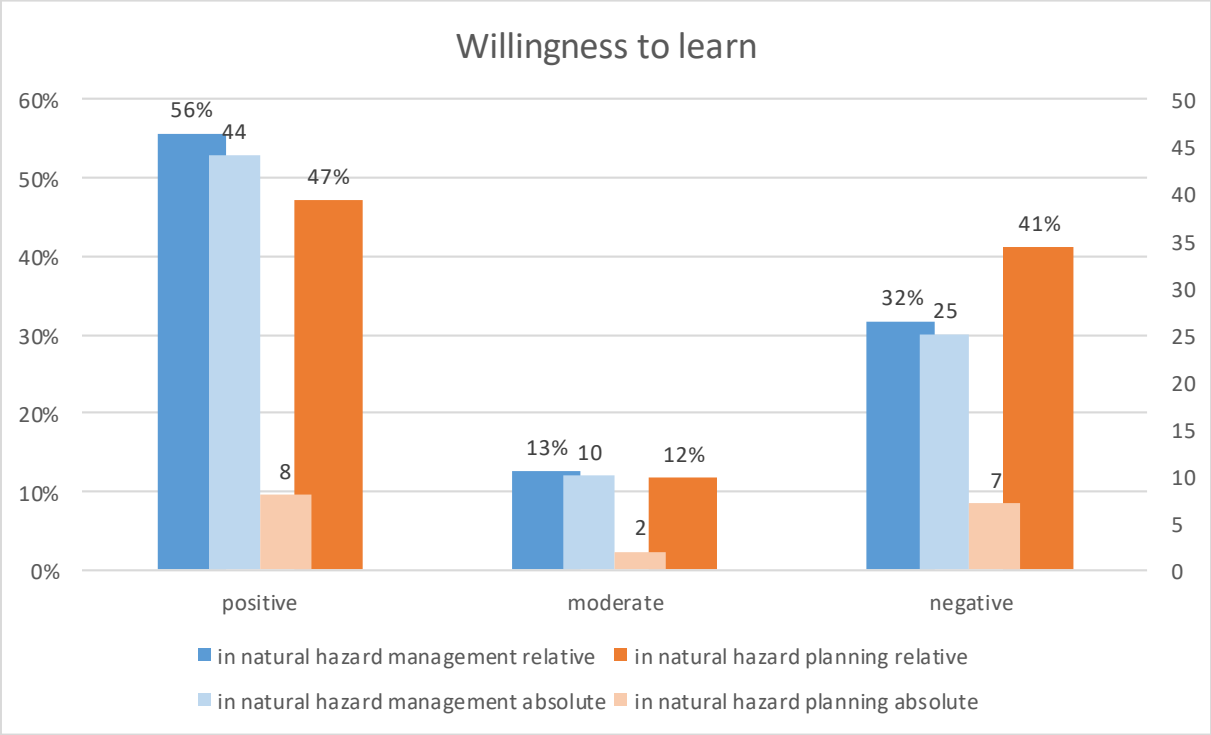

Figure 80: Evaluation of the willingness to learn of the avalanche / ice avalanche experts.

The evaluation of the willingness to learn shows, that most of the natural hazard management (56%) and planning (47%) experts gave a positive feedback. However also a significant of percentage in natural hazard management (32%) and planning (41%) gave a negative feedback to that topic. It seems that the willingness to learn is quite divided within the experts and possible trainings opportunities would not be consumed as willing as hoped.

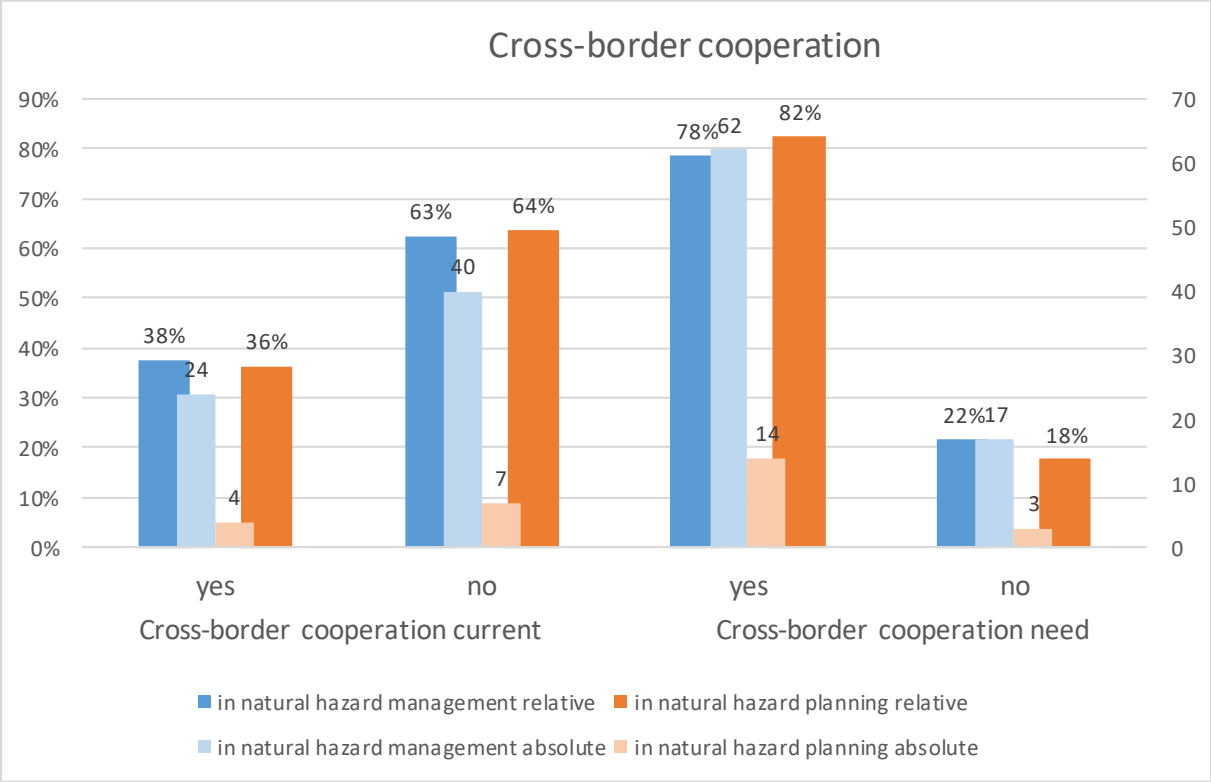

Figure 81: Availability of cross-border cooperation current and needed for avalanche / ice avalanche experts.

The evaluation of the cross-border cooperation shows that currently there are not much of such cooperation in place, but that there is a great need for more exchange between the countries.

Soil slope failures

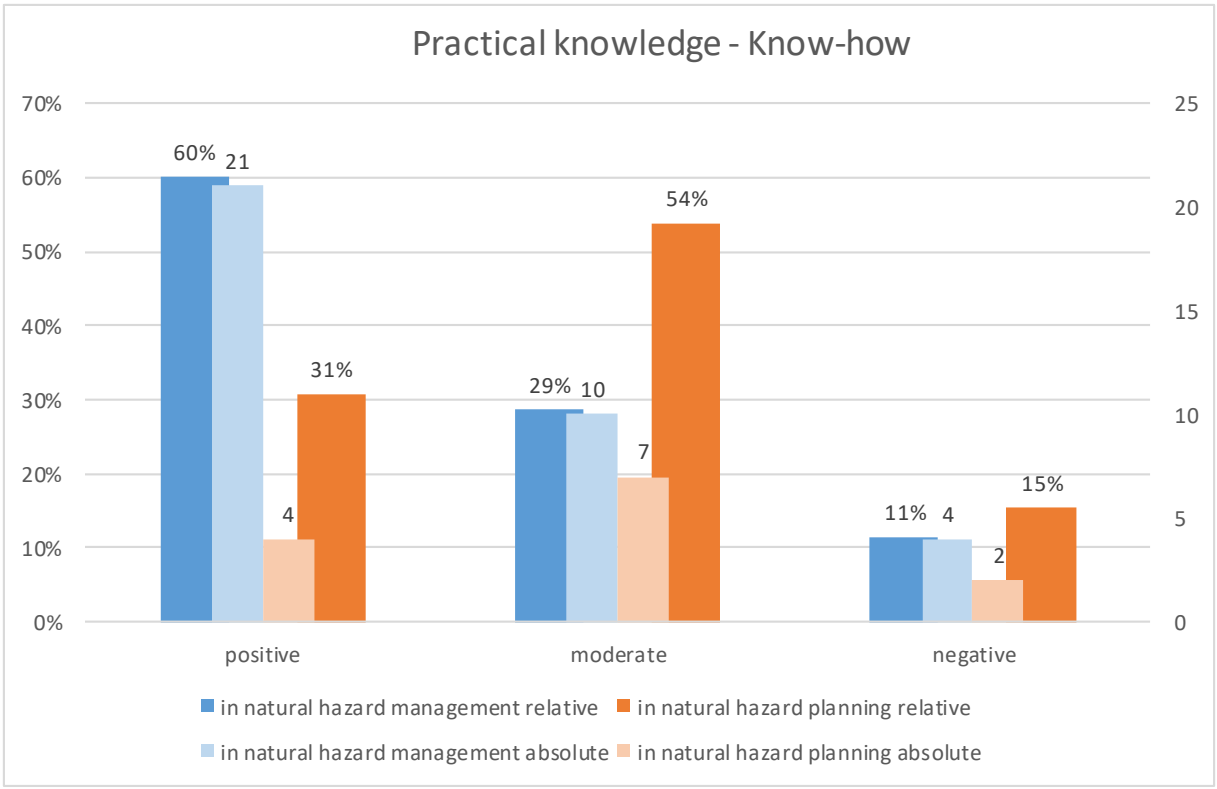

Figure 82: Practical knowledge due to know-how within the natural hazard soil slope failures.

60% of the experts in natural hazard managements and 31% of the experts in natural hazard planning rated the practical knowledge based on experienced knowledge positive, while 54% of planners and 29% of the managers rated it as moderate. Within this human resource is more room for improvement and coordination of the different perspectives on the processes in handling natural disaster situations.

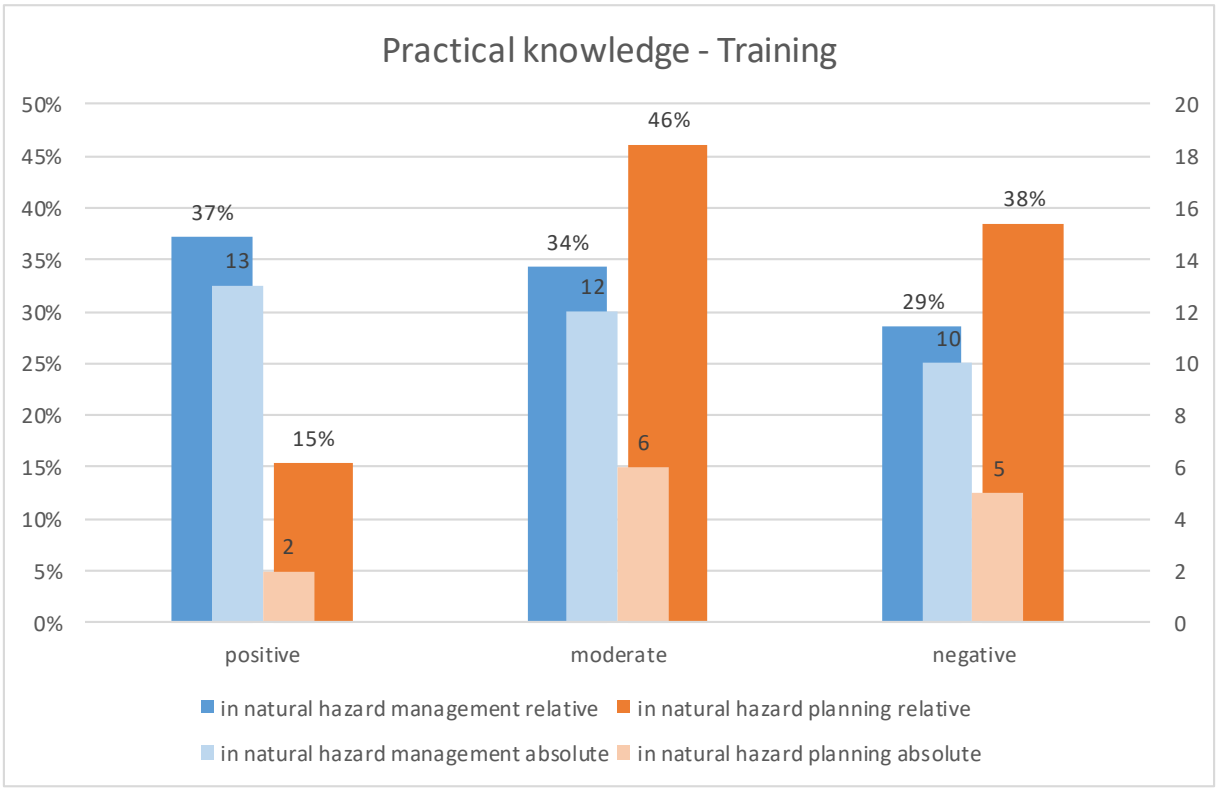

Figure 83: Practical knowledge due to training within the natural hazard soil slope failures.

The practical knowledge with focus on the trainings in the natural hazard soil slope failure got a rather moderate to negative feedback. Even though most of the natural hazard management votes gave a positive feedback, a large percentage of the evaluation rated this practical knowledge as moderate and negative. For both experts groups the training situation is not satisfying as it is.

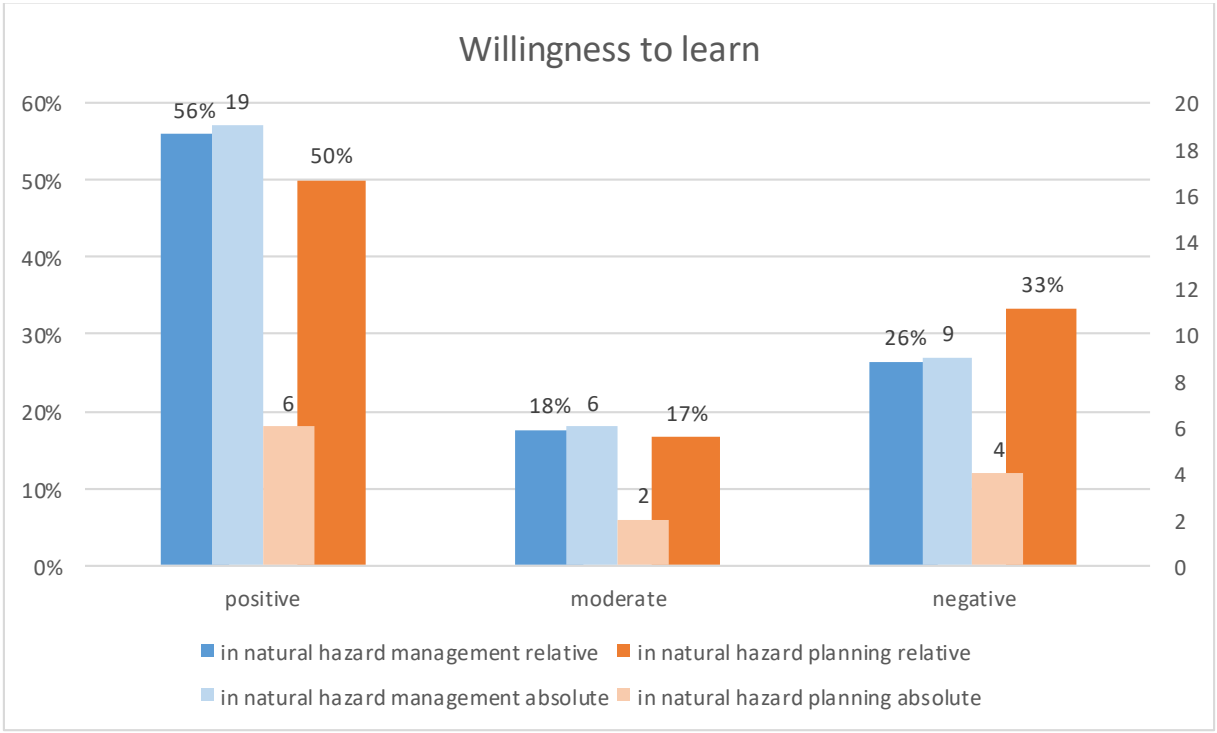

Figure 84: Evaluation of the willingness to learn of the soil slope failure experts.

The evaluation of the willingness to learn shows, that most of the natural hazard management (56%) and planning (50%) experts gave a positive feedback. However, some of the participants (29% and 33%) gave a negative feedback to that topic. It seems that the majority of the experts is willing to learn and consume more training opportunities.

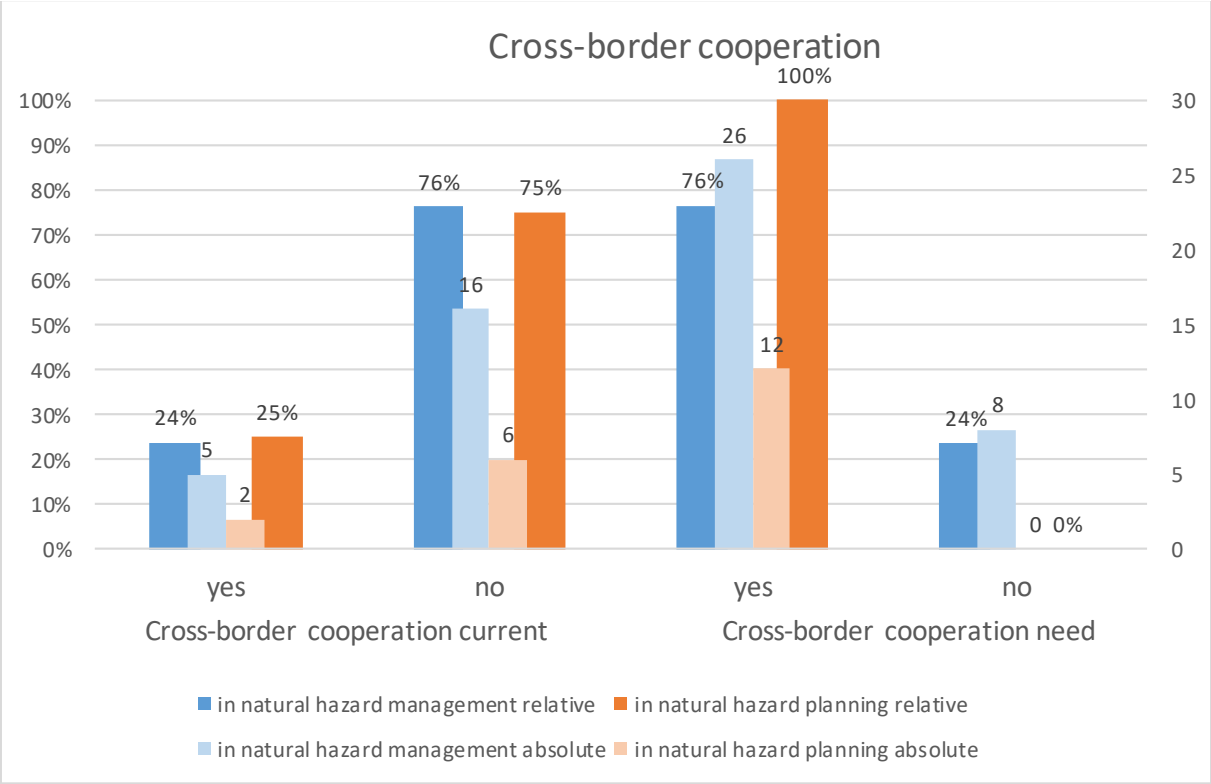

Figure 85: Availability of cross-border cooperation current and needed for soil slope failure experts.

The evaluation of the cross-border cooperation shows that currently there are only a few examples of such trainings in the natural hazard soil slope failure, but that there is still a great need for more exchange between the countries.

Forest fire

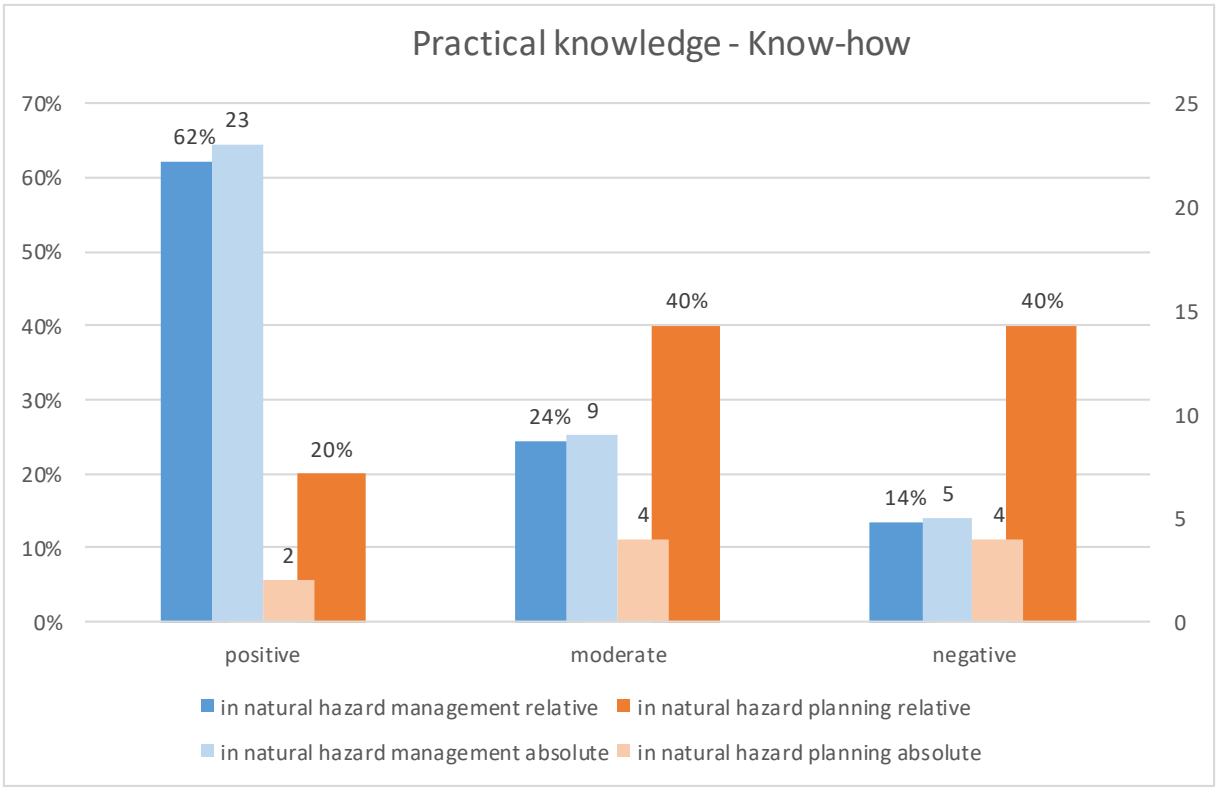

Figure 86: Practical knowledge due to know-how within the natural hazard forest fires.

The practical knowledge with focus on experience-based knowledge of experts is rated very positive by natural hazard management (62%) and rather moderate (40%) or negative (40%) by natural hazard planning. On this human resource the opinion of the experts groups differ significant which indicates the different perspectives on the processes in handling natural disaster situations. Especially for natural hazard planning there is room for improvement, while the practical knowledge within natural hazard management seems like a best practice example.

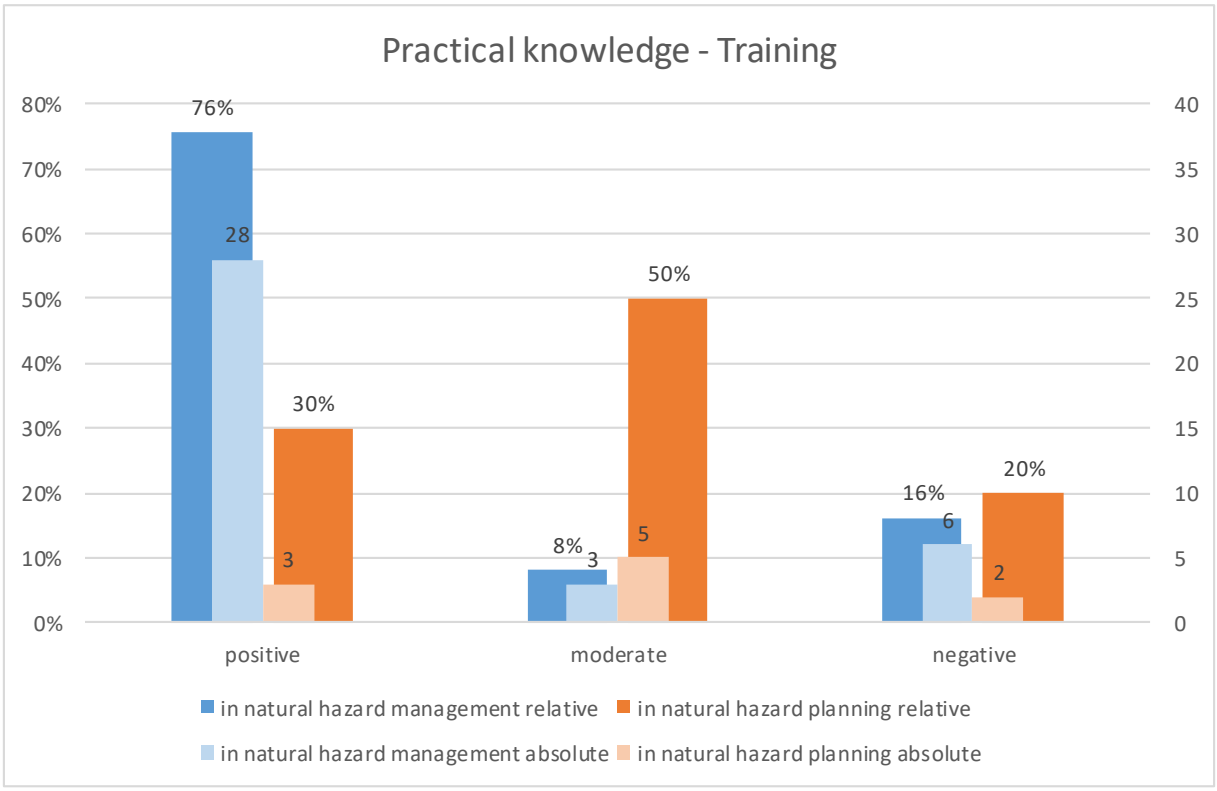

Figure 87: Practical knowledge due to training within the natural hazard forest fires.

Natural hazard management rated the practical knowledge with focus on training very positive (76%) while the majority of natural hazard planning rated it moderate (50%).

Especially for natural hazard planning there is room for improvement, while the practical knowledge within natural hazard management seems like a best practice example.

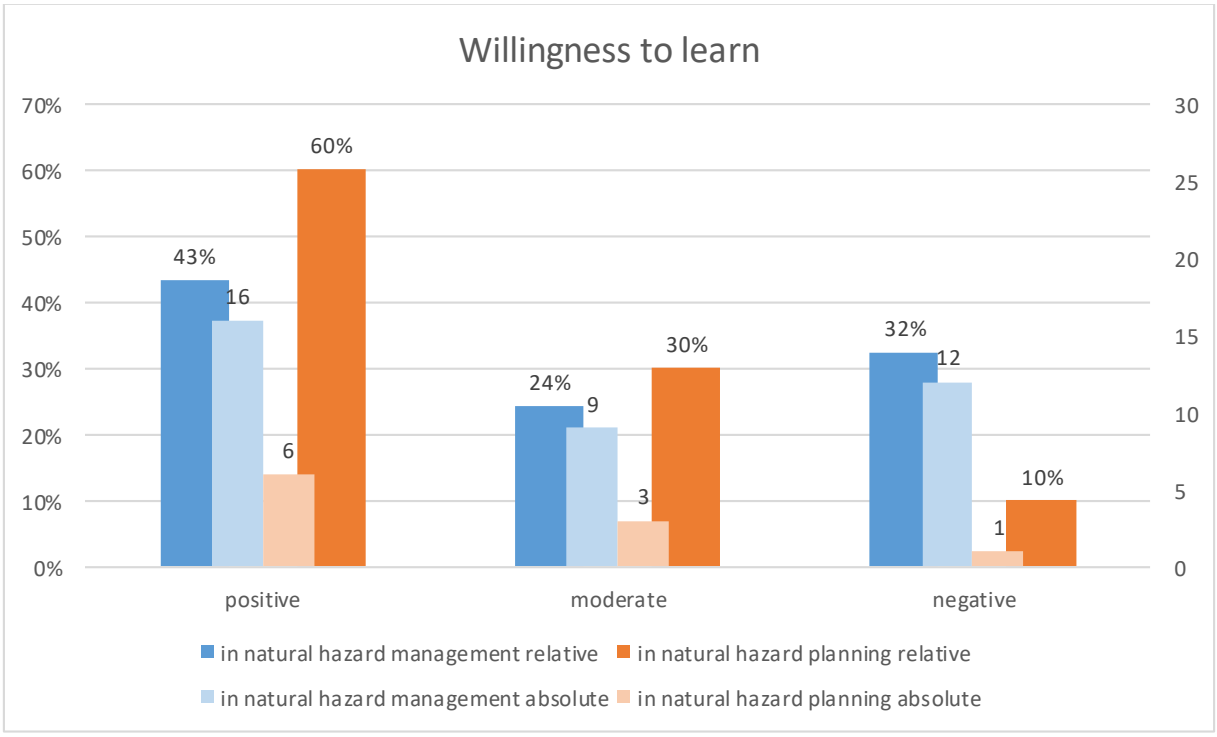

Figure 88: Evaluation of the willingness to learn of the forest fire experts.

The feedback on the willingness to learn was from both expert groups mainly positive. Natural hazard management rated it rather worse. With this result, one can ask if the manager have the feeling to not need more training or to not have more motivation for training in their field.

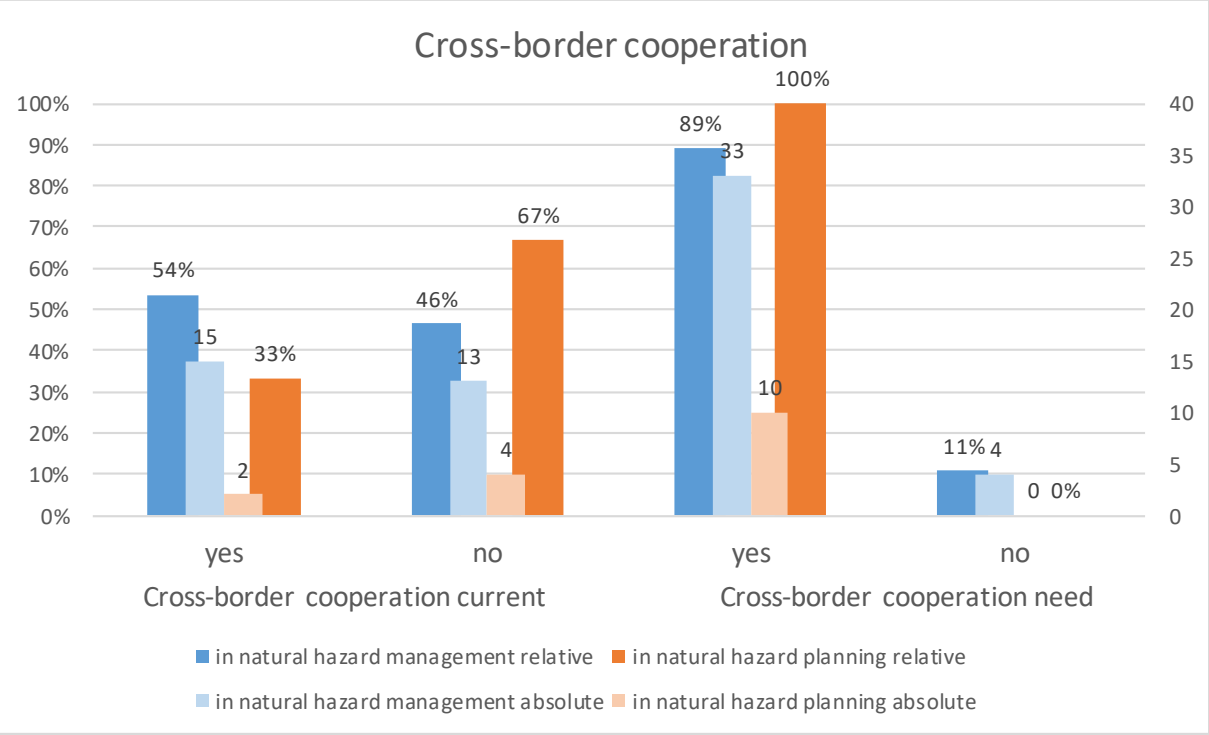

Figure 89: Availability of cross-border cooperation current and needed for forest fire experts.

The question about current cross-border cooperation reveal, that significant more of such cooperation exists for natural hazard management (54%) than for natural hazard planning (33%). The second question shows that both expert groups have an extensive need for further cross-border cooperation.

Recommendations for Action

Recommendations - Data availability

The documentation of damage events should be more standardized with definition of at least necessary parameters. Those documentations should be a digital available, continuous catalogue of local events with the possibility of traceability and the derivation of lessons learned protocols for coping capacities regarding future events.

A challenge in terms of documentation is that hazardous events (also within different countries) are often documented by different institutions according to their pursued goal or purpose. The depth of content for recording events therefore differs depending on the purpose of the documentation. A documentation scheme that allows to be filled by all actors with a uniform minimum input would be an advantage! In the sense of an international unification, standardized recording procedures should be available. For example, in the field of avalanche documentation, one could orientate oneself more on guidelines such as the UNESCO Avalanche Atlas or standards from the EAWS (European Avalanche Warning Services).

Contingency planning should evaluate the existing hazard warning maps in cooperation with natural hazard management, because the management does not see them as positive as the planning does.

However, the survey shows, that a great need for all such hazard maps for the natural hazards to be available digital, best to be available online via GIS. The working process of contingency planners and natural hazard managers has changed much more in the last years towards digital and mobile availability of information.

Early warning systems are working, but the input data should be optimized and the network has to be updated, so that all current consumers will be reached. Additionally, the early warning systems should be available earlier, but with lengthening the forecast horizon the quality of accuracy will decrease. Early warning systems (e.g. regarding soil slope failures) are mostly based on precipitation information or weather forecasts. Local accurate forecasts for small alpine catchment areas are still difficult. For local emergency managers, more specific weather information would be of great advantage. This is where the challenges lie in research, especially in times of climate change with changing weather patterns.

For the natural hazards soil slope failures, floods and forest fires more measuring water withdrawal points, precipitation measuring points and river level measuring points should be available – especially in the preparedness phase for the risk managers.

Recommendations - Risk communication

For improving information exchange between contingency planning and natural hazard management and the relation between those experts a yearly meeting between planner and manager would be recommended to encourage the development of maps in close cooperation and to communicate lessons learned from practical experience.

An important tool for risk communication between planners and managers are among others the disaster control plans at local level. It is important that the responsible planners at the local level record all (future) relevant risks and that the procedures for deployment are clearly defined for local management. The mapping of certain event scenarios promotes risk awareness and contributes to a better understanding between planners and managers.

Furthermore, a transformation of pure hazard maps into cross-disciplinary risk maps should also be aimed at (risk maps that include exposure and vulnerability are only available to a lesser extent in some countries).

Recommendations - Material resources

The need of material resources is specific for every natural hazard, but mainly helicopters, personal equipment (like protective clothing for forest fires or avalanche transceiver, shovel and probe for avalanches), special fire trucks, drones and mobile flood barriers are needed.

The main tasks regarding technical protection measures are to be assigned also to the spatial planners and political decision-makers. Local spatial planning must be well coordinated with existing hazard zone plans. It is important that damage potentials are already avoided during the planning phase. A retention area would often not have to be created if it was kept away from creating new infrastructure from the ground up. Infrastructure on questionable slopes (e.g. with regard to soil slope failures) or within flood plains must be critically examined in the future under the care of responsible spatial planning. Building sins from past decades must not be repeated - with political support. Under these circumstances, some structural measures or financial expenditures will not even be necessary.

Recommendations - Human resources

For all natural hazards, the results of the online survey show a positive feedback on the willingness to learn. Therefore, more training of the natural hazard experts should be offered and definitely more cross-border cooperation within the natural hazards should be initiated.

More exchange of data and information is not just wanted between contingency planning and disaster management, but also between the countries.

In some countries, the participation of volunteers plays an extremely important role in the field of natural hazard management. With increasing settlement pressure and intensifying weather extremes, this volunteer work will become even more important. It is of immense importance to maintain the level of volunteers (e.g. fire brigades) and to increase it in the light of a generally worsening situation due to climate change. In this context consider volunteers are intrinsically motivated. People want to experience competence and group membership. If people feel self-determined and competent during their voluntary service intrinsic motivation increases. Consequently, invest in training for volunteers and in everything that increases identification with the group.

Qualitative Analysis – Outlook

In our research we focused on „How is contingency planning put into practice in real life? What do we learn from it for future contingency planning?" While the quantitative survey was focusing on the status quo, the qualitative approach allows to rather understand the reasons and processes behind developing best practice examples.

Each participating country was invited to organize a workshop to be held within a region that is severely affected by at least two natural hazards. In two separate workshops, the responsible emergency planners and emergency managers assessed the respective natural hazard using the Rapid Risk Appraisal[1] (RRA) adapted in this project. The adapted RRA is a network diagram that reflects the subjective assessment of the respondents on the quality of five selected categories. The categories

- Data availability
- Risk communication
- Structural quality
- Material resources
- Human resources

were often mentioned in previous exploratory interviews as being particularly important with regard to the cooperation between contingency planner and natural hazard manager and were therefore selected as central analysis categories. After spontaneous assessment of the cooperation on these 5 categories, a focus group discussion followed in the Austrian workshop. The discussion did not cover all categories, but rather those that were either conspicuously assessed in the RRA or for which the workshop group had a particular need for discussion. The results of the workshops on avalanche and floods held in Austria were evaluated with regard to the following questions:

1. What are the reasons for developing strengths (best practice) in terms of data/information availability, risk communication, structural quality, material resources and human resources?

[1] The Rapid Risk Appraisal approach was developed within the UE Interreg Alpine Space Project "*GreenRisk4Alps*".

2. What hinders us to develop strengths (best practice)?
3. How to master the weaknesses (points missing) through measurements at the interface between contingency planning and natural hazard management?

A case comparison of all workshop results at the level of natural hazards will be presented in the final report. First results and political recommendations for action can, on this basis, be derived from the Austrian Workshop.

Findings from the flood workshop

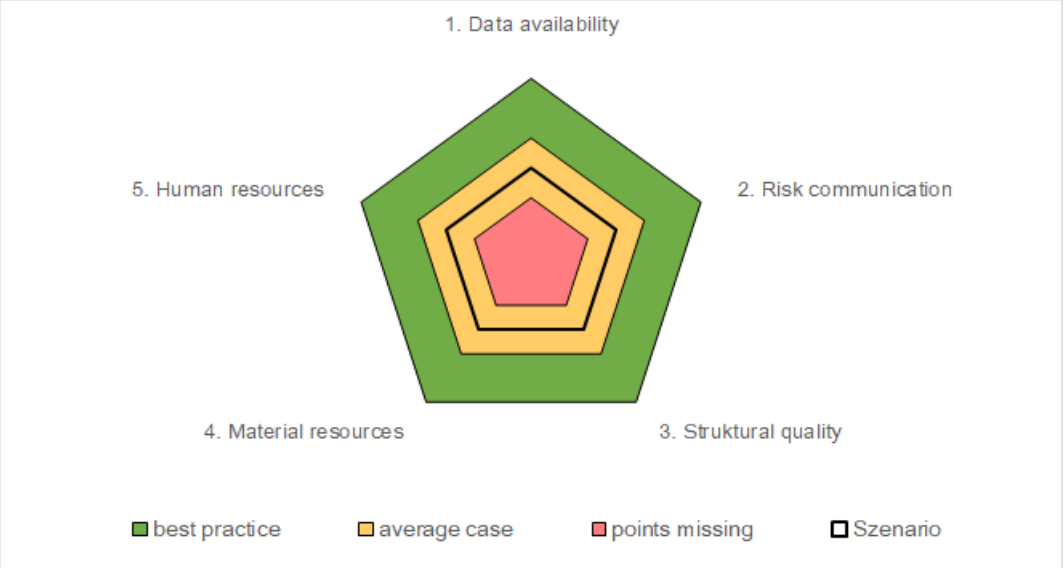

Figure 90: RRA-Flood-Workshop Austria.

Based on the individual and subjective individual results of the workshop participants, an average assessment for the natural hazard "flood" was found for the individual analysis criteria. The overall assessment showed an "average case" evaluation for flood scenarios in each individual criterion. Thus, improvements are desirable in all areas. From the individual assessments, several best practice scenarios can be found in the area of "data availability".

The results of the Rapid Risk Appraisal were then discussed in the focus groups on the basis of the evaluation questions.

In Austria there are several working tools in various applications for the natural hazard " flood ". At regional level, analysis and forecasting tools are used in combination with advance warning of the emergency services. In this context, best practice is understood to mean that as many events as possible should be recorded, independent of the extent of the event and the scope of the information. The data on past damage events can be applied in such a way that the findings serve for assessment and drawing conclusions. Online apps and online databases are used to record and document current fire-fighting operations. This online availability allows, already during the operations, to draw conclusions in which areas and regions problems are currently occurring. For the application of these tools, the collection and documentation of events is a very important step and requires the cooperation of the individual institutions. But in most cases it is not a matter of cooperation, just the disclosure of data. Furthermore, working and forecasting tools are subject to constant development. In this context, mobilisation of the system is particularly desirable. However, the staff in charge still prefer to use pen and paper, a mobile version and its application do not go hand in hand. In addition, these tools are very difficult to use because they were created by IT specialists. The use of existing work tools must be made easier and developed further for the local level. This can be achieved by improving cooperation between the various institutions concerned for data collection. The user-friendliness of such tools and their general mobilisation should also be promoted.

In addition to the benefits of digitisation, an increase in user acceptance must also be achieved. In order to be able to record and verify the data accordingly, a structured processing is necessary. Risk

management plays an important role here. The reference to and awareness of events must be created. Acting persons must be assigned by the municipalities and districts to achieve a structured process and to be able to pass on knowledge. But the reason for not appointing such persons is a lack of resources, financial means.

In many municipalities, the distribution of tasks is often not clearly defined and no person has been appointed as a hazard officer. The origin of such problems is not a lack of interest or ability, it is the financial side, the lack of resources. Similar problems are also evident in the processing of event data. There it often fails due to a lack of acting persons or the transfer of knowledge of past events. Human resources are a very big issue and in principle this is a challenge, since public authorities are usually involved. This results in a prioritisation of resource allocation and often there is a general lack of risk awareness, especially among decision-makers (resource allocation and demand planning).

Best practice examples in contingency planning are mainly found in regions with recurring scenarios. In recent years, problem scenarios with slope water have become more and more frequent. Due to the popularisation of the problems, slope water maps are increasingly being produced. With regard to these new extreme events, a functioning risk communication must be promoted with an additional focus on raising awareness, in the population and especially among decision-makers. More priority must be given to resource allocation. There is a need for joint work on awareness raising. Conscious communication and the passing on of information are also important at the interface between the administration and the executing institutions (fire brigade, hydraulic engineering office, etc.). Young people must be properly trained, especially in reading hazard zone plans correctly and understanding how to use them correctly in spatial planning. The purpose of this would be to establish responsible experts for the correct use.

A basic statement was made: "Basically, a lot of things work very well. But this fact is based on a high level of commitment from individuals". People with commitment must be sought and found. There are highly motivated and committed people almost everywhere, but more structure is needed, especially in the state and federal departments. Often institutions do not feel addressed or a classification is not possible because the context is not given. Functionality in the event of an incident is often only achieved by individuals.

Political instructions for action derived from the flood workshop

- Investment in digitisation: Simplifying the design and establishment of digital (online) tools for data documentation (e.g. regional event documentation) and involving users in the development process in order to increase both user-friendliness and acceptance of the new technologies. Uniform or compatible tools concerning all involved institutions (planning and management) and levels (local, regional and national) in order to optimise data transfer.
- Develop regional experts: Within the regional population, interested and committed individuals must be found who are intrinsically motivated to make contributions to risk prevention (documenting observations and events, etc.). It is a state task to train regional experts in order to ensure uniform documentation and the quality of risk prevention.
- Define responsible persons: Defined regional risk officers can improve and support the structure - the communication channels and cooperation between the institutions concerned - and thus optimise functionality. However, this can only be achieved if the follow-up points are also taken into account.

- Raising awareness, especially among decision-makers, through training, information events, etc., in order to give greater priority to the allocation of resources
- Make financial resources available for appropriate tasks, create human resources.

Findings from the avalanche workshop

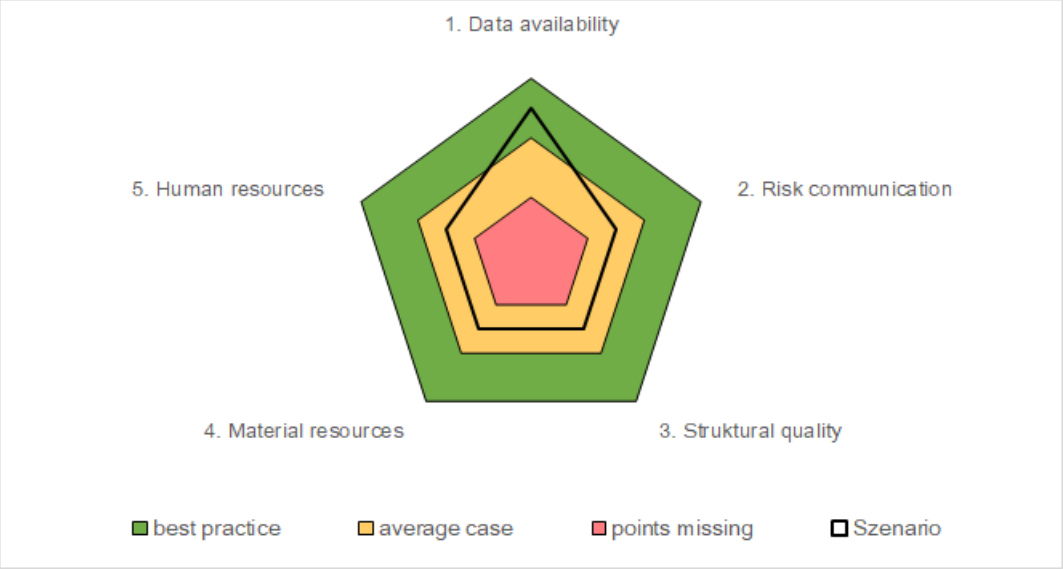

Figure 91: RRA-Avalanche-Workshop Austria.

The summary of the individual, subjective results of the avalanche workshop showed the average assessment for natural hazards as presented above. In the area of "data availability", best practice scenarios were found for avalanche events. The other analysis criteria were evaluated as "average case" and thus represent the areas with potential for improvement. From the individual assessments, several best practice scenarios can be found in the area of "material resources".

The results of the Rapid Risk Appraisal were then discussed in the focus groups on the basis of the evaluation questions.

Austria already has very good tools for the documentation of avalanches (the province of Styria, ZAMG, and local interested parties are also trying to refine the network) as well as a very good online network of weather and snow data. There are a lot of weather stations and they are constantly being expanded due to the great interest of various institutions (Land, ÖBB, ...). Major events have made it possible again and again to obtain funding. The avalanche warning system in recent years has been expanded enormously, with the main influence of ski touring and paragliding on tourism. More than the natural hazard itself has an influence on data availability, and safety is not the only priority. Ski tourism requires more information (weather conditions, temperature, avalanche warning level, ...), the focus has moved away from protection (of the infrastructure) to information for ski tourism. Therefore there are many new weather stations and the information is available on a larger scale. To further improve the existing, very good tools for the documentation of avalanches by providing more data, a further expansion of weather stations is necessary. This is due to the fact that there are many different interested parties that benefit from these data (the federal state, ÖBB), the promotion of country development is being promoted. Networking and the provision of data via the Internet are also of great importance and should be promoted.

It is very difficult to set up a functioning, consolidated and independently documented avalanche database, regardless of the extent of the event. This requires a complex adaptation of the data by critical questioning and personal validation of the individual events. Experience has shown that this system can only work with committed people and the necessary funding. Existing databases provide a form for the documentation and logging of events. But not all avalanche warning services use a uniform database. There is also a lack of a uniform guideline or a law on the obligation to document events.

Experience has shown that existing APPs or online tools do not work for event recording or documentation. However, a best practice example is the use of a WhatsApp group. This option works very well in practice. It provides a very simple source of information, photos and brief information are transmitted quickly and easily. This system is easy to use and constantly / ubiquitously available. In addition, in the case described, immediate feedback is provided by reply and confirmation. As a best practice, communication in both directions (two-way-communication) is experienced here.

In Upper Austria, event documentation basically works very well. However, the dissemination of information about avalanches that have already occurred is not very effective. This information is mainly passed on by telephone and hardly ever digitally (internet and portal). Also due to the weather conditions, people are often not aware of the avalanches that have already occurred. In the workshop region, ten commissioned weather and avalanche detectors are interviewed by telephone every day. Therefore, the information received has been transmitted and confirmed by qualified persons and existing situations can be discussed directly. Information on avalanche events is collected and passed on by experts and interested persons. When data is passed on by telephone, the situation is quickly and clearly understood between experts. For non-experts, there is a barrier to be overcome first! Here the information is often misunderstood. It influences the management and an optimisation is very difficult. Picture material from laypersons about events, is very helpful for experts.

A major aspect of the work of avalanche commissions or avalanche experts in general is the influence of the media. Media interest has a strong influence on preventive activities and event management. The influence is reflected in the faster reaction time of the avalanche experts and institutions concerned and in the media's assessment of how the situation is being handled. Therefore, media training is helpful for the commissions as well as all persons / institutions concerned. This is to protect the commission and to improve the structures (central office for media matters in the commission and the region, defined contact person on the part of the municipalities) in the affected offices of the municipalities and regions. It has also been shown, however, that in the opposite case the media can be used specifically to present the working/non-functioning system, e.g. to attract funds or advertise for themselves.

With regard to the analysis item "material resources", the discussion showed that the measures taken (explosive masts) are in place and that there are no material deficits. In ski resorts a lot has been invested and a safe and good infrastructure is given. A frequently experienced problem is the long waiting time for helicopters to be able to carry out a risk assessment. Helicopters are often requested at the same time by different authorities. In addition, bad weather conditions can speak against helicopter deployment.

Political courses of action derived from the avalanche workshop

- Taking advantage of trends and events: Progress in the interaction between emergency planning and management was always experienced after a major incident. The attention to the danger zone must then be used to raise funds, evaluate and optimise processes. It also

became clear, particularly in the area of avalanches, that the interests of tourism have a decisive influence on developments in safety issues. Skitourers and paragliders influence the general availability of data on (weather, events, etc.) both through their demand for data and as providers of information.

- Continuous expansion of the data network and use of synergies: Data availability is rated very highly at planning and management level. However, a continuous expansion of weather stations is necessary. For this purpose, a wide variety of funding agencies and data users (e.g. ÖBB) have been addressed in the past. It is also worth finding out who is interested in the data and networking in a targeted manner.
- Investment in data networking projects: For planning and risk, crisis and disaster management to be successful, data networking via the Internet - general data provision (observations, events at regional level) - is necessary.
- Maintain intrinsic motivation: Communication between local lay observers (winter sports enthusiasts) and supra-regional experts should take place via a somewhat time-consuming two-way system. A WhatsApp group, for example, was found useful: The advantages are a.) it is easy to use, is used in other contexts anyway and is user familiar; b.) the expert can thank the layperson for the data information. Laypersons are intrinsically motivated to make contributions. However, it is important that the contributions are appreciated or that they know that the contributions have been received. Experience shows that a "thumbs up" or "thank you" from the expert is sufficient as a response.
- Discursive exchange via known channels: Discursive exchange between regional experts (weather and avalanche observers) and supraregional experts (forecasters). This interface works well. Here, it should also be taken into account in the emergency plan that telephone exchange about regional observations and events has advantages and that digital data transmission can only take place in a complementary manner. Risk communication channels can be used directly during the crisis. Channels used daily during the season can be used in the crisis situation. The information is trustworthy. Telephone contact enables discursive exchange. Experts can ask for specific information, demand it. Local and national experts can consult with each other.
- Emergency plans include a central media office, press office planned and prepared. The media currently place a negative burden on the work of regional risk and crisis managers, for example when they interview emergency forces during their deployment. However, media can also be used positively by a trained media office, and through your reporting you can focus on necessary financial support, etc.
- Helicopters are not sufficiently available at local level at the right time. The availability of helicopters for locally responsible risk and crisis managers, which is experienced as difficult, must be taken into account in emergency planning. The requirements for helicopters must be simplified and availability must be generated more quickly.

List of figures

EXHIBITION OF NATURAL HAZARD MODELS AND RISK COMMUNICATION TOOLS

with discussion about knowledge transfer and risk communication

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Documentation of the joint workshop between EUSALP Action Group 8 and Alpine Convention Working Group PLANALP

Heimschuh (Austria), 25 April 2019

EUSALP EU STRATEGY FOR THE ALPINE REGION
Interreg Alpine Space AlpGov EUROPEAN REGIONAL DEVELOPMENT FUND
alpenkonvention • convention alpine convenzione delle alpi • alpska konvencija

1. Rationale of the workshop

This document summarizes the outputs of the workshop "Interactive Natural Hazard Models" that was organized back to back with the 7th EUSALP Action Group 8 Meeting and the 28th Alpine Convention PLANALP Meeting on 25.04.2019 in Heimschuh (Styria). The joint workshop was based on the initiative for collaboration between the EUSALP Action Groups 8 and the PLANALP working group to implement knowledge transfer and exchange of good natural disaster risk reduction practices and climate change adaption on local level including risk communication and focussing on different social groups.

The Alpine region offers a unique and valuable living space. With the growing demand for settlement areas and the pronounced climate changes, especially in the mountains, the need for protection against natural hazards has also increased. Heavy storms, avalanches, landslides and intense rainfall pose a threat to Alpine regions and their inhabitants. The challenge is to provide sustainable protection for future generations and their habitats, paying particular attention to raising awareness for natural hazards and climate change.

For this reason, the Co-Leader of EUSALP Action Group 8 (Federal Ministry for Sustainability and Tourism), together with the chair of the PLANALP working group (Province of Styria, Department 14, Water Management, Resources and Sustainability) and their partners from the member states of the Alpine Space, organized an interactive workshop for children and young people on the subject of natural hazard management with an exhibition of exciting models of natural hazards and risk communication tools. The target group was not limited to the younger generation, but also included multipliers such as teachers and media representatives who can disseminate the knowledge they have acquired about how to deal with natural hazards.

The goal was to work together with decision-makers, scientists, children and young people to address current and future challenges of natural hazard risk management in order to ensure sustainable development for future generations.

2. Workshop proceedings

The workshop consisted of two parts: The exhibition of natural hazard models and a discussion about recommendations for future events and natural hazard communication.

3. Exhibition of the natural hazard models and risk communication tools

1. Interactive models for flood protection – (Slovenia)

The models teach children and adolescents that sometimes flood dams invite children as a playground, but in the case of an extreme event, they pose a serious danger. For example, dam fractures, leaks, and landslides are illustrated in a playful way and help the children to understand the danger.

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2. Biber Berti – (Austria)

Biber Berti is a successful instrument for bringing children and young people closer to natural hazards. The cartoons of Biber Berti and his friends are the main actors who live in the mountainous country. They take the children on an exciting journey to the Alpine region. Here they show them the beauties but also the threats of nature. Depending on the season, they learn what types of snow and avalanches there are, why floods occur and what protective measures have been developed.

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3. Model of a river section with two check dams – (Austria)

The model shows a river section with two technical mitigation structures. Water runs in the channel and transports sediment (pebbles) and wild wood. The model shows the function of torrent check dams. Children learn how wood debris is filtered out of a torrential flow and how the run-off is reduced by the mitigation structure to a harmless level.

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4. Memory game – (Italy, Province of Bozen)

A memory game with pictures of natural hazards, buildings, measures, rivers, river regeneration and recreational function presents natural hazard management.

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Communication tools for flood prevention – (Bavaria)

Whether river floods or heavy rainfall events: all floods are united by the fact that there can never be one hundred percent protection. It needs the commitment of many people to make their individual contribution to prevention. This requires close cooperation between all stakeholders involved, because effective flood protection is a joint social task. Here the participants learn what each one individually can contribute for their own precaution.

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5. Augmented Reality Sandbox – (Austria)

The Augmented Reality Sandbox combines 3D visualization applications with a practical sandbox to convey geoscientific concepts. The Augmented Reality (AR) sandbox allows the user to create a topography by modelling sand, which is then complemented in real time by a height colour map, topographic contour lines, and simulated water. The system illustrates geographical, geological and hydrological concepts such as a topographic map, the meaning of contour lines, water catchment areas, catchment basins, dams, etc.

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6. Rock fall model – (Austria)

The model demonstrates the triggering of rock fall in inclined terrain and shows the trajectory of rocks in an event. Here, the protective effect of the forest is particularly discussed. A healthy and dense forest can both prevent the onset of a snow slab avalanche and stop falling rocks, thus protecting the underlying houses and infrastructure.

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7. Model for flood protection of a house – (Austria)

Groundwater / flood buoyancy model: After a flood event, the cellar is pumped empty. If this happens too quickly, the surrounding groundwater can cause the house to float and thus damage the building structure. The participants themselves can pump the cellar of the scale model house empty and observe the buoyancy of a model house.

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8. Models of different types of barriers for torrent and avalanche control - (Austria)

The different modes of operation (filtering e.g. of sediment or wild wood, dosage to a harmless amount of run-off...) can be explained and illustrated by means of the models. The models show different types of check dam structures of the Austrian Torrent and Avalanche Control.

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4. Documentation of the discussion about knowledge transfer and risk communication

Moderation: Dr. Natalie Prüggler (KLAR! - Climate Change Adaptation Model Region Ennstal)

Discussion Questions:

1. In what way are you and/or your institution active in natural hazard knowledge transfer and risk communication?
2. Taking into account today`s exhibition and your experience, what are good and efficient ways and methods to increase knowledge and awareness for natural hazard management with youth?
3. What should be avoided in risk communication and natural hazard knowledge transfer?
4. What is the most important aspect when communicating risk and natural hazard management to children and youth?
5. Can you think of possible Alpine-wide ways of cooperation/ network/ support/ … to improve risk communication and natural hazard knowledge transfer?

Notes from the discussion:

Goal: Awareness Raising

- Collection of good practise examples
- Learning from each other

Ad 1.) - Many institutions are involved in cooperation with schools and school events. Some institutions also organize school projects (e.g. a field trip).

- An Austrian good practise example is "Biber Berti", which is successful instrument for bringing children and young people closer to natural hazards working also with physical interactive models. Cartoons.

- Another interesting initiative are the "Walderlebniszentren" ("forest adventure centres") that are a state funded on-site forest education.

Ad 2.) - A very efficient way of increasing knowledge and awareness are school events and cooperation with education institutions and teachers.

- Taking into account the preceding exhibition, interactive models that can be touched and give haptic feedback are a very useful tool in transferring knowledge. Both for children and for adults it is important to touch and play to convey complex information in an easy and understandable way (-> physical interactive models).

- Games such as "Memory" and the use of digital technologies (e.g. 3D map, augmented reality…) raise interest for the topic especially in the young generation.

Ad 3.) - An often-neglected issue in the communication is the investment in staff. Institutions, that want to communicate with children in a successful way need to have a proper budged and staff with good coordination.

- Another gap in the transfer of knowledge is a poor interaction with schools.
- Only communication via print media & flyers is not going to bring expected results, because people do not remember the information for long.
- A very technical language/style of presentation might scare people off.
- An aversion to use new technologies (e.g. 3D-video, virtual reality) will result in the situation that one can reach fewer people with the information.
- Big events with lots of organisation effort for only small groups/ school classes naturally have a big untapped potential.

Ad 4.) - A very important aspect in the communication of natural hazards is budget (EU, funding…). Therefor a political decision needed, which allows allocating funds for structures. A political network for this issue would increase the success.

- A big step towards a better communication is done by voluntary work/initiative. It is of greatest importance to have dedicated staff. In addition, here the institutions have to keep in mind the comprehensive coordination of the initiatives.
- An easy way to reach youth is with school projects (e.g. field trip). To set up these projects, close cooperation with schools and teachers is necessary. Ideally a self-explaining package for teachers (practicable, with a specific delivery, short: ~20 minutes presentation) could be developed. Within this package it would be important for children to trigger curiosity and to touch and play -> physical interactive models. Further improved paper documents like flyers etc. could accompany the package.
- For a comprehensive communication strategy, it would be advisable to create a character/visibility/corporate identity.
- Establish an "institutionalized" risk communication.
- Systematic inclusion of models in planning and building phase (concrete actual project models) in collaboration with local actors would enhance a sense of ownership.
- The use digital technologies (e.g. 3D map, interactive map, virtual reality, 3D glasses, augmented reality…) is an important aspect to visualize natural hazards.

Ad 5.) - An Alpine-wide workshop with teachers would support the building of a network and improve risk communication and natural hazard knowledge transfer

- A study on status quo and existing models would be useful to get an overview about the currently used teaching methods.

5. Documentation of the comments on the White Boards

Goal: Awareness raising

- Collection of good practise examples
- Learning from each other

Output: Recommendation for further action / events

Good practise examples & recommendations

- School events/cooperation
- "Real" events simulation (alarm, technical measures…)
- Interactive models that can be touched
    - Mandate
    - Budget (EU, funding…)
    - Voluntary work/initiative
    - Important to have dedicated staff, allocate funds
- Create character/visibility/CI
- Biber Berti
- Political decision needed -> allocate funds for structures
- Professional association by region for disaster risk reduction communication
- Comprehensive coordination of initiatives needed
- Use political networks
- Cooperation between prevention and civil protection
- Feedback loops
- Games and models as output
- Reach youth with school projects (e.g. field trip)
- Establish "institutionalized" risk communication
    - Cooperation with schools and teachers
- Improved paper documents: flyers,… combined with models for teachers
- Systematic inclusion of models in planning and building phase (concrete actual project models)
- Use digital technologies (e.g. 3D map)
    - Interactive map
    - Involve local actors (ownership)
- School competition on natural hazards
- Use virtual reality, 3D glasses, augmented reality,… to visualize natural hazards

- Self-explaining package for teachers (delivery, practicable, short: ~20 minutes)
- (for children) important to touch and play -> physical interactive models
- "learning by playing"
- Cartoon/popular culture
- "Walderlebniszentren" (state funded)
    - Combining info, models, forest
    - Waldpädagogik (forest education)
- Adventure Days together with project
- Diversify tools (VR, models, adventure days,...)
- Trigger curiosity

To avoid in risk communication

- No investment in staff
- No coordination / bad structures
- Poorly interacting with schools
- Only communication via print media & flyers
- Technical language/style of presentation
- Aversion to use new technologies (e.g. 3D-video, virtual reality)
- Big event with lots of organisation effort for only small group/class

Future Actions

- Workshop with teachers
- Study on status quo and existing models