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Climate Change Adaptation by Spatial Planning in the Alpine Space

CLISP - Climate Change Adaptation by Spatial Planning in the Alpine Space

WP 6 Risk Governance & Risk Communication

Communication and Decision Support Tool

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Communication and Decision Support Tool - CDT

Introduction

In the frame of the Alpine Space Project AdaptAlp (Adaptation to Climate Change in the Alpine Space) possible climate change adaptation strategies were described. In the part AdaptEvent (analysis of safety and accuracy of gravitational alpine natural hazard design events and the delineation of climate change adaptation strategies) a qualitative assessment based on current knowledge and experience was performed in order to determine fundamentals for adaptation possibilities in natural hazard and risk management. The studied processes include: floods, debris flows, landslides and avalanches. The focus was on developing a method with which natural hazard processes and their likely reaction to climate change can objectively and reasonably be described. During the work in the CLISP model regions it became clear that the communication of climate change, climate change impacts and climate change adaptation is an important issue, but difficult to achieve in spatial planning. There was a discrepancy in state of knowledge of climate change issues between actors in the model region and on different levels of governance. In addition as climate change is a cross-cutting issue much of the information was sectoral specific and not easy to understand. Many stakeholders who participated in CLISP activities stated that the information given was too scientific for them and a common language had to be found to guarantee the success of the project. The uncertainties are often seen as a hindrance for successfully establishing adaptation strategies. Unfortunately a communication tool does not already exist. Therefore, building on the Alpine Space Climate Change Project Cluster initiated and led by the CLISP Lead Partner, the idea was to adapt and use the method proposed in the project AdaptAlp and discuss its potential in a municipality with natural hazards experts, spatial planning experts and decision makers (e.g. mayors).

Aim of the communication and decision support tool

The main thought behind the communication and decision support tool (CDT) is that natural hazard processes are dependent on several parameters, which can be assessed in their relevance for a specific process (e.g. avalanche, debris flow, landslide). The relevance is determined by an expert online survey. Based on the results the tool can be applied to show the relevance of single parameters and use these as “starting point” and “discussion guidance”. It is possible to analyse each parameter individually and discuss the possible impact on a specific process in a transparent way. The assessed parameters for each process can be merged with the information of climate change or other changes (affected parameters). If this tool is used for its intended purpose it should foster the harmonization of languages spoken in natural hazard management procedures.

Specifically the development of the tool requires four steps:

1. Determining a parameter structure for each hazard process, which contains all relevant factors by avoiding thematic overlaps, considering especially parameters that may be considered relevant in climate change expert discussions and which are based on the experience of former projects (Step 1)
2. Semi-quantitative evaluation of the relevance of the parameters based on a broad group of experts (scientists and practitioners) working on natural hazards in the Alpine Space (Step 2) - *expert online survey*
3. Pin-point possible future process types of increased intensity or occurrence probability of natural hazards by merging the survey results with results of climate change research (Step 3) – *expert analysis and implementation of survey results*
4. Harmonizing the knowledge of different stakeholders and laying the groundwork for successful communication (Step 4) – *application of CDT strategic decision level in the field of natural hazard risk management*

The tool is not a quantitative assessment of change effects for concrete measures like hazard maps or technical mitigation measures. The information gained by using this tool is strategic (based on expert opinion) without spatial relevance on a detailed scale. It mainly supports decisions on larger local, regional or higher level. While determining the “starting information” it may turn out that the relevance of some parameters may clearly differ from the suggested relevance. The assessment can be changed by the experts with an obligatory

statement, which is based on specific surveys or experiences in the past. However this issue also shows the spatial limitations of the tool.

Linkage to other Alpine Space projects

The CDT is under constant development in order to improve the performance the fine-tuning of its application considering different stakeholders and requirements. Generally the duration of one project is too short to design, test and implement a decision tool. Table 1 shows the linkage of different Alpine Space projects with regard to the CDT.

Table 1. Overview Alpine Space projects

AlpineSpace project	Specific tasks
AdaptEvent 2008-2011	Assessment of parameters relevant for processes First evaluation of parameters (limited online survey with focus on Austria)
CLISP 2008-2011	Presentation and application of results from AdaptEvent in risk communication workshop Recommendations for version 2 of communication and decision tool
Paramount 2009-2012	Development of Version 2 (extended online survey with focus on the Alpine space) Testing version 2

Development in AdaptEvent

Below the working steps applied to design the method in AdaptAlp are summarized. For a detailed description please refer to Andrecs and Hagen (2010).

In a first step the input parameters were assessed by experts with regard to:

- The relevance for the specific process
- The information value, quality and uncertainties
- The climate change impact

Subsequently the assessed parameters were evaluated to meet the following criteria:

- The method should allow an estimation of the relevance of the single parameters in natural hazard processes.
- The method should be used uniformly by accommodating different input parameters
- The method should be transparent and easy to follow.
- The method should be applicable without any further expert analysis.
- The method should be easy to adapt in case better information and knowledge becomes available or changes occur e.g. due to a changing climate.

In a second step the input parameters were evaluated by means of an expert online survey (Figure 1) with regard to:

- The relative relevance of the parameter by triggering group and factor (A)
- The relative relevance of input factor by triggering group (B)
- The product of A and B reflects the process specific relevance of the parameter

triggering		factor	rating factor (sum 100%)	parameter	rating param. (sum 100%)	absolut
waterinput		precipitation (liquid)	18	intensity	45	8.1
				amount	45	8.1
				spatial and temporal pattern	10	1.8
				other	0	0
					100	18
waterinput		snowmelt	2	amount of snow (waterequivaler	30	0.6
				melting rate	70	1.4
				other	0	0
					100	2
other		climate (ecept P)	0	air temperature	90	0
				other	10	0
sum	20				100	0

Figure 1. Process parameters by triggering group and factor. Yellow fields were filled in during the online survey.

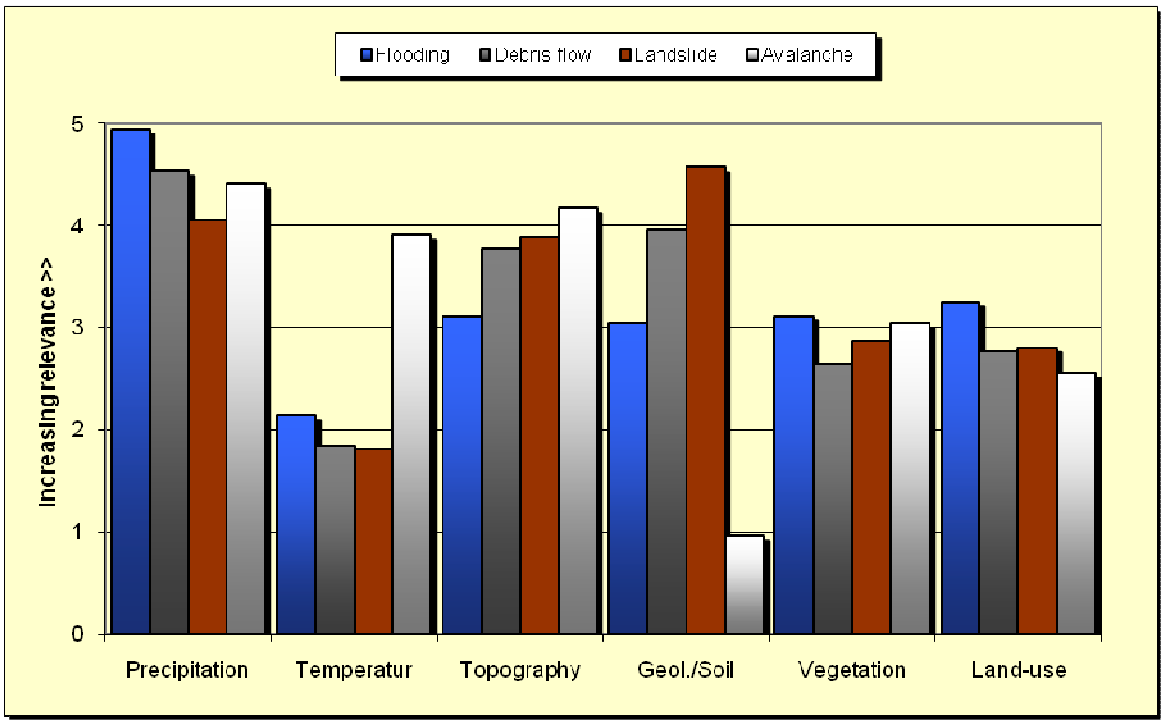

Figure 2. Result of the CDT. Factor groups and their relevance to the 4 assessed hazard types

The absolute relevance of the parameters for each process type was determined in AdaptAlp by means of an online expert survey. The results (Figure 2) form the basis of communicating the importance of different parameters affecting natural hazards in general. Furthermore, the findings may give indications to aid the assessment of the impact of climate change and the associated uncertainties.

Further use in CLISP and Paramount

In CLISP the method developed in AdaptEvent has been introduced as a communication tool in a municipality in Austria. The first version tested in CLISP will be further developed in the project PARAmount taking the results of CLISP into consideration. Especially the communication aspect gained importance from the first development idea to first implementation.

Application process in CLISP

Aim

In CLISP the aim of applying the communication tool in one municipality was to test whether the tool can be used as an awareness raising and communication tool. The tool does not intend to be scientific in all aspects as the main focus is given to its coherence and simple approach, but aims at harmonizing knowledge in order to be able to speak the same language in different sectors, across levels of governance and with the public and subsequently enable a good cooperation and coordination between actors from different fields of expertise and decision makers. In communication and participation processes the tools should help to achieve mutual understanding of all stakeholders from different backgrounds and lead the discussion process to more acceptable solutions.

The target group is manifold because the tool aims at providing a basis for successful communication between relevant stakeholders from different levels of governance and multiple sectors. The tool addresses anyone who has to coordinate planning processes across sectors and levels of governance, but it is not the duty of spatial planners to apply the method. It should rather be used on a strategic level and be used as guidance through a discussion on natural hazard processes and the impact of climate change.

CLISP is a good platform to test the method, because it comprises many sectors and multiple levels of decision makers. As mentioned above, the CLISP model regions reported that it was difficult to communicate climate change aspects and uncertainties, because the information was often too scientific and stakeholders had different risk perceptions. Consequently the tool should support communication, education, awareness raising and on a strategic level decisions of relevant stakeholders. The idea in CLISP was to apply the communication tool and provide feedback.

Procedure in CLISP

- **Expert meeting in Vienna** – presentation of tool to natural hazards and spatial planning experts to assess usefulness:

  In a first meeting on April 11th, 2011 in Vienna the communication and decision tool was introduced to natural hazard and spatial planning experts in order to discuss its usability in the frame of natural hazard management, including spatial planning. The natural hazard experts saw the tool as a contribution to better communicate with non-experts and suggested to perform a trial during a workshop in Gasen/Styria. The spatial planners did not think the tool should be part of their work, although it might contribute to a better process understanding.

- **Workshop - Application in Gasen/Styria** – testing of tool for communication between experts and decision makers; assessing implementation options:

  In the frame of the event “simulation of landslides in 2005” on May 25th, 2011 in the municipality of Gasen/Styria the CDT was tested. First the theoretical basic approach was presented, followed by an interactive session comprising the application of the tool. For the analysis of results of the CDT recent results on climate change were introduced (Schöner et al. 2011). Following the results of model calculations presented above, Gasen can expect an increase in temperature. With regard to precipitation there is no clear trend for the region. The precipitation trend is uncertain, especially with regard to extreme events with a short duration.

Evaluation

During the workshop in Gasen one person recorded the answers of the participants and evaluated them. Special attention was given to the following questions:

- Do the potential users find their way through the tool (differentiated by experts/non-experts)?
- What kind of additional information or assistance do the potential users require?
- How did the groups (sectoral representatives, experts, decision makers) react?
- Does the tool have the ability to offer a common communication basis?
- Is the way to come to a decision for all participants comprehensible?
- How do the users utilise the gained information?
- What kind of relevance does the information have in a decision process?
- A questionnaire was prepared (see Appendix) for a formal evaluation. However, as time was running out and because of the limited understanding of the non-expert group it was decided not to hand out the evaluation form. Only one natural hazard expert took the time to fill in the questionnaire; the evaluation is included in the description below.

Results in CLISP

General impression of presentation and content

During and after the presentation of the theoretical background of the communication and decision tool (CDT) only little reaction occurred. This was different during the interactive application of the CDT. Here the limitations of the tool and emerging misunderstandings were discussed intensively. Several representatives of the municipality (Gemeinderat) feared at the beginning that they would be confronted with new restrictions. However, due to recent changes in the natural hazard zoning they came to the conclusion that today's planning instruments ("static documents") are problematic in a dynamically developing landscape. Subsequently there was a willingness to think about the existing static planning procedures and how to incorporate climate change aspects. Representatives of the expert group (Torrent and Avalanche Control Service, spatial planning) were sceptical, because consideration of potentially changed hazards implicitly encounter the question on the validity of existing documents. The implementation and acceptance of e.g. hazard zone maps in Austria took quite a long time and the experts fear that the introduced approach may question the delineated hazard zone. The results of the CDT are however only additional information, without any reverse effect on a detailed level. This has to be accentuated when introducing the CDT.

One mayor issue was the lack of clarity concerning the goals of the tool and the question on how to deal with the gained information. The topic of the administrative practicability on dealing with uncertainties and changes is fundamental, but could not be discussed in great detail during the event. Generally, in risk management there is a clear deficit with regard to answering the question on how to cope with uncertainties and changes. Since one aim of CDT is to indicate changed hazard impacts (hot spots) because of changed frame conditions, using this approach means to challenge static maps and identify uncertainties. The question on what to do with this information is not answered by CDT, only general advice (detailed survey of the indicated issue) can be given so far, which is not satisfying for practitioners at this point. Practical solutions should be found in future and implemented in the CDT.

Evaluation/assessment of CDT

- For the non-expert group describing complex natural hazards by relevant factors and parameters was not feasible. It is not appropriate to presume that the used terminology is clear (e.g. land use had to be explained). Furthermore lay persons are not able to assess and evaluate single process parameters.
- The assessment of process parameters and the determination of their relevance should be done by experts only. The terminology is known to experts and the analysis of parameters is feasible (e.g. do the results of the CDT deviate significantly from the mean).
- The assessments by the experts should be communicated to the interested lay person, who may consider the result as an indication for the relevance of parameters in process analysis. The communication should be comprehensible and transparent for the public in order to understand the decisions and subsequently accept these. For this the terminology has to be explained and the expert assessment (deviation from mean) has to be accounted for.
- Based on past events and research results it was stated that the importance of the vegetation and land use is higher than implied in the CDT result table. For the vegetation the results from the simulation (scenario forest clearing – forestation and development of sliding disposition of the project AdaptSlide part of AdaptAlp) were shown. For the importance of the land use in addition the observations of the neighbourhood. The documentation showed that 2/3 of slide releases were in the vicinity of paths and roads. With this additional information the results became comprehensible. With regard to the new weighing of the parameters the approach has to be refined (e.g. is land use as important as precipitation, more important or less important?)
- Merging this parameter assessment with the known impact of climate change (rising temperatures) in the area, the result was that the slide disposition will not change significantly due to this fact. In other words existing documents where validated. The impact of recent uncertainties in planning instruments regarding this hazard type is much higher.
- According to a recent survey (Schöner et al. 2011), for the area of Gasen and Haslau, rising precipitation amounts can neither be confirmed nor excluded. To be prepared to “insecure future” a scenario with increasing precipitation was created, where it was possible to show the fundamental interrelation and the participants comprehended those.
- The participants who are concerned with spatially relevant mitigation/adaption measures value the results as additional information on a strategic level. However, it is not clear how to use the information in the practical planning procedures on the detailed scale.
- The municipalities would like to rely on information/outputs from experts (e.g. hazard zoning, technical expertise, maps, etc.) – “you are the experts”. The information given to the municipalities should be directly usable. In addition, the information provided by the technical services or planning information on natural hazards must be clearly communicated to the municipalities by the planner. The information must be explained and guidelines given on how to use the information.

  It can be concluded that the simple method of communication amongst experts could be improved, because a structured discussion on specific topics was possible. The structure of the content of the tool is logical and comprehensible and so are the results. In addition the splitting of complex processes into single parameters was judged as useful for practical appliances. This may help in the future to understand and communicate climate change impacts on natural hazard processes. Local characteristics can only be reflected in the tool to a limited degree. Anyhow, there is a great uncertainty about how to implement the results, when CDT indicate a dynamical development but do not offer prepared solutions on how to deal with this information. Existing instruments are not flexible to incorporate dynamic changes. The natural hazard experts can imagine working with this kind of tool.

Strengths and weaknesses

The identified **strengths** of the tool include the focus on process parameters and the resulting step by step approximation towards the determination of the impact on the process itself. This way to "explain" complex natural hazard processes in a relatively simple and traceable way appears promising. Determining relevant hazard process parameters and parameters that may change due to climate change in a decoupled way and merging them only in a second step helps to lead a factual discussion of the highly emotional issue "impacts of climate change". Thus, the influence of climate change can be explained in a comprehensive and transparent way to non-experts. This leads to a common language spoken across stakeholder groups and fosters a discussion between experts and the public. A natural hazard expert stated that the CDT has the potential to be introduced as a standardized method in practical applications.

The **weaknesses** at this stage of development include that the tool is not usable for the public, because basic expert knowledge on natural hazard processes is required. The suggestion is to design a two step approach to using and applying the tool. Experts should evaluate the results and communicate these to the non-expert group. Other weaknesses are that interactions of parameters are not considered, there are no figures for the explanation of the processes, the implementation is not clear, the target group is not clear, and the goal was not clearly communicated.

Lessons Learnt for further development

- For future events it seems appropriate to focus primarily on interactive examples and schedule enough time. This approach seems most promising because it allows to explain the approach to the participants.
- A two-step approach should be encouraged in future. There should be a clear distinction between the evaluation step of parameters and the application of the CDT. In a first step the application of the tool should be among experts only. In the second step the assessments by experts should be communicated to the interested lay person. The results should be comprehensible and transparent so that the public can understand and accept the decisions suggested by the experts.
- For the regional/local application of the tools the following steps are necessary:
  - Identifying relevant processes in the area
  - Weighting of the listed, process-relevant parameters to be discussed and, if necessary, tailored to the municipal area
  - Defining possible future scenarios in regard to changes of single parameters (temperature, precipitation, changes in land use, …)
  - Identifying a need for action with regard to the selected future scenarios based on the prior steps (e.g. due to higher temperatures in one scenario and in accordance to the selected factor weighing there is no significant change in the future process of torrents seen -> there is no need for action)
- For municipalities the implementation of planning instruments is in the foreground; the expertise should come from experts
- The CDT has to be adapted to better account for climate change aspects
- The benefit of this tool should be exemplified with relevance to the audience group
- Concepts for communicating and dealing with uncertainties need to be developed
- It is important to present specific local examples that clearly demonstrate the benefit of the approach, e.g.: What is the specific advantage of using the CDT for the mayor/municipality, for experts of the Torrent and Avalanche Control (WLV) and for others involved in the decision process? Are there possibilities to integrate the presented approach in existing decision structures of specific user groups?
- One must remember that different interest groups speak a different language, and less scientific formulations of facts may be more valuable at times

- The application should be in regard to risk communication, e.g. in expert forums, in order to find the same language in the assessment of processes
- Applying the tool has an educational effect.

Outlook

In a nutshell, the CDT has the potential to be used as a primary communication tool regarding spatial planning issues in the future. The results and lessons learnt in CLISP encourage proceeding with the development. Considering the lessons learnt, the second version of the tool will be prepared in the Alpine Space project PARAmount.