STRATEGIC COMMUNICATION AND DECISION SUPPORT TOOL

AN APPROACH FOR DECISION-MAKERS MANAGING NATURAL HAZARDS

Karl Hagen, Peter Andrecs[1] and Marc Simon Adams[2]

INTRODUCTION

Climate change has become a topic of major concern on a national and international level. Possible effects of changed climatic conditions are discussed by various stakeholders and experts, sometimes on a more emotional level than based on verifiable facts or data. The aim of the presented Strategic Communication and Decision Support Tool (CDT) is to supply decision-makers with a guide to aid communication between experts of different spatial-planning relevant disciplines, thus supporting the objective and transparent assessment of effects of dynamic processes (e.g. climate change) on natural hazard management. This should be achieved by reproducing complex systems of natural hazard processes by the determination of the relevance of single factors and sub-factors (parameters) within these processes. However, the approach should provide a method to generate results and display them in a comprehensible and more acceptable manner to other stakeholders and the public. This work is conducted within the Alpine Space project PARAmount (Adams et al. 2010) and is based on the results achieved in the previous Alpine Space project AdaptAlp. Within AdaptAlp first steps were already taken to validate relevant parameters of natural hazard processes (Andrecs et al. 2010).

METHOD

The methodological approach of the CDT is based on the determination of the relevance of single factors and sub-factors (parameters) for specific natural hazard processes (flooding in small catchments/torrents, debris flow, spontaneous landslides in loose material, rock fall and avalanches). The evaluation of the parameters (e.g. intensity of precipitation) is implemented in an online survey. Invitations to take part in the survey are sent out to a list of relevant stakeholders, which is compiled by the PARAmount partners. Thus the contacted persons represent a wide range of experts containing scientific as well as administrative, planning and executive staff, dealing with natural hazards and land use planning, working throughout the alpine space.

The questionnaire-structure of the factor-process matrix and the legend are developed on the basis of a first (smaller) online survey accomplished in the project AdaptAlp. The emphasis of the survey lies on clearly phrasing a limited number of questions. The questionnaire structure allows assessing the single natural hazard parameters in a standardized way. The database generated by the survey results offers both the estimation of the relevance (average) for each parameter and the spread of the evaluation (reliability and/or the uniformity). Since these results display the "average opinion" of the experts for the whole alpine space, they are intended as the starting point of an expert discussion, which may have to be adapted to local or regional specifications. Significant changes of parameter assessment have to be reasoned and accepted by the experts. The result is a "simplified but well defined" state-of-the-art process-parameter assessment for the respective region.

To estimate the effects of changing conditions like e.g. climate change, this information has to be merged with the weighted relevance of the process parameters. For example, the rise in temperature within the last 30 years is evident and a further rise very likely. The (imaginary) assessment (Fig: 1) indicates that the relevance of the parameter temperature is relatively low when compared to other process parameters. In this case the existing hazard maps need not be adapted. Otherwise a scenario

[1] DI Karl Hagen, Dr.DI Peter Andrecs Dep. for Natural Hazards and Alpine Timberline, Federal Research and Training Centre for Forests, Natural Hazards and Landscape, Hauptstr. 7; 1140 Vienna, Austria (e-mail: karl.hagen@bfw.gv.at).
[2] Mag. Marc Simon Adams, Dep. for Natural Hazards and Alpine Timberline, Federal Research and Training Centre for Forests, Natural Hazards and Landscape, Rennweg 1; 6020 Innsbruck, Austria (e-mail: marc.adams@uibk.ac.at).

with increasing intensities of precipitation events indicates a high relevance to the process. Existing hazard (index) maps may be out-dated.

triggering/weather	factor	parameter	weight
water input	precipitation (liquid)	event precipitation intensity	20
		event precipitation amount	15
		spatial and temporal pattern	4
		precipitation (previous days)	7
		...	...
	other	temperature	3
		wind	1
		...	...
triggering	infiltration/water storage	land use (vegetation)	12
		land use (constructions)	14
		lithology (loose material incl. A_{biogen})	9
		morphology of surface	5
		...	...

Fig. 1 Scheme of individual (imaginary) parameter weighting (averages)

DISCUSSION

The CDT offers a structured assessment of complex natural hazard processes. The suggested weighting is an objective "starting point" for expert discussion to pre-determine the effects of changing conditions of the processes, by merging the changed parameters (e.g. change of climatic parameters) with the weighted process parameters. The results can be presented in a comprehensible way to "non experts" (in the field of natural hazards), stakeholders or the public.
Due to the transparent approach of this assessment, changes of e.g. process knowledge or further climatic parameters can also be updated easily. However, both the structure and the design of the factor-process matrix and the choice of the questionnaire address list have to be made very carefully to allow clear survey results. The outcome can indicate the relevance of changes to the processes on a regional to local scale and should identify potential "hot spots" of increasing problems with natural hazards as well as maps (hazard maps, spatial planning maps) which are or will become (probably) outdated. The CDT approach cannot answer questions on how to handle insecure and changing conditions, it can only provide indications. Ongoing implementations need to be part of a current project. The CDT may need to be adapted to different end-users; therefore additional applications may entail further modifications, depending on their requirements.

ACKNOWLEDGEMENTS

This study is conducted in the frame of the Alpine Space project PARAmount, which is part of the "European Territorial Cooperation" (Objective 3 of the Regional Policy 2007-2013) and is co-funded by the European Regional Development Fund.

REFERENCES

Adams M.S., Perzl F., Stehlik C., Schroemmer G. (2010). Improved accessibility: Reliability and security of Alpine transport infrastructure related to mountainous hazards in a changing climate – an introduction to the project PARAmount. Proceedings of the 'Mountain Risks' international conference, Firenze, Italy, 24-26 November 2010.

Andrecs P., Hagen K., Fromm R., Gauer P., Höller P., Klebinder K., Kohl B., Lang E., Markart G., Perzl F., Stary U., Zeidler A. (2010). AdaptEvent. Analyse der Sicherheit und Genauigkeit von Bemessungswerten bei gravitativen alpinen Naturgefahren und Ableitung von Anpassungsstrategien an den Klimawandel. Endbericht des BFW im Auftrag des BMLFUW im Rahmen des EU Projekts AdaptAlp ("Adaptation to Climate Change in the Alpine Space"), Vienna: 321 S.

Keywords: decision support, natural hazards, debris flow, avalanches, landslides, climate change