BETWEEN SUBJECTIVE CONSTRUCTION AND OBJECTIVE ANALYZES: NATURAL HAZARDS AND TOURISM DEVELOPMENT IN THE VALLEY OF MOIECIU DE SUS (ROMANIAN CARPATHIANS)

Ralph LESSMEISTER[1], Ulrich HAMBACH[1], George MURATOREANU[2]

[1]*University of Bayreuth*
[2]*Valahia University of Târgovişte*

Abstract: The aim of the following paper is dealing with the phenomena of flooding and landslides in the Southern Romanian Carpathians. It builds upon the first results of a bilateral research project of the Geography Institutes of the Universities of Bayreuth and Valahia University of Târgovişte which has been realized in the Moieciu Valley in September 2009.
The paper is divided into four sections: The first section gives a general introduction into Moieciu Valley, the research area. Section two deals with theoretical concepts and definition to find a common language and to make clear what natural and social geographers are talking about when it comes to the topics of risks and hazards. In section three we present the methodology and show the so far gathered empirical findings. Section four will discuss these findings and conclude with an outlook of the necessary next steps in our research.

Key words: Moieciu Valley, hazards, risks, tourism activities, safe places, perception

1. Introduction

"An avalanche in an uninhabited valley in Alaska is a natural event; a similar avalanche in the Stubai Valley (a touristic site in the Austrian Alps) may lead to a human and economic catastrophe (Pohl 1998: 155[1])". This small citation makes obvious that here two systems are interacting: "Nature" and "Human Society". Consequently, for the understanding of natural catastrophes we need to understand not only the natural processes, as it would be insufficient to restrict hazard research only to human behavior. The decisive point lays in the information about how these two processes – the (potential) natural event and human acting – do coincide. As nature catastrophes encompass many aspects we must seek for interdisciplinary research (Hochrainer 2005: 65).

Geography as a boundary science which covers the fields of natural as well as social sciences seems ideally fit to this research challenge. Unfortunately we can remark an ongoing process of specialization in these two fields which alienates the main research lines in resent Geography[2]. But if science is not only done for its one sake but to deliver applicable information for a better understanding of the real world we should come back to that very inherent strong point of our discipline and combine methods, theoretical concepts and empirical findings of both research lines to come to an appropriate approach to the man – environment relations in the field of hazard research. This is especially true for the application of scientific knowledge in *ex ante* strategies to cope with nature catastrophes before they do occur.

This indeed is the aim of the following paper which deals with the phenomena of flooding and landslides in the Southern Romanian Carpathians. It builds upon the first results of a bilateral research project of the Geography Institutes of the Universities of Bayreuth (Germany) and Valahia University of Târgovişte (Romania) which has been realized in the

[1] Ein Lawinenabgang in einem unbesiedelten Tal in Alaska stellt ein Naturereignis dar, eine vergleichbare Lawine im Stubaital kann zu einer menschlichen und wirtschaftlichen Katastrophe führen (Original text translated by the authors).
[2] This can generally be stated for the different fields in risk research, where we often find controversial concepts and definitions which hinders a concerted approach (see Buergin 1999: 3, also Renn 1992)

Moieciu Valley in September 2009. The research interest is to understand the underlying logics of the inhabitants acting being exposed to extreme natural events and to see in how far their perceptions and estimations differ to what the "hard facts" of natural science say. This will provide us with a deeper insight about how such events can be dealt with and shall help to improve the methods of risk communication.

2. The Moieciu Valley

The commune of Moieciu is located in the transitional area between the southern end of the structural East Carpathians and the actual South Carpthians south of the Brasov Basin. This transitional area is called Bran-Rucar corridor which connects the Inner Carpathian Basins with the southern foreland (fig. 1). The settlement of Moieciu de Sus developed along the headwaters of the Moieciu Creek in the steeply incised Moieciu Valley.

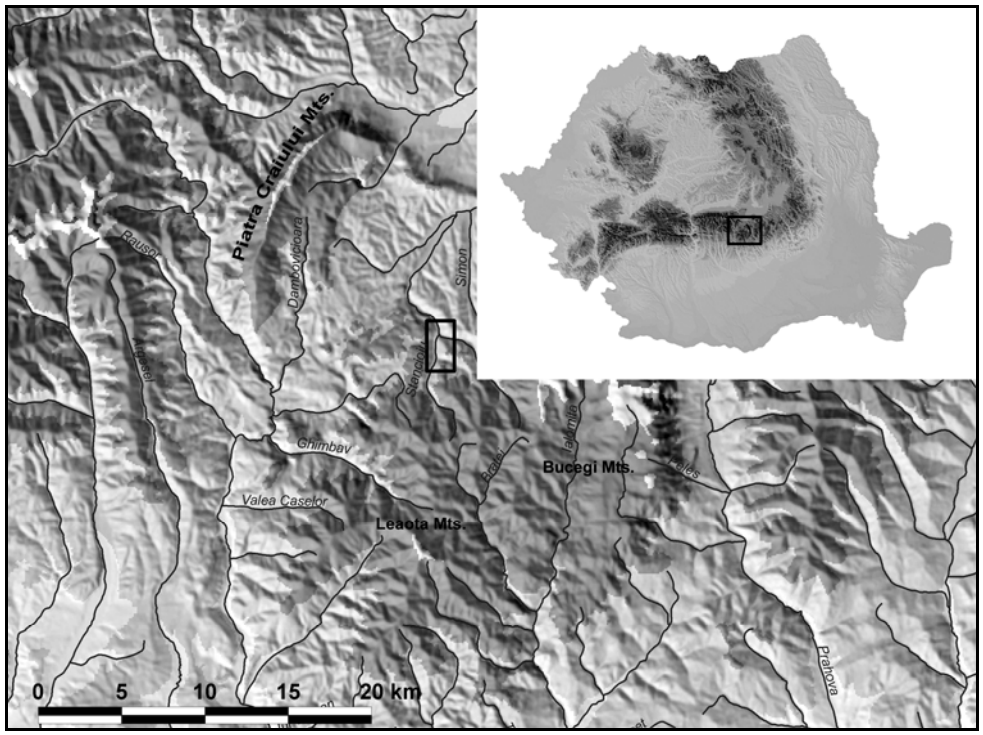

Fig. 1 The location of the study area in Romania and of the Bucegi Mountains in the Meridionali Carpathians

The Moieciu Valley is formed by the Moieciu Creek which is part of the Olt catchment, an important fluvial basin draining parts of the Transylvanian Basin as well as of the Carpathians. The Moieciu Creek springs up in the northern Leaota Mountains and some of its tributaries originate in the western Bucegi Massif. The springs lie in an altitude of maximal 1800 to 1900 meter. The Moieciu Creek is the main drainage of the Moieciu Basin: a fluvial mountain type catchment formed by mainly SE-NW and secondarily ca. S-N and SW-NE trending valleys following Neogene tectonic faults (Geografia României, vol III, 1987).

In our study we focus on the area of the settlement of Moieciu de Sus situated between the confluence of the tributary creeks of Moieciu Cald Valley and the Moiecel (Moieciu Rece Valley) in the South (alt. 1010 m) and the end of the housing (alt. 920 m) about 1.5 km north of the confluence of the Moieciu Creek with the creek draining the Bangaleasa Valley. In the latter, housing is found until ca. 4 km upstream forming a significant part of the settlement.

The valleys are incised into metamorphic rocks of Variscan age which in turn are overlain by block faulted Jurassic to Cretaceous calcareous and clastic sediments. In the South and in the West of the Moieciu Basin the karstified calcareous sediments are outcropping and karstic-hydrology-dynamics control the surface runoff. The metamorphic basement and the Jurassic to Cretaceous sediments belong to tectonic nappes which were emplaced during the alpine orogeny of the Carpathians which started in the Mid-Creatceous and ended in the Neogen with the topographic uplift of the mountain range (Săndulescu 1988).

Neogene inversion tectonics shaped the landscape of the SE-Carpathians forming the Bucegi and Leaota Massifs in the East and South, the Piatra Craiului Range in the West, the Brasov-Basin-System to the North and the intermediate Bran-Plateau in which the central and lower Moieciu Valley is incised. In the Moieciu Basin, as a result from uninterrupted interaction between rock uplift and erosion V-shaped valleys were formed. As the slope of the thalweg is controlled by ongoing tectonic activity, intervals along the creeks with narrow valley bottoms without sediment accumulation alternate with up to 200 meter wide intervals filled up and covered by floodplain deposits. Like in all rapidly uplifting mountain areas, an erosional terrace system did not develop in the Moieciu Basin. However, small accumulation terraces of Holocene age can be occasionally found in valley intervals with wider floodplain (Fielitz and Seghedi 2005, Necea et al. 2005, Muratoreanu, 2009).

The current climate conditions for the Moieciu area were analyzed based on the climatic data recorded by the meteorological stations Fundata (45º28' lat N; 25º18' long E; 1.380 m altitude) and Vf. Omu (45º27' lat N; 25º27' long E; 2.504 m altitude), the nearest stations to Moieciu.

The annual medium temperature ranges from 4 to 5°C being lower than in the areas situated at the same altitude on the southern slope of the Leaota Mountains, due to the general northern exposure. Annually, the thermal amplitude is of approximately 20°C (the medium temperature for the month of July is 14 – 15°C and the medium temperature for the month of January is -5 / -6°C). The average number of winter days is 120 (t max $\leq$ 0°C) and there are approximately 20 summer days (t max $\geq$ 25°C).

The annual average of atmospheric precipitations is around 900 mm (the maximum amount is recorded in summer, while the minimum is recorded in autumn). The annual number of days with snow cover varies between 100 and 120.

Traditionally, Moieciu de Sus is a farming village dominated by livestock farming (cattle, sheep). One can find alpine meadows along the valley slopes up to the level of the Bran-Plateau and alpine pasture farming in the subalpine areas of the Leaota and Bucegi Massifs.

Since the late 1990s the Moieciu valley has been confronted with a dramatic change in its economic structure as tourism has begun to play an important role, substituting or even replacing in many cases the so far dominant forms of agriculture and pasture farming. This economic change holds severe consequences for the valley's settlement structure as many new houses have been built while older ones have been transformed for tourism purposes. This dynamism in constructing activities results in a much higher building density than the one we know from earlier times when the valley was only sporadically spotted with farm buildings. As a consequence, the nowadays relatively high building density enhances the risk for damages caused by flooding. Most of the housing in Moieciu de Sus is found in strip patterns located in the floodplains along the creeks and thus in danger to be flooded during extreme runoff events. Before the recent boom in tourism buildings were mostly placed in relatively safe areas on small fluvial accumulation terraces or on the foot of slopes high enough not to be affected by floods. According to the local inhabitants, the roads which were built during the first half of last century function as dams protecting large floodplain areas against floods and thus providing safe ground for housing.

Floods in small catchments like the Moieciu Basin occur only after extreme precipitation events which might be quite local and are most often associated with summer convective thunderstorms. Since 2005, a sequence of extreme precipitation events occurred culminating so far in the events of July 2009. During these days (July 10 to 20) the heavy rainfalls caused not only flooding which destroyed roads and small bridges but triggered also numerous landslides with a marked hazard potential (Evenimentul Zilei, 10.09.2007; Cotidianul, 24.10.2007; HotNews.ro, 11.07.2009, 6.08.2009, 6.03.2009; Adevarul *12.07.2009, 3.08.2009*)

3. Risks, hazards, extreme events – what are we actually talking about?

Extremes in amplitude, temporality and spatiality makes from a natural phenomenon a potential natural hazard (Abbott 2004). This statement is especially valid for extreme precipitation events. A natural landscape represents an equilibrium state and the product of often competitive endogenic and exogenic processes. Changes in amplitude, temporality and spatiality of the forming processes may cause an abrupt shift of a stable landscape system to a new equilibrium state. This shift may be seen by humans as a hazardous event affecting their self-constructed environment and even their lives. Hence, we may talk of natural risks as people are living under risky natural conditions.

If we approach the term "risk" in a social Geographer's perspective we may argue first with Luhmann's (1991) conception of risk. He defines risk as deliberate decisions in face of dangerous events. By that he introduces a social perspective into the hazard debate. Risk is not seen as a result of statistical operations (as it is the case e.g. in the definition of risk assurances) but depends upon human acting. People judge a potential event and decide if they take a risk or not. Risk can be understood in that sense as subjective construction. But Luhmann's definition, as charming as it comes, still builds upon the idea of an objectively existing external danger, the constant, whereas risk as a result of human decision can be seen as a variable parameter. This conception of risk and danger seems quite logic, particularly if you regard it with the eyes of a natural scientist. An everyday example shall make clear that subjective perception and construction plays a much more important role: Imagine two people standing in the high mountains at the beginning of a mountain track. Person A is a well-trained and experienced alpinist, person B is an overweighed city dweller who has never been in the mountains before. The scenery holds the potential for rock falls, sudden fall in temperature, avalanches and so on. It is apparent that this scenery does not mean the same to our two persons. And everyone would agree that it holds different risks resulting from the different characteristics of our two mountain tourists. And of course it would be the case that these two persons also would judge the risks for themselves in a very different way. Risk in our example could therefore be referred to as a subjective construction.

So far Luhmann's conception. But reality is even more complicated because not only risk – in accordance to an objectively existing potential for danger – is constructed, but also the danger itself (in Luhmann's perspective the precondition for risk resulting from human decisions) already undergoes a process of individual perception and evaluation. In our example the same (objective) environment may be seen by our two mountaineers in very different ways. Our overweighed friend could possibly find dangerous spots all along the way which makes him stay in the safety of the mountain cabin – or he may not even detect a single sign for danger and, optimistically, marches in shorts and sandals right into the next abyss.

This small example makes evident that risks as social constructions do themselves result out of subjective constructions about our environment. This is a decisive fact when we try to understand how people act in environment as well as it is a precondition for adequate means of risk communication.

Still our so far conception of human behavior is about rational decisions. If one is able to conceive and judge a situation completely he may come to a precise idea about the risk when he acts in a certain way. So, the ability to define a precise risk (at best occurrence prob-

ability expressed in percentage) would be in many situations already a very satisfying objection. But most of the times we find ourselves not in a risky situation but in a state of uncertainty, which is even worse precisely because we do not know what the consequences of our acting will be in the future. Uncertainty hinders people in making decisions so they try to overcome this state and transform uncertainty about their acting into precise risks under which acting then is possible (Knight 1964; Bonß 1995). As we can never get complete information about our environment, rational decisions in the sense of a homo oeconomicus assumption are rather unlikely in reality. In fact, people tend to use cognitive heuristics to help them finding the right decisions. Such mental strategies are useful in the way they enable people to act in a state of uncertainty. The problem is that they may lead to wrong estimations about the probability of extreme events. In her study about risk perception Karger gives an overview about possible heuristics: These include the *gambler's fallacy* (has an extreme event occurred in one year, then the probability for a similar event in the next year is rated very low); *the illusionary correlated bias* (events, which are distributed randomly are seen as deterministic events to come periodically); *the law of small numbers* (two events in a row make people await a third one to come in the same period of time by which the first one was followed by the second one); *availability* (recently experienced events enhance the subjective expectations for another event); *anchoring* (extreme events are brought in relation with other events). For more detailed information see Karger 1996: 20; also wagner 2004: 76f.

As an interim conclusion we may stat the following: Nature science is about the process of extreme events, its aim is to forecast events and thus do define "risks" (with a probability of X% there will be an earthquake within the next X years; risk maps etc). It provides us with expert knowledge about the external conditions. Human sciences by contrast is more about understanding the way people perceive their environment, the cognitive heuristics they use and the way they deal with extreme events once they are confronted with them. Namely studies from cognitive psychology found that there is a difference between the way experts and laypeople (including even decision makers and politicians) perceive such events (Buergin 1999: 6/7; Wagner 2004: 17f). But unlike many of these studies, as Jungermann & Slovic (1993) critically state, we do not aim to compare these differences in knowledge in order to deduce a difference in rationality. We rather work on these different rationalities in order to find an appropriate way to communicate about hazards and risks.

In our work we will define hazard as a potential threat for human beings. They are the result of "objective"[3] scientific analyzes and may be seen as the "hard facts" or the objective perspective. By contrast, natural danger is the outcome of the human perception of his environment. Risk finally is the deliberate choice to act under the conditions human beings construct for themselves. Risk in this sense helps to overcome uncertainty by giving at least a rough probability of future events.

The term hazard finally is often distinguished in "natural" and "man made" hazards. This distinction is a very helpful one e.g. for psychometric studies which aim to reveal how harmful people consider different events. For our study such a distinction is of only limited explanatory use. According to our definition of risk we think that all hazards imply a "man made" component as the nature event poses the "objective" cause but the risk, as well as finally the damage caused by the event, occurs, when people expose themselves to the event.

4. Hazards, risks and unsafe places – flooding and landslides in the Moieciu Valley

As described above, the Moieciu valley has been the scenery for a serious of flooding and landslides in recent times, with a very heavy one in 2008. The 2008 flooding did severe damage to the public infrastructure, namely the main road which serves as the only way into

[3] We are completely aware of the fact that science can never be objective, as it reflects the current state of knowledge and research paradigms as well as the researcher's interpretation and, for that, must be seen itself as a social construction. The distinction in objective and subjective knowledge is only done for explanatory reasons.

the valley so that large parts of the settlement were cut of from the rest of the world for a week or so. Also houses, stables, barns and other buildings for livestock and agriculture were hit by the water. This event was a matter even in national broadcasting, but already in the years before the villagers had to face extreme nature events.

Despite these infrequently occurring events the Moieciu valley has remained one of Romania's most popular tourist sites. Because of the high tourism demand we can state an ongoing settlement process with hotels, pensions, guesthouses and restaurants dotting along the valley.

In the given context we now have to ask about the potential nature holds for even extremer events with probably more devastating outcomes and the role people and their way of acting play against this background. For this we have established three hypotheses:

- Our first hypothesis is that the main driver behind the settlement process is tourism. We await a comparable high number of tourist buildings among the recent constructions.

- Our second Hypothesis deals with the place where recent constructions have been installed. We assume that most of the recent constructions can be found in "objectively" unsafe places. This means that they have been build in the geomorphologic floodplain or exposed to landslides. In contrast we await older buildings in "safe" places.

- The third hypothesis is about human intervention in nature systems: We suppose that the recent settlement area has been transformed from "unsafe" places (floodplain, instable slopes) to "safe" places (area for settlement) by means of technology (building of dams, consolidation of slopes and riverbed). Thereby we will estimate these technologies as means to transfer uncertainty into risk.

Our methodological approach for the above mentioned hypotheses is mainly based on mapping. In a first step we compared historic topographic maps based on aerial photographs from 1976 with actual maps to outline the settlement development. We then actualized these maps en terrain by adding all recently constructed buildings which have not been in the map (fig. 2). We further did a functional mapping and signed all buildings used for tourism purposes. Finally, we mapped the creeks including all technical interventions as well as all signs of erosion.

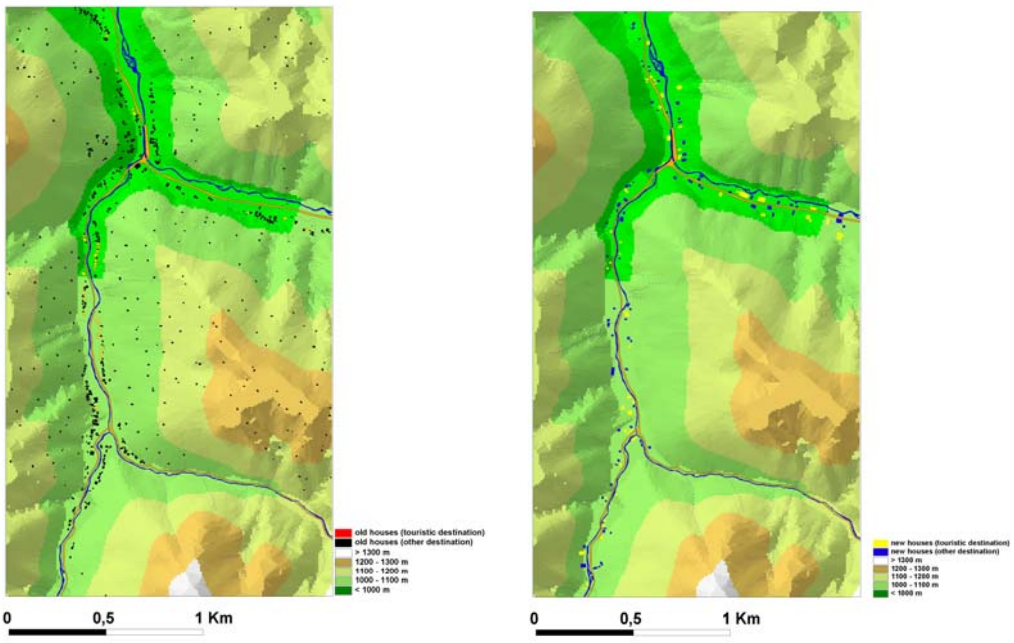

Fig. 2. The housing structure of Moieciu de Sus in 1976 (left) and the houses built after 1976 mapped on field in 2009 (right)

The second part of our research follows a qualitative design. We want to understand how the people in the Moieciu Valley perceive their environment, how they consider danger and risk for themselves and how they prepare for extreme events. For that we conducted 30 guided interviews with the villagers in the Moieciu valley.

5. Interim findings and outlook

The first step in our research was to collect "hard data" about the settlement of the Moieciu Valley. For that, a complete mapping of the build environment of the village was done. Comparing cadastre maps from 1981, based on aerial photographs from 1976, with recent aerial photographs we could find that 139 buildings have been constructed since that time. Our findings showed further that 55 of these buildings serve for tourism purposes. In fact we assume an even higher importance of tourism as some houses are at least partially used for accommodation, e.g. by renting single rooms to tourists in high season or in form of secondary residences. These "hidden" tourism functions are not apparent from the outside, but the fact that some of the houses are only temporarily in use gives at least a strong hint for this assumption. If we add the older houses (before 1976) to our functional map we can state an overall number of 84 buildings which are apparently used for accommodation or restaurants. Within only more than 30 years the number of houses has increased enormously and many of them serve for tourism. If we take into consideration that the valley was not inhabited before the late 19th century we might say that tourism is one of the main driving forces for the settlement process here.

But far more interesting than the mere number of buildings for our research topic is the place in which they have been erected. Together with a mapping of the natural conditions of the valley we might draw conclusions about how peoples' acting may have influence upon or even evoke extreme events and in how far people expose themselves to these events.

Our results showed that a comparable high number of the recent constructions have been built in the geomorphologic floodplain or in older river courses which have been abandoned. And most of these buildings have a tourist function. In the nature scientist's perspective this poses a permanent threat for flooding as fluvial systems in mountains are characterized by steep slopes of the thalweg and high sediment load in combination with a high variability of the discharge on seasonal to decadal scale, their actual course in the present floodplain is temporally and spatially variable. In intervals of the valleys with relatively low gradient increasing sediment load and/or decreasing discharge may lead to sediment accumulation and thus to the formation of a geomorphic floodplain. Depending on the controlling factors mentioned above, the actual course of the thalweg may move laterally through eroding the river banks. Moreover, not only lateral erosion but also the development of a braided channel system is typical for such fluvial systems. In a braided river, several parallel and interconnected channels are active at the same time and shifts in channel courses depend on the controlling factors (Charlton 2008). In parts of the Moieciu Valley downstream the confluence with the creek draining Bangaleasa Valley and in the middle and lower part of the latter floodplains with braided channels developed. These floodplains are geomorphic active areas dynamically depending mainly on precipitation controlled discharge and any construction there may be in danger even so the channel courses seem to be static on decadal scale. As the result of an extreme precipitation event the abrupt discharge may lead to reactivation of abandoned channels which in turn tend to move laterally and by that -figuratively speeking- ploughing the floodplain.

It is important to state in this context that we found the older buildings without any exception in elevated places, sometimes on the edge of the riverbank on accumulation terraces but mostly on higher places in the valley. The fact that we nowadays find buildings in formerly at least temporarily flooded parts of the river is not a result of natural processes. It is much more due to human interaction when the river was embanked and the natural course of

the water was altered. By means of technique land for buildings and infrastructure was created. This intervention into the natural system of course brought other consequences: The stream velocity increased, erosive processes along the embanked riverside now impose the hazard of landslides and rock falls which may lead to the even more dangerous situation of accumulating material blocking the down coming water which may then result in a severe flooding. The enhanced energy of the fluvial system caused by embanking measurements in combination with heavy rainfalls already led to flooding events which damaged roads and constructions in the past. And even though we cannot precisely foresee the effects of the climate change in the future, most prognoses say that we will have to deal with an increasing number of extreme events

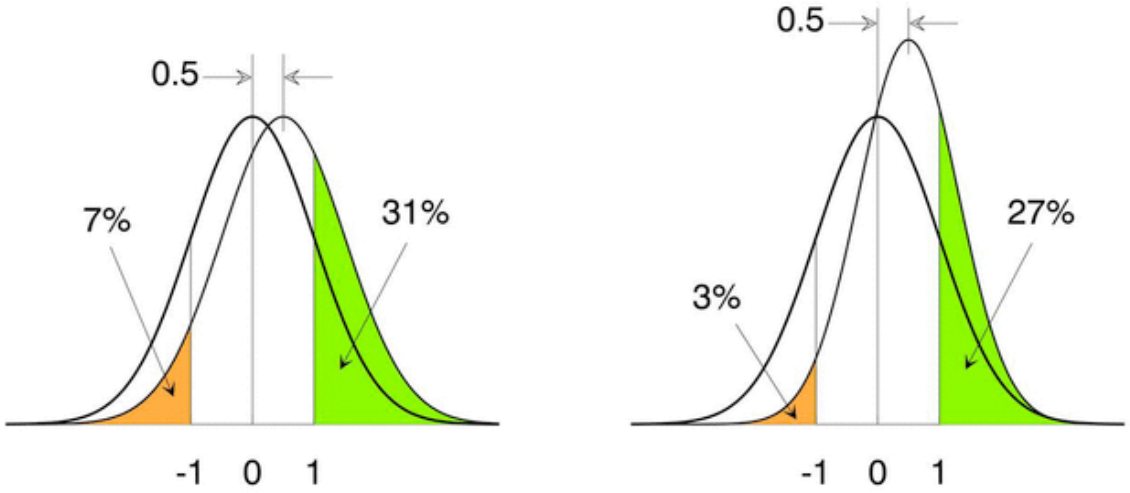

Fig. 3. The figure shows probability density functions (PDFs) of the occurrence probability of climate elements such as temperature. In the left panel the impact of changes in the mean on the probability of extreme values (left panel) is illustrated. PDFs in the right panel illustrate impact of changes in both the mean and the spread on the probability of extreme values. Green (orange) shading indicates an increase (decrease) of the probability of extreme values (from Sardeshmukh et al., download: 02-12-2011).

Here it is important to note that the occurrence probability of climate elements such as temperature increases already disproportionately when the median of its normal distribution shifts only little (compare fig. 3). In other words, when we talk about the possible impact of climate change, we have to realize that small shifts in average local climate produce a larger change in the number of events we already regard as extremes (Karl et al. 2008).

The villagers respond to such events by reconstructing the dams with an even higher effort in material and workforce. Do they behave irrational? Are they not able to see the consequences? Do they lack specialized knowledge? What are the reasons for their acting?

The nature scientist's analyze is concentrated upon measurable facts and only seldom is he personally involved in his study area. So his analyze is based upon a logic which may differ completely from how people living in this area judge the same situation. To find out the underlying logics of the villagers' acting we conducted guided interviews with ten inhabitants of the Moieciu Valley. The questions were about how they perceive the recent situation in the valley, covering the aspects of natural hazards, tourism development and the rising number of constructions in the valley. We further asked for the "responsibility" for the extreme events in the last years and how they personally deal with such events.

The answers made obvious that the interviewed persons rather see the danger but the chances of the recent situation. Although everyone could remember the floods of the last

years (1998, 2005, 2008), these events were not described as really critical or severe. This has various reasons: For one, up to now no natural event caused casualties. Even the heavy floods in 2005 and 2008 damaged mainly agricultural constructions, gardens, some houses and public infrastructure. For the latter it is in the local authorities' responsibility to rebuild it. Especially the older interviewed persons told us of flooding as a permanent threat. Out of their remembrance we could at least identify five more floods in the years 1941, 1956, 1976, 1985 and 1988. Flooding as an occasionally occurring event seems to be considered a normal thing. And, in fact it is. This is precisely why we find older buildings on elevated spots in the valley. A further thing is that, in relation to the lifetime they have spent in the valley, the total number of floods is rated comparable low by older people. Flooding has become something you have to live with.

But what about the owner of the new constructions? Many of them work in tourism, and, as we mentioned above, tourism has strongly developed within the last years. As it means the economic base for many people in Moieciu, tourism is seen quite positively. It does not really surprise when none of the interviewees mentioned a correlation between tourism and extreme natural events. Floods and landslides are rather seen as regular nature events and the costs which arise from such events are equaled many times by what people can gain from tourism. But the decisive point in this logic is that floods are seen as a *constant* thing. This refers to the temporal appearance (e.g. *"every ten years"*, as two older interviewees stated) as well as to the degree of damage (infrastructure, no casualties) and, finally, also to the responsibility for the rebuilding (Which they see in the hands of the public authorities). These simplified assumptions therefore help the villagers to transform uncertainty into a defined risk. From that point of view it becomes obvious that investing in tourism buildings in attractive locations along the riverside is a very rational thing to do.

All in all our results are consistent to what Slovic, Fischhoff and Lichtenstein found in their psychometric approach about risk perception: in their standardized studies they presented various social phenomena to their test persons and let them rate these according to their supposed extend of being harmful, using a set of given factors. By way of factor analyzes they reduced the number of decisive factors and found that phenomena are rated harmful when they cause a feeling of dread, when they are unknown and uncontrollable and when people think that they are exposed to them involuntary. By contrast they are willing to accept higher risks when they expect a high benefit (in detail see Fischhoff, Slovic & Lichtenstein 1978; Slovic, Fischhoff & Lichtenstein 1977, 1982). In our case we find exactly these factors again: The phenomena "flooding" is not judged to be very harmful because up to now there have not been any casualties; it is a natural event that has appeared again and again over time, so it is already known; the decision to build a house in a area prone to flooding is voluntary and is made because high benefits are expected, and finally it is controllable by means of technique.

6. Where do we go from here?

From a scientific point of view we can state a high potential for extreme events in the Moieciu valley and identified some critical spots were erosive processes enhance the danger of severe events. The perception of the interviewed villagers by contrast points to very different estimation of the situation. So we have to different logics and approaches to perceive the same space and accordingly, we came to different results. But is the scientific approach the right one, due to a more elaborate set of analyzing instruments and better knowledge?

Our interviews showed that the people in Moieciu know well about the consequences of floods and landslides, yet the recent building activities mustn't be judged as irrational. The decisive point in this context is that the logic of their acting is based upon the projection of past events (experience) into the future (expectations) while the scientific view tries to come to a prognosis. By that it is focused on potential outcomes, taking even the worst scenario into

consideration. The interviewees' assumptions neglect the fact of changing parameters. While their focus is upon an appropriate evaluation of the current situation (in the way of a cost benefit analyze) the scientist's aim is to determine the potential for future events (in the way of a process diagnosis). Both logics have a justification. Even though the interviewed persons make simplified assumptions we must not forget that these assumptions are the only base to enable acting at all. They provide certain reliability about future expectations thus transforming uncertainty into risk but neglect possible consequences. The scientific analyze makes precise statements about the process and consequences that may happen without giving information about the point of time or the extent of damage; therefore it brings in an uncertain component which in the long run may turn out to become reality but hinders action at present.

7. Further research questions

The here presented findings do represent an interim stage of our research in the Moieciu Valley. Especially the point of how the people in Moieciu perceive and judge their environment needs more attention. The relatively small number of interviews done so far provides us with a first impression, but we need to have a broader empirical basis to come to reliable statements. Nevertheless, rather than presenting a conclusion at this point we would like to formulate further questions.

In our research we could confirm the findings of earlier studies stating that laypeople and experts judge the same phenomena in a different way. This alone, indeed, is no great news and it is a confirmation of already known facts rather than a new finding. But now the question would be how we these different judging and their underlying logics can be brought together, in order to come to improved risk communication.

The topic of risk communication may be of interest for the people in Moieciu also in a different context. We are thinking of the external communication about extreme natural events, that is the information given to the media after such an event has occurred. This does not seem to be in the villagers' mind, but if we take into consideration how the media reported about the 2008 flooding, which was broadcasted nationwide in Romania, and if we further think of the potential for even more dangerous events in the future, then in the sense of an integral risk management appropriate and proved means of communication should be build up in order to quickly respond to such events. An image of Moieciu as a risky and unsafe place for tourists will lead to economic losses because the tourists' perceptions are also subjective constructions, fed by information and images. And, as Bell rightly states: What is social today is political tomorrow and economic in costs and consequences the day after (Bell, in Coates et al. 1986: 21; see also Wiedemann, Schütz 2005).

References

Abbott, Patrick L., (2004), *Natural Disasters*, 5th edition, 512 pp., McGraw-Hill

Bonß, Wolfgang, (1995), *Vom Risiko. Unsicherheit und Ungewißheit in der Moderne*. Hamburg, Hamburger Edition.

Buergin, Reiner, (1999), *Handeln unter Unsicherheit und Risiko. Eine Zusammenschau verschiedener Zugänge und disziplinärer Forschungslinien* (Arbeitsbericht 27-99 des Instituts für Forstökonomie der Albert-Ludwigs-Universität Freiburg). Online: www.ife.uni-freiburg.de/dateien/pdf-dateien/ab27

Charlton, Ro., (2008), *Fundamentals of Fluvial Geomorphology*, 234 pp., Routledge.

Fielitz, Werner, Seghedi, Ion, (2005), *Late Miocene-Quaternary volcanism, tectonics and drainage system evolution in the East Carpathians, Romania*. Tectonophysics 410, 111-136.

Fischhoff, Baruch; Slovic, Paul & Lichtenstein, Sarah, (1978), *How safe is safe enough? A psychometric study of attitudes towards technological risk and benefits*, Policy Science 9, pp.127-152.

Hochrainer, Stefan (2005), *Naturkatastrophen – Risikowahrnehmung und Vorsorgestrategien. Eine empirische Untersuchung zum Hochwasser 2002 in Schwertberg*. SWS-Rundschau 45/1, pp. 63-85.

Jungermann, Helmut, Paul Slovic, (1993), *Charakteristika individueller Risikowahrnehmung*. In: Wolfgang Krohn & Georg Krücken (eds.): Riskante Technologien: Reflexion und Regulation. Einführung in die sozialwissenschaftliche Risikoforschung, Frankfurt a.M.: Suhrkamp, pp. 79-100.

Karger, Cornelia, (1996), *Wahrnehmung und Bewertung von „Umweltrisiken". Was können wir aus der Forschung zu Naturkatastrophen lernen?* (Arbeiten zur Risiko-Kommunikation 57. Programmgruppe Mensch, Umwelt, Technik. Forschungszentrum Jülich). Online: http://fz-juelich.de/inb/inb-mut/publikationen/hefte/heft_57.pdf

Karl, T.R., G.A. Meehl, T.C. Peterson, K.E. Kunkel, W.J. Gutowski, Jr., D.R. Easterling, (2008), *Executive Summary in Weather and Climate Extremes in a Changing Climate. Regions of Focus: North America, Hawaii, Caribbean, and U.S. Pacific Islands.* T.R. Karl, G.A. Meehl, C.D. Miller, S.J. Hassol, A.M. Waple, and W.L. Murray (eds.). A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research, Washington, DC. (downloaded from: http://www.climatescience.gov/Library/sap/sap3-3/final-report/sap3-3-final-all.pdf)

Knight, Frank H., (1964), *Risk, uncertainty and profit*. New York, Augustus M. Keller.

Luhmann, Niklas (1991), *Soziologie des Risikos*. Berlin, De Gruyter.

Murătoreanu G., (2009), *Munții Leaota. Studiu de Geomorfologie*, Edit. Transversal, Târgovişte

Necea, Diana, Fielitz, Werner and Matenco, Liviu (2005), *Late Pliocene-Quaternary tectonics in the frontal part of the SE Carpathians: insights from tectonic geomorphology*. Tectonophysics 410, 137-156.

Pohl, Jürgen, (1998), *Die Wahrnehmung von Naturrisiken in der 'Risikogesellschaft'*. In: Günter Heinritz, Reinhard Wießner & Matthias Winiger (eds.): Nachhaltigkeit als Leitbild der Umwelt- und Raumentwicklung in Europa. In: Verhandlungen des 51. Deutschen Geographentages. Stuttgart, pp. 153-163.

Renn, Ortwin, (1992), *Concepts of risk: a classification*. In: Sheldon Krimsky & Dominic. Golding (eds.): Social Theories of Risk. Westport, CT (Praeger), pp. 53-79.

Săndulescu, M., (1988), *Cenozoic tectonic history of the Carpathians*. In: L.H., Royden and F., Horvath (Editors), The Pannonian Basin, a study in basin evolution. AAPG Memoirs, 17-25.

Sardeshmukh, Prashant, Compo, Gilbert, and Penland, Cécile (download: 02-12-2011). *El Niño and Probability*. Climate Diagnostics Center - Climate Research Spotlight Article (http://www.esrl.noaa.gov/psd/spotlight/07092003/spotlight_elnino.pdf)

Slovic, Paul, Fischhoff, Baruch, & Lichtenstein, Sarah (1982), *Facts versus fears: Understanding perceived risks*. In Daniel Kahneman, Paul Slovic, & Amos Tversky (Eds.), Judgment under uncertainty: Heuristics and biases. Cambridge: Cambridge University Press.

Slovic, Paul., Fischhoff, Baruch, & Lichtenstein, Sarah (1977), *Risk assessment: Basic issues.* In Robert W. Kates (Ed.), Managing technological hazard: Research needs and opportunities. Program on technology, environment, and man. University of Colorado.

Wagner, Klaus, (2004), *Naturgefahrenbewusstsein und –kommunikation am Beispiel von Sturzfluten und Rutschungen in vier Gemeinden des Bayerischen Alpenraums*. Dissertation am Lehrstuhl für Forstpolitik und Forstgeschichte der TU München.

***, (1987), *Geografia României*, vol III, Edit. Academiei Române, Bucureşti