THE NATURAL RISKS PERCEPTION IN LEPŞA-GREŞU DEPRESSION

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Abstract. Le but de cet ouvrage est de mettre en place une évaluation du dégrée de la perception des risques naturels, perçue par les habitants de la dépression de Lepşa-Greşu appartenant à la chaine montagneuse des Carpates Orientales. Il s`agit d`une région où on peut saisir toute une série de mécanismes émergents de turistification de ces deux localités, les implications systémiques étant les plus complexes. Etant donné ce contexte, la perception devient très importante comme paramètre d`évaluation de la vulnérabilité générale.

Introduction

Understanding vulnerability requires more than simply understanding societies' past and present relations with regard to disasters and development. Understanding vulnerability requires taking into account people's knowledge, experiences and perceptions.

People's ideas about risk and their practices in relation to disaster constitute the sextant and compass with which they measure and chart the landscape of vulnerability.

Hilhorst (2004) categorizes people's perceptions according to three different social domains of knowledge that correspond to science, governance or local custom. All three are equally valuable and necessary for understanding what makes people vulnerable and how they can set about reducing that condition.

Worldwide, there are significant concerns regarding risk perception problems (Gardner et al. 1996; Heijmans, 2001, Chesney et al., 2002, Peek and Miletti, 2002, Cannon and Davis, 2004; Rundmo and Sjöberg, 2004) etc. by highlighting the important correlations and variations caused by several factors, such as age, gender, socio-economic status and even ethnicity or race.

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In Romania, there are few studies regarding the problem of natural risks perception and their results are heterogeneous (Reteşan-Floca, 2002, Cheval, 2003; Balteanu and Costache, 2006; Goţiu and Surdeanu, 2007; Sorocovschi, 2007; Goţiu and Surdeanu, 2008; Armas 2008). Some are more focused on flood risk perception (Sorocovschi and Mac, 2006; Balteanu and Costache, 2007; Conţiu and Conţiu, 2007; Goţiu, 2007; Ceobanu and Grozavu, 2009).

Perception is the individual and private mental process of organizing all the received external impulses (Armas, 2008), which, in risk analysis, requires a high degree of unpredictable decisions, often subjective towards given realities. Perception requires a certain behavior and attitude, making it difficult to attempt to quantify this parameter.

This study aims to assess the natural risk perception of the inhabitants of Lepşa-Gresu Depression situated in Vrancea County, based on a sample survey of 99 people.
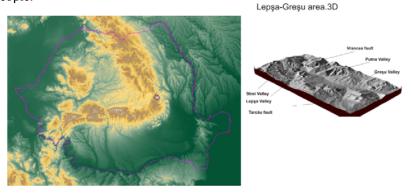

Fig. 1 - Lepşa-Greşu area. Regional location of the zone study

The area has been chosen because, following touristification, human pressure on natural components increased, the response or attempt of a natural adjustment sometimes having adverse effects on the quality of life of human society.

A number of natural risk phenomena were identified, ranging from slope processes proximate to socio-economic factors (landslides, collapses, crumblings) to channel processes or flash floods.

1. Methodology

A first step in making the study was to design a questionnaire containing 11 questions (Appendix 1) and seeking answers to following issues:

- interviewed identification data (I);
- awareness likelihood (II-III);
- knowledge and information, including knowledge of defense plans (IV-VI);
- volunteering availability (VII-VIII);
- perception of involvement by the authorities in risk prevention and mitigation (IX-X);
- the level of property insurance (XI);

It was aimed at assessing understanding (clear or unclear), the exposure degree (involuntary-voluntary), the institutional efforts (absent-involved), awareness of defense plans (yes, no) and the degree of personal involvement (high, low).

Four potentially destructive phenomena were chosen: earthquakes, landslides, torrential rains, flooding and finally, a fifth open question to which many people mentioned a phenomenon of risk, which is not natural, the fires; a sign that this issue is a matter of concern for the people of the area.

The respondents' appreciation has been marked with scores from 1 to 5, provided on an ascending scale of probability of risk manifestation of a phenomenon affecting the socio-economic factors.

The survey took place during the summer of 2009, with support from a group of students of the Faculty of Geography and Geology of „Al. I. Cuza" University of Iasi.

Data processing has been done by quantitative and qualitative methods of interpretation and statistical method (descriptive graphics).

A calculation formula belonging to the school of sociology in New Zealand has been applied for the representativeness of the questionnaire,

$$M \arg in = \pm 1.96 \sqrt{\frac{(100-P)P}{n} x \frac{(N-n)}{N-1}}$$

for a 95% confidence interval where:

➢ N - total number of inhabitants for an area
➢ n - number of interviewed subjects
➢ P - percentage of people who chose a particular response that deviates from the general line, with a margin of error higher than 50%.

For the study area the problem occurs when assessing the total population number of the depression, knowing that the stable population is 284 people for Lepşa and 120 people for Greşu, but with an presence of over 1124 secondary dwellings (September 2008, guildhall data).

This is the reason why multiple scenarios have been considered:

a) the stable population only, from both localities;

b) stable population plus a number of owners of secondary residencies wich follow a series of scenarios: secondary dwellings occupied during summer and week-ends for the whole year by:

      - 3 persons (wich represent the average also)

      - 4 persons (a family)

      - 6 persons (family and/or family friends)

For the *a)* scenario results:

$$\Rightarrow \quad \pm 1,96 \sqrt{\frac{(100-50)*50}{99}} * \frac{404-99}{403} = \pm 8,08\%$$

    b) scenario

- 3 persons: 404 (natives) + 3* 1124=3776 =>

$$\pm 1,96 \sqrt{\frac{(100-50)*50}{99}} * \frac{3776-99}{3775} = 10,45\%$$

-   4   persons   :   404   (natives)   +   4*1124   =   4900

$$\Rightarrow \pm 1,96 \sqrt{\frac{(100-50)*50}{99}} * \frac{4900-99}{4899} = \pm 10,45\%$$

-   6   persons   :   404   (natives)   +   6   *   1124   =   7148

$$\Rightarrow \pm 1,96 \sqrt{\frac{(100-50)*50}{99}} * \frac{7148-99}{7147} = \pm 10,63\%$$

      It can be observed that since the total population number increases, the growth indices of the coefficient of error is becoming lower, therefore, a growing number of statistical population results in an inverse error coefficient. We can talk about a representative case of 86 persons at a 95% confidence interval of 99 respondents.

      Data on the interviewee regarded indicators such locality, age, gender, occupation, level of education. The principle of spatial uniformity was respected, by age groups, gender and the widest possible distribution by occupation type.

      We opted for a larger number of subjects in the advanced age categories, just to take advantage of their increased experience (23% for those over 60 years) of an inhabited space better understood than by the young ones.

    2. Results and discussion

      A first aspect revealed by the interpretation of the answers given by respondents was that 38% of the population has a 12-grade level of education (high school).

Interesting, by choice, is the proportion of highly educated subjects (23%, explained by the fact that many subjects are retired owners of secondary residencies and they came from the counties of south-east, located in the touristic polarization of Vrancea area). This last point is affecting their perception of natural risk phenomena, by age group and occupation category, their options being better correlated to those of other age groups.

According to the questionnaire compiling methodology of the school of sociology in New Zealand, gender distribution respects a certain balance of 58% men, 42% women, although the balance could be even 50%.

Because we are talking about two places subject to obvious aging processes (aging index of 1.57 for Greşu and 1.16 for Lepşa), with a low educational level and a low degree of economic specialization, the highest proportion was that of pensioners (24%) and of those working in agriculture or at home (20%).

Due to the lack of space, not all graphs will receive an interpretation, but the methodology for achieving correlation and R^2 factor between the two questions and certain parameters (occupation, education level, age).

We insisted on interpretations of results and correlations for the 2nd and 3rd question, by attempting to understand the perception of the population in the area, on two crucial issues, production-related probability of risk phenomena (question 2) and the intensity of these phenomena (question 3).

Inferential statistics provided a brief analysis of the relationship between different categories of occupation and perceived likelihood of occurrence of natural risk phenomena; a weak correlation is observed, caused by an uneven perception of occupation classes (fig. 2, 3 and 4).
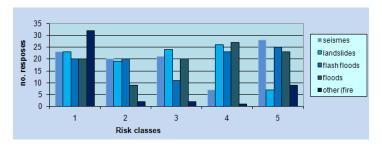

Fig. 2 - The perception of the risk phenomena

In order to understand the correlations between probability, perception on one hand and occupation, educational level and age on the other hand, the correlation index R^2 was calculated. The applied function was the exponent for earthquakes, landslides, torrential rains, flooding and logarithm for response

number five 'other', because of the fact that in many cases, for this variant, multiple answers were chosen, from fire to disease; the one chosen by us, namely fire, does not have ratings for the total statistical population.

Tab. 1 - Probability perception of risk phenomena

	Probability perception of risk phenomena expressions R² factor correlation analysis Analyzed parameters				
	earthquakes	landslides	flash floods	floods	other (fire)
occupation	0,032	0,168	0,146	0.2044	0,050
level of education	0,481	0,016	0,096	0,162	0,352
age	0,000	0,501	0,452	0,122	0,022
	Intensity perception of risk phenomena expressions R² factor correlation analysis Analyzed parameters				
	earthquakes	landslides	flash loods	floods	other (fire)
occupation	0.034	0,064	0,086	0,003	0,255
level of education	0,642	0,586	0,225	0,062	0,074
age	0,681	0,131	0,003	0,373	0,178

The best correlations are achieved for „earthquakes", thus the correlation depending on education level and age reaches the highest values; this shows that age (especially those with a life experience) and level of education are parameters that can be followed in future studies on risk perception phenomena. Good correlations can be observed between age-education level and landslides.

Correlations between education and the probability/intensity of risk phenomena manifestation have been exemplified to show the methodology employed (fig. 3 and 4).
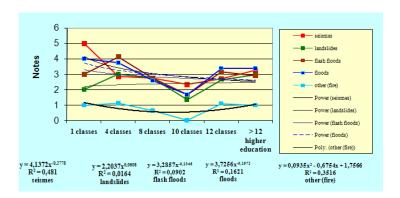

Fig. 3 - Correlation between the level studies of the respondents and the perception of the probability occurrence of the risk phenomena
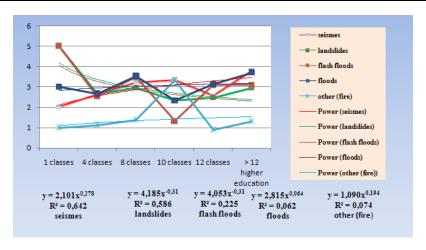
Fig. 4 - Correlation between the level studies of the respondents and the
perception of the risk phenomena intensity

We may notice that there is a good correlation between the perception of the
likelihood of adverse event risk and the intensity of these phenomena, by
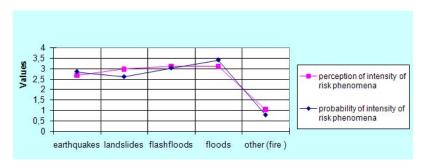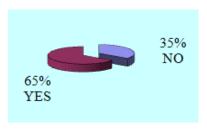categories of occupation (fig. 5), by age and level of education.

Fig. 5 - Correlation between the perception and probability of intensity of risk
phenomena

For question number four (fig. 7), concerning the level of knowledge on
procedures to be followed, the majority (84%) responded yes, only a small
percentage has chosen another answer. The explanation lies, actually, in the
inability to recognize the lack of knowledge about the procedures. In the case of
question number five (fig. 6), it appears that there is a certain balance between the

two options, which can show a decreased understanding of prevention and intervention plans, with a high potential of increasing the vulnerability in the event of adverse event risk.
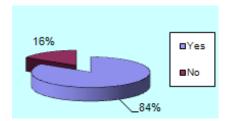

Fig.6 - Knowledge of prevention and intervention plans

Fig 7 - Knowing how to act in case o risk phenomena

In the case where natural risk phenomena occurred, they would affect the integrity of the socio-economic system of this area, 86% would leave the property and dwelling in various ways (fig. 8).

The percentage of those who would not part without their goods, namely 14% is interesting; although it is said that elders are those who would not leave, in this case, the situation has changed: the highest percentage of people who will not go is between 40-49 years, which can be explained by the low income of those interviewed, so that those with a low financial strength or simply with a poor perception of the phenomenon itself. This ability requires low resilience and an increase of vulnerability.
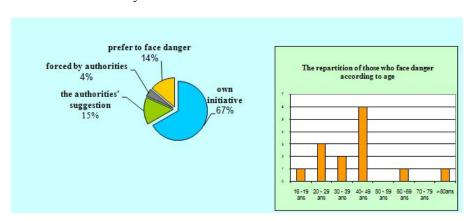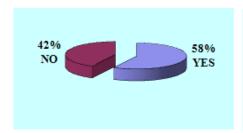

Fig. 8 - The respondents available for leaving their own goods

Regarding the participation in voluntary activities (building dams, riverbed cleansing, etc.), the interviewed population is divided; in case of rescue measures, the percentage of participation is 96%. The explanation lies in the human cohesion and the adversity towards the authorities, which intervene for questions 7 and 8, presented in the graphic below (fig. 9:10).
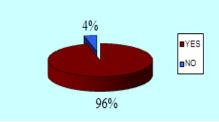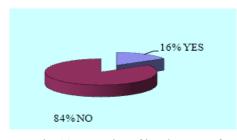

Fig. 9 - Availability of voluntary actions   Fig. 10 - Availability of involvement in rescue

Public distrust towards the authorities (fig. 11, 12) is detailed in question number 10; this level of skepticism regarding the ability of public authorities indicates either a low degree of involvement, a lack of involvement, or the big distances that don't allow an effective intervention; such is the case of firefighters (with times intervention of approximately 30 minutes), or the existence of a hospital in Vidra village (travel time 45 minutes).
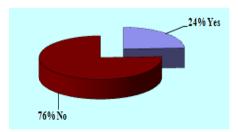

Fig. 11 Perception of involvement of authorities in preventing and reducing risk   Fig. 12 Degree of insurance against he risk phenomena

On the last question of the questionnaire (Figure 13), we observed that most of subjects were either owners of secondary residencies located in Lepşa or Greşu or managers of insured hostels, pensions, etc.

The pensioners, who responded that they did insure their properties, are people settled in this area or people with a longer residency period throughout the
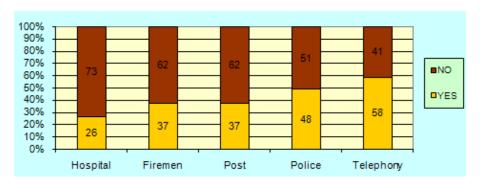
Fig. 13 - Perception of local capacity and effectiveness

year, which led them to answer that they are natives of Lepşa. Of course, most of them did not insure their goods, so that their overall vulnerability can be increased in the event of the occurrence of adverse natural phenomena.

Conclusions

Public perception in Lepşa-Gresu depression on risk phenomena is at a low level. This leads to an increase in vulnerability, if the risk phenomena occur, with possible negative effects, from damage of goods to loss of lives.

The necessary measures for the future converged both to educate people to be aware of the risks and to be prepared to face any extreme natural events. Also, the strengthening of the community spirit and a better communication between the authorities and the community is of particular importance.

References:

Armaş, Iuliana (2008), *The natural risk perception: earthquakes, flods, landslides*. Edit. Univ. Bucharest, Bucharest, p. 217 (in romanian).

Bălteanu, D., Costache, Andra (2006), *The concept of vulenrability. Aplications in Geography*. Rev. Geo., XII/2005, Inst. Geogr., Acad. Rom., Bucharest, pp. 5 – 13 (in romanian).

Bălteanu, D., Costache, Andra (2007), *The perception of flood effects in April 2005from Foeni and Otelec (Timiş county). Preliminary considerations.* St. si Cerc. de Geogr., LI-LII/2004-2005, Acad. Rom., Bucharest, pp. 139-152 (in romanian).

Cannon, T., Davis, I. (2004), *At Risk: Natural Hazards, People's Vulnerability and Disasters.* 2nd edition, Routledge, London, N.Y., p. 471.

Ceobanu C., Grozavu A. (2009), *Psychosocial effects of the floods. Perception and attitudes, Carpathian Journal of Earth and Environmental Sciences*, 4, 25-38.

Chesney, P. E. S., Cannibal, G. L., Baines, R. (2002), *The Development of a New Holistic Assessment Model for the Inclusion of Public Perceptual Values in the Decision-*

Making Process. Risk Analysis, III, WIT Press, Southampton, Boston, pp. 171-180.

Cheval, S. (2003), *The natural hazards perception. The resuslts of a survey did in Romania (October 2001-December 2002)*. Risks and catastrophe, vol. II, Casa Cărţii de Ştiinţă, Cluj-Napoca, pp. 49 – 59 (in romanian).

Conţiu, Andreea, Conţiu, H. V. (2007), *The risk produced by floods perception. The result of a poll made in Romania in the cities from Tarnava basin.* Riscuri şi catastrofe, vol. IV, Casa Cărţii de Ştiinţă, Cluj-Napoca, pp. 179 – 188 (in romanian).

Floca, L., Reteşan-Floca, Diana (2002), *Environmental risk perception and acceptability analysis - prerequisite for sustainable development*. Riscuri şi catastrofe, vol. I, Casa Cărţii de Ştiinţă, Cluj-Napoca, pp. 45 – 51 (in romanian).

Gardner, G. T., Stern, P. C. (1996), *Human Reaction to Environmental Hazards: Perceptual and Cognitive Processes in Environmental Problems and Human Behavior,* Allyn and Bacon, USA. Geographical Association, pp. 161-198.

Goţiu, Dana (2007), *Measuring Community Preparedness for Hazard Mitigation. Case Study: the Râul Mare Hydroelectric System,* Geography within the context of contemporary development, Presa Universitară Clujeană, Cluj-Napoca, pp. 112 - 118.

Goţiu, Dana, Surdeanu, V. (2007), *Basic study of natural hazards*, Presa Universitară Clujeană, Cluj-Napoca, p. 141 (in romanian).

Goţiu, Dana, Surdeanu, V. 2008, *Natural hazards and risks of Hateg Area*. Presa Universitară Clujeană, Cluj-Napoca, p. 335 (in romanian).

Heijmans, Annelies (2001), *Vulnerability – A Matter of Perception,* Disaster Management Working Paper, vol. IV, Benfield Grey Hazard Research Center, London, p. 17.

Hilhorst, Dorothea (2004), *Complexity and Diversity: Unlocking Social Domains of Disaster Response*, in Mapping Vulnerability. Disasters, Development and People, Earthscan, London • Sterling, VA, 2004, pp. 52 – 66.

Peek, L., Miletti, D. (2002), *The History and Future of Disaster Research*, in Bechtel, B.R. & Churchman, A. (editors) Handbook of Environmental Psychology, John Wiley & Sons Inc., New York, p. 515.

Sjöberg, L., Moen, B. E., Rundmo, T. (2004), *Explaining Risk Perception. An Evaluation of the Psychometric Paradigm in Risk Perception Research,* Rotunde Publikasjoner, Trondheim, Norway, p. 33.

Sorocovschi, V., Mac, I., (2006), *Risk perception induced flooding in the Niraj basin*. Riscuri şi catastrofe, vol. V, nr. 3, Casa Cărţii de Ştiinţă, Cluj-Napoca, pp. 260 – 272 (in Romanian).

Sorocovschi, V., (2007), *The vulnerability component of risk. Concept, control variables, types and models of evaluation*. Riscuri şi catastrofe, vol. VI, nr. 4, Casa Cărţii de Ştiinţă, Cluj-Napoca, pp. 58 – 69.

Appendix 1

Natural risk perception questionnaire for depression Lepşa – Greşu

I. **Interviewed data :**
Locality :
Age :
Gender :
Education level :
a) Primary school
b) Secondary school
c) Highschool
d) College
Occupation :

II. **Do you think you live in an area that may be affected by dangerous natural phenomena?**
Grades from 1 to 5 (1 = low chance production phenomenon ... 5 = high chance of producing phenomenon)
Earthquakes_ ;Landslides-_ ;flash floods- ; Floods_ ; Other_ ;

III. **Of these phenomena wich one do you think would represent the higher risk ?**
Grades from 1 to 5 (1 = low risk... 5 = high risk)
Earthquakes_ ; Landslides_ ; flash floods_ ; Floods_ ; Other_ ;

IV. **In case of dangerous natural phenomena do you know how to act?**
1) Yes   2) No

V. **Do you know of the existence and content of prevention and intervention plans in case of occuring of dangerous natural phenomena in the village?**
1) Yes 2) No

VI. **VI. In case of dangerous natural phenomena, are you willing to leave home and personal property?**

1) own initiative
2) only at recommendation of the Authorities
3) only forced by the Authorities
4) I prefer to face the danger

VII. Would you be willing to participate in voluntary activities (cleaning whites, building dams, repair, etc..) prevention and / or removing the effects of dangerous natural phenomena?
1) Yes 2) No

VIII. In case of dangerous natural phenomena wold you involve in rescue (human lives, material goods)?
1) Yes 2) No

IX Do you consider that the authorities should do everything to prevent these dangerous phenomena?
1) Yes 2) No

X Do you consider that the local institutions respond to community needs?
a)   Hospital
       Yes   No Partly
b)   Firefighters
       Yes   No   Partly
c)   Police
       Yes   No   Partly
d)   Post Office/Telecommunication
       Yes   No   Partly

XI. Are you insured in case of occurence of dangerous natural phenomena?
1) Yes 2) No