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Local stakeholders' perception of natural risks. Case study of Iași County, NE Romania

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Extended Abstract

INTRODUCTION

Iasi County is located in north-east part of the Romanian territory, in the Moldavian Plateau. This is one of most exposed region from Romania to gravitational processes (Bălțeanu et al., 2010) and floods (Romanescu and Stoleriu, 2013). For the recent years it was recorded a real growing of damages caused by floods, and a relative stagnation of those caused by landslides. An important component for the preparation of human communities against these unwanted futures events, is a correct evaluation of risk perception both for peoples in general but for the stakeholders especially (Heitz et al., 2008).

Risk perception is an important issue for an efficient management of natural hazards and its negative impact on social and economic life. At administrative unit scale, local stakeholders play an effective role in case of an emergency situation, regarding the warning and alerting the population, collaboration with specialized institution and managing material assistance during and after the crisis. In addition they are among the best connoisseurs of human community and places, and consequently they could substantial help national level forces during emergency situations. These issues argues the high degree of responsibilities assigned to Romanian mayors, and is reflected in the legislation in terms of evaluation of damages produced and the management of natural hazards, like landslide and floods.

In this paper we have tried to assess local stakeholders' perception for natural risks in general, and particularly for landslides and floods. We want to test the discrepancies of the specific risks perception and an assessment of correspondence between scientific outputs versus the subjective judgement and evaluation (Salvati et al., 2014) of the administrative decision makers. This approach was based on a questionnaire which was distributed, in the summer of 2014, to all 98 mayors from Iasi County, north-east Romania. It contained 12 questions structured in a specific mode, from general to particular.

The assessment of the answers provided from the village halls, was realised with integration in GIS environment, of codes assigned to each question, and the overlay with the scientific results regarding landslide occurrence and susceptibility and floods risk maps. The first two results were carried out by the authors of this presentation and the latest one was provided by Prut-Bârlad Basin Administration.

STUDY AREA

Iasi County has a surface of 5497 km², and overlap on three main subunits of the Moldavian Plateau: Jijia Hills, Suceava Plateau and Central Moldavian Plateau (Figure 1). The altitudes range between 28 m a.s.l., along Prut Valley, and 593 m a.s.l., in the north-west. This is an

administrative unit which annually is hit by floods, droughts, heavy rains, and at larger periods of time by landslide events and earthquakes. The lithology is dominated by Neogene clayey-silty formations with intercalations of sandstones, limestones, volcanic tuffs, and sands, and Quaternary formations (predominantly sands and silts) along the main rivers (Siret, Prut, Moldova, Jijia, Bahui etc.). These lithological conditions, in addition with the monoclinic structure, the topographic framework, the climatic conditions and the land use/cover patterns are responsible for a large occurrence of landslides. These are represented by rotational and translational slides, earth flows, lateral spreads, and very distinguished for this region, a large numbers of complex slides, mono- or poly-amphitheatre like nests (Mărgărint et al., 2013). These affect many settlements, roads and other lifelines, and the value of agricultural lands (Figure 2).

For the decade was reported a real increase of the cases of catastrophic floods with historic high-water marks only to be registered every 500 or 1000 years, the cases of 2005 and 2008 years. This situation was recorded also for the north-east part of Romania (Romanescu and Stoleriu, 2013). Along the main rivers (Siret, Prut, Moldova), due to the legislative deficiencies, the low level of awareness manifested for long periods of time, and the lack of training of the administrative managers, the consequences of these hydrologic events, at human scale background, was impressive (Figure 3).

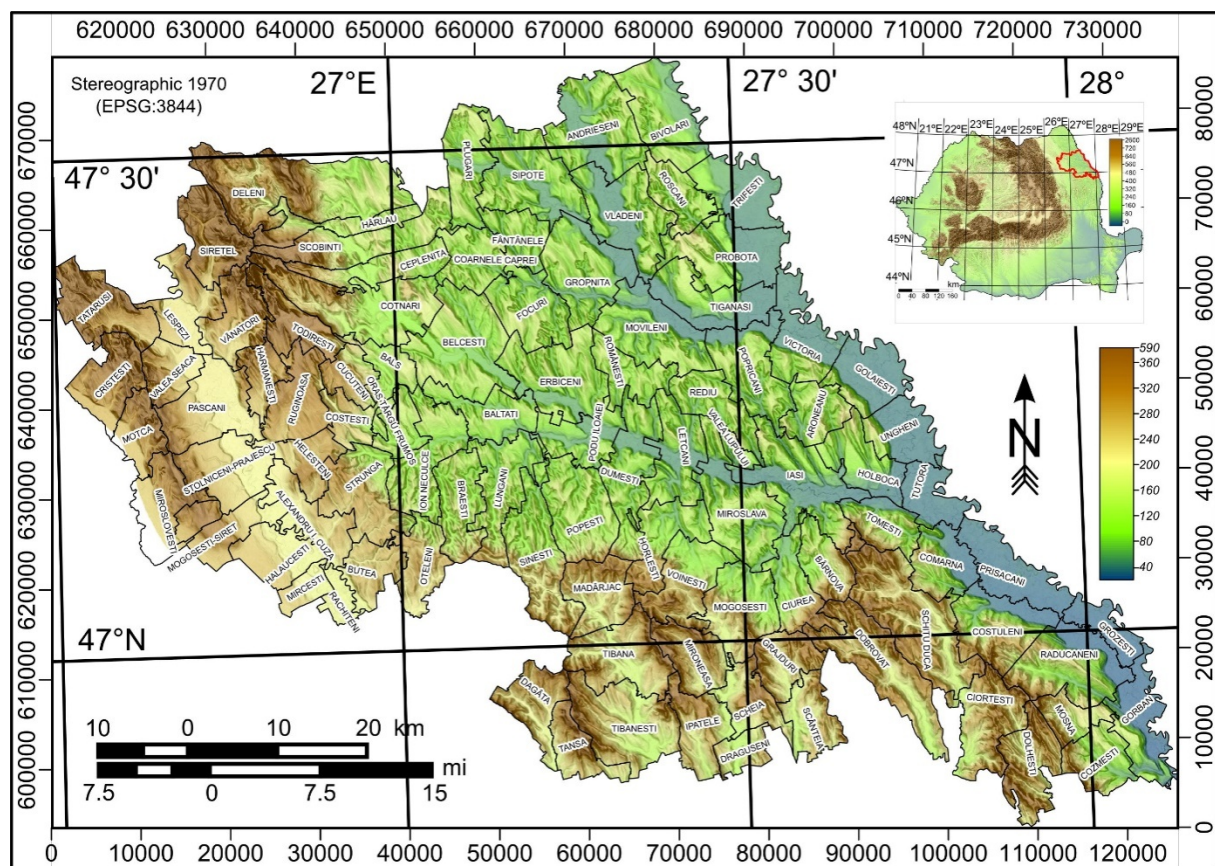


Figure 1. Iasi County hypsometry and the administrative units.

METHODS

The questionnaire used in this study, contain 12 questions related to the following main issues:

- the estimation of hierarchies of the main problems that have affected in the past and which can affect in the future the local communities (development level, criminal

insecurity, technological and natural risks, and environmental pollution) – question 1 (Q1) and Q2;

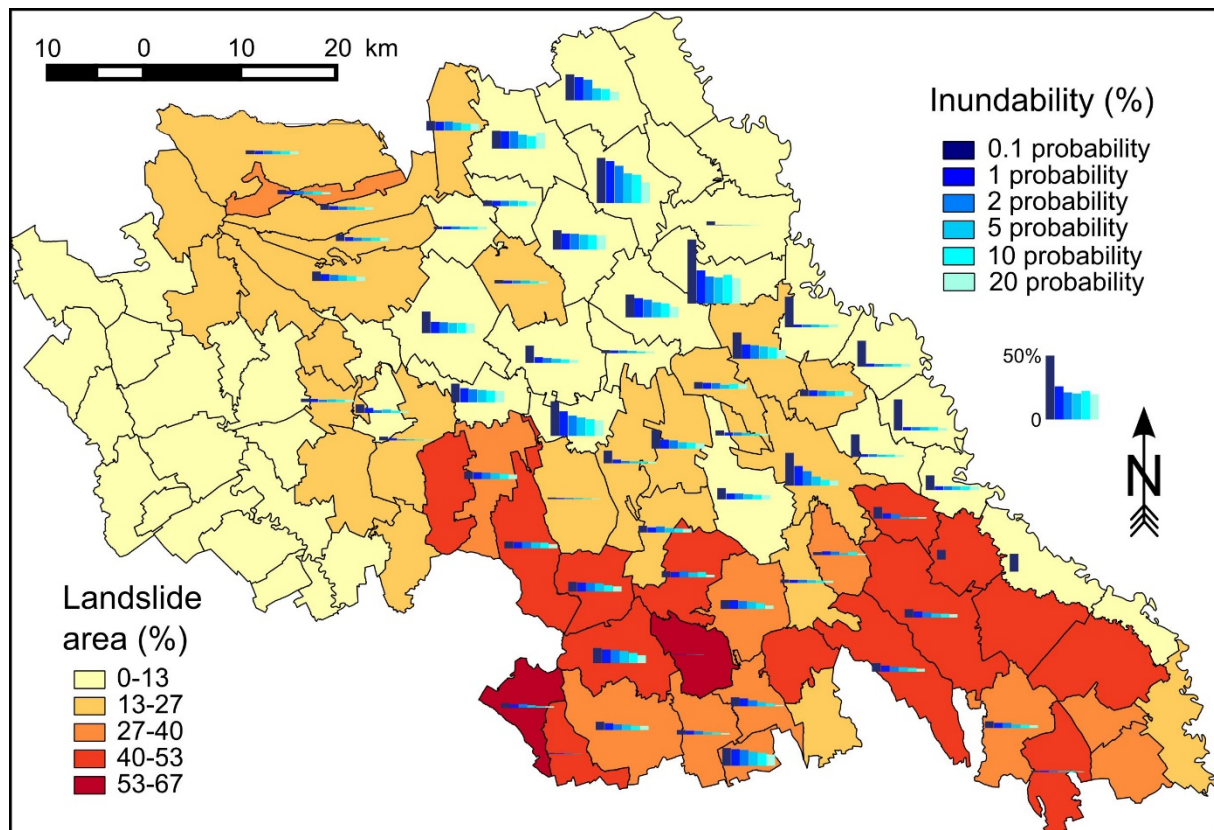


Figure 2. Landslide area and inundability at different probabilities (% from total area of the administrative unit).

- the estimation of level of exposure (very exposed, exposed, less exposed, and unexposed) of the communities to main natural and technological risks (earthquakes, floods, landslides, fires, traffic accidents, discharges of pollutants) – **Q3**;
- the hierarchy of natural hazard which have affected in the last 50 years the life and the material assets of the community (earthquakes, floods, landslides, heavy rains and droughts) – **Q4**;
- the hierarchy of phenomena which will mostly affect the life and the material assets of the community in the next 10-15 years (earthquakes, floods, landslides, heavy rains/hail falls, snowfalls/snowstorms, droughts, and climatic global changes) – **Q5**;
- the direct knowledge of casualties or material damages caused in the administrative unit by floods and/or landslides (yes/no) – **Q6**;
- the level of threat to the population and material assets represented by landslides and floods (no/yes in a lesser measure/in a large measure) – **Q7**;
- the degree of influence (from weak to high, 5 classes) of factors which are responsible for the occurrence and spatial distribution of landslides and floods (the extreme meteorological events, the climate changes, the characteristics of the landforms, the changes of land use, the extension of settlements and transport network, and the missing of territorial planning) – **Q8**;
- the level of threat induced by landslides and floods (from low to high, 5 classes) to the elements exposed: population life, buildings, built-up area, transport network, utilities (water, gas and electricity network), environment (the quality of soils, waters and air) – **Q9**;

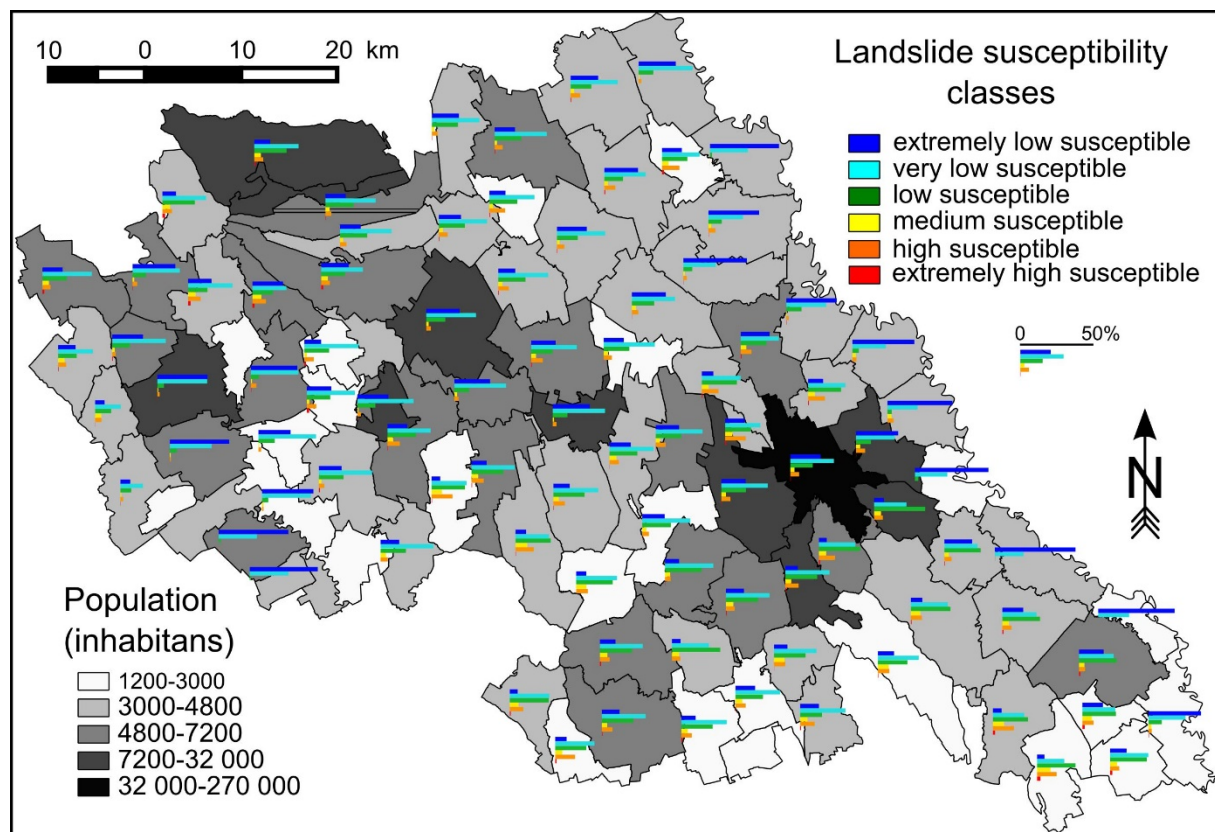


Figure 3. Population and landslide susceptibility classes(% from total area of the administrative unit).

- the hierarchy of measures which should be adopted to reduce the level of vulnerability to landslides and floods: the improvement of the legislation (in general); the improvement of the specific legislation (regarding urban planning, hazard maps of floods and landslides); local outgoings in the areas already affected by landslides and floods; national outgoings for terrains exposed to these risks; increasing the awareness of the population; realization, discussion and dissemination (brochures, flyers); systematic informing and conducting periodic intervention exercises at local level – **Q10**;
- an estimation of percent of the (a) total surface and (b) built area of the (i) areas affected by landslides, (ii) areas with high and very high probability to be affected by landslide, and (iii) areas with high and very high probability to be affected by floods (under 1%, 1-5%, 5-10%, 10-20%, 20-30%, and over 30%) – **Q11**;
- the factors and their level of influence of awareness/perception of the population to natural hazards (earthquakes, floods, landslides, extreme meteorological events): direct experiences; indirect knowledge (mass-media, books, encyclopedia); thrust in local authorities; thrust in county level authorities; thrust in national authorities; educational level; age; standard of living; proximity to the exposed areas.

The answers provided have been centralized, statistic analysed, and integrated in a GIS, together with a scientific database carried out at administrative level units which contains: landslide inventory (Niculiță and Mărgărint, 2014), landslide susceptibility carried out through AHP method (Mărgărint and Niculiță, 2014) and flood risk database provided by Prut-Bârlad Basin Administration (Figure 2).

RESULTS

The perception on the main issues of the human communities (Figure 4), emphasizes the high frequency of the need for development, both for the present situation and for the future 10-15 years. The place of natural hazards is situated on a low level of the proposed hierarchy, because these events do not account now for high losses, although in the last few decades (the large earthquake of 1977, the floods and landslides from 1969-1975), these events produced high levels of losses. This temporal clustering of the natural hazard events, do not remain imprinted in the decision makers perception, and their perception on the main issues of the human communities are dominated by the development perspectives.

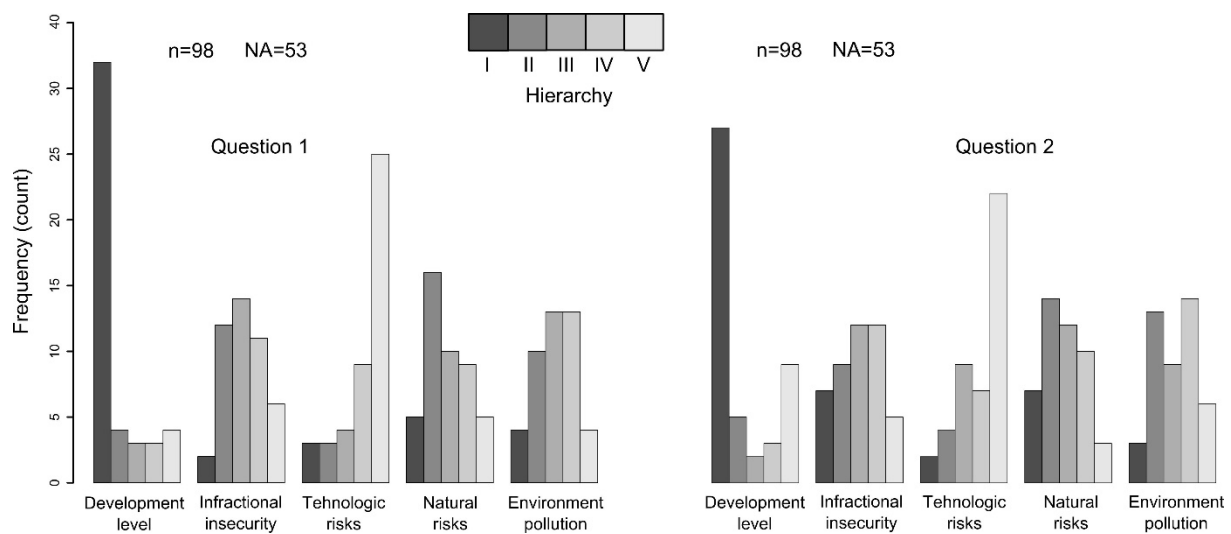


Figure 4. Outputs resulted for questions 1 and 2.

Regarding the natural and technological hazards, the decision makers appreciate that the human communities are little exposed to them. Some of them consider that the human communities are very exposed to earthquakes and floods (Figure 5).

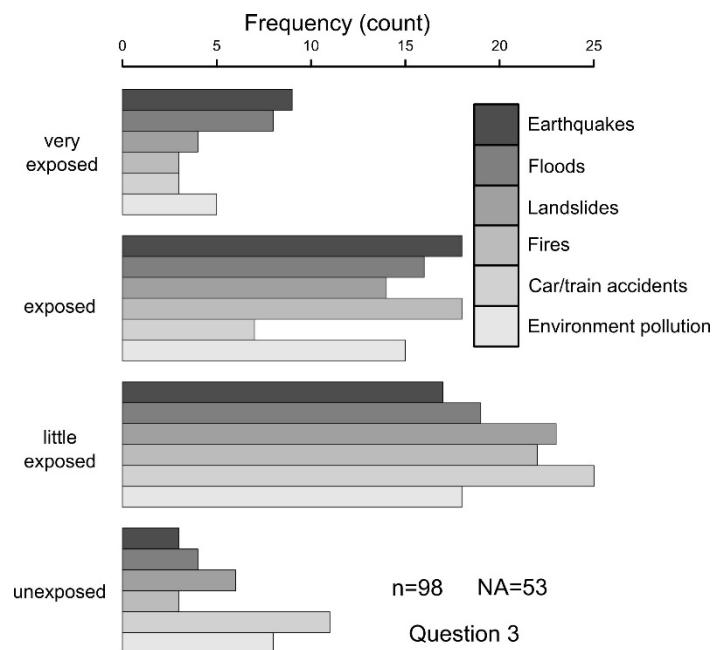


Figure 5. Outputs resulted for question 3.

Regarding the natural hazards, for the actual period, the meteorological events (heavy rains and droughts) play the most important role in the perception of the decision makers (Figure 6). This tendency decrease for the next period (10-15 years perspective), in the context of the inclusion of these event in the global climate changes. The floods are considered in the medium part of the hierarchy, while landslides in the lowest part of the hierarchy.

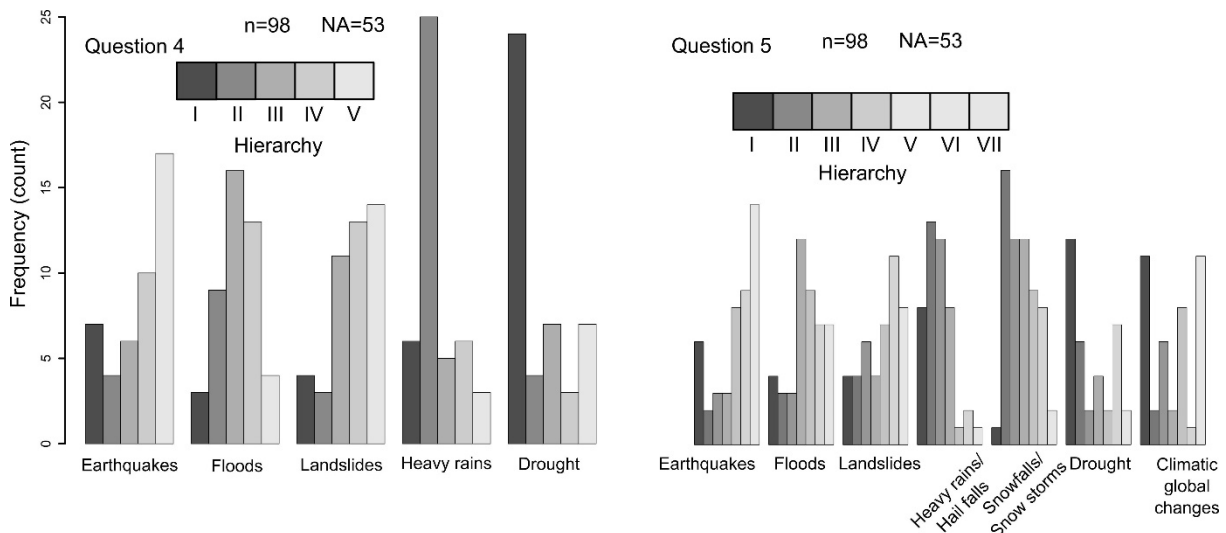


Figure 6. Outputs resulted for questions 4 and 5.

In the case of the control factors, for landslides and floods, the perception of the decision makers is that the human activity play the most important role, (extension of built-up area and the lack of land planning – Figure 7). In their perception, landform characteristics and land use change, follow in a medium level of the hierarchy, while the extreme meteorologic events and climate changes play the lowest role.

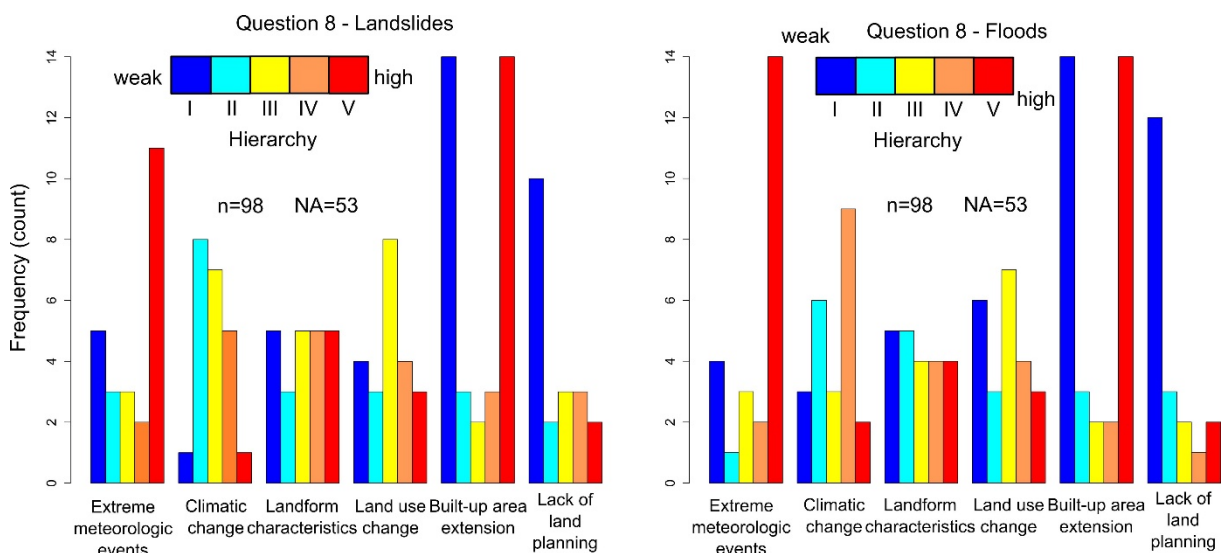


Figure 7. Outputs resulted for question 8.

The most exposed elements at risk, in the perception of the decision makers are people life and buildings, the transport network and environment quality following on medium levels, while the built-up and utilities network are considered the less exposed (Figure 8).

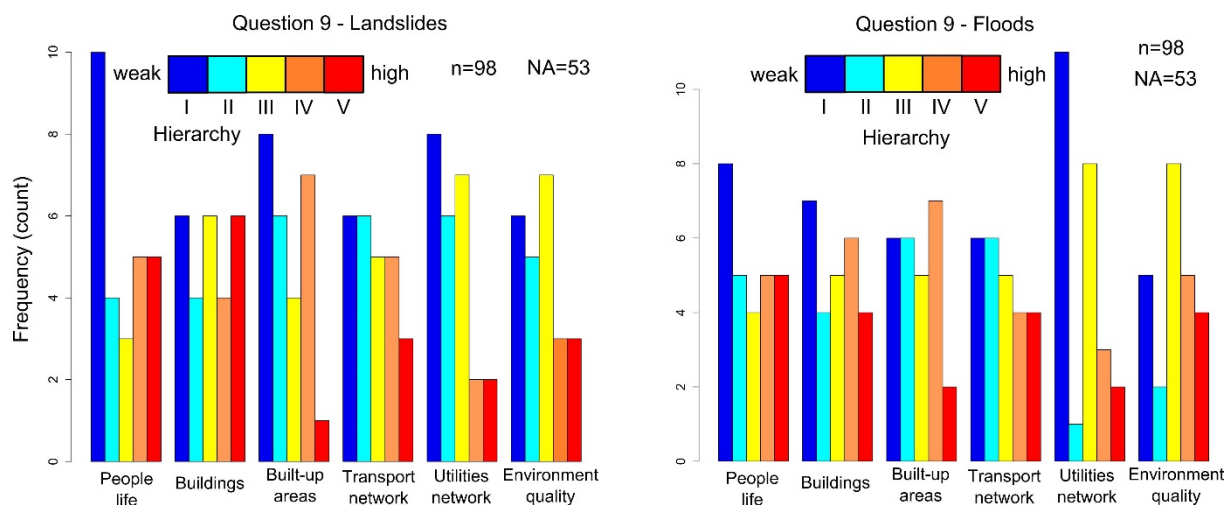


Figure 8. Outputs resulted for question 9.

For the remaining undiscussed questions, we believe that the interpretation will be valid only when all the respondents will complete the database.

CONCLUSIONS

Because of the incompleteness of the database, we have presented just some preliminary results, based especially on descriptive statistics. More results and their relational interpretations will be presented after the availability of all questionnaires. But, for the moment, some conclusion can be highlighted, after reviewing of 60% from the total answers expected.

Stakeholders' perception and the factors causing them can be estimated in a general framework of these critical issues regarding the management of crisis induced by natural hazards. It was registered a large variation of answers and important discrepancies between scientific results and stakeholders' estimation, both for landslides but for the flood components. The decision makers perception is strongly influenced by their personal experience regarding the hazard events, the events with short temporal recurrence interval being seen as more important, than the events with long term recurrence interval.

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