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Many different phenomena could produce alteration, decay, depletion or loss of material and immaterial assets that mark out landscapes. In this Special Issue, "Landscape at risk" is understood as concerning all the phenomena that could alter or interrupt that relationship between community and places, which lead to landscape features creation. Therefore, the topic "Landscapes at risk" is addressed considering its multiple meanings: Landscapes under environmental risk, climate change effects, but also landscape at risk of abandonment, or at the contrary landscape overexploited by tourism and other intensive activities. Landscapes endangered by environmental phenomena are analysed taking into account the way risk influences everyday life and the population-resources relationship underpinning landscape creation. Special consideration is given to climate-change related risk and to methodological improvements to develop criteria and tools to achieve the integration of mitigation and adaptation measures within landscape. In addition, landscapes suffering drastic depopulation are investigated and the most suitable management processes to prevent modification on landscape features are proposed. Finally, causes, effects and possible solutions are examined for landscapes where exploitation levels maxed-out saturation or where resources enjoyment is mainly based on an intensive consumption pattern and on the appropriation for commercial purpose, which lead to jeopardize the resources themselves, as mass tourism does.

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INSIGHTS ON RISK PERCEPTION: THE CASE OF FRIULI VENEZIA GIULIA

Abstract

Existing risk research usually does not contemplate the landscape dimension as a category of risk, thereby failing to consider whether the conditions of local landscapes are a source of individual concern. A study involving members of the University of Udine was conducted in 2018 to explore, through an online survey, what opinions of the surrounding environment respondents have, specifically if they perceive the existence of situations of degradation, and what their risk perception is. Survey data are therefore used to explore the judgments of locals towards risk and how intensely different situations of risks are felt. The Categorical Principal Components Analysis was conducted to verify if demographic characteristics influence risk perception. We found that respondents are primarily concerned with the risks linked to the abandonment of buildings for industrial, commercial and military uses. The statistical procedure revealed that women and older people have a higher risk perception.

Keywords: risk perception, online survey, local population

Introduction

The theme of risk is certainly not a novelty in academia and, above all, it is characterized by the involvement of a plurality of fields of knowledge [1], [2]. The multiple interpretation of the concept of risk stems from various factors. On the one hand, it derives from the numerous typologies of potential situations of risk, ranging from those attributable to natural events (earthquakes, floods, etc.) to those linked to socio-economic conditions (for example the risk of remaining jobless or without any form of social protection). On the other hand, the existence of a multiple interpretation of the concept relates to the diverse, parallel and/or convergent, specialist contributions that different disciplines can provide for the understanding and evaluation of risk [3]. Despite the common acceptance of the importance and complexity of the theme of risk, there is no convergence within academia on the precise meaning to assign to this concept. The scientific and technical domain focuses primarily on the quantification of risk, where risk is largely expressed by means of probabilities and expected values [4]. In human sciences, on the other hand, risk is seen in terms of events/consequences and uncertainties, and can be defined as: “a

situation or event where something of human value (including humans themselves) is at stake, and where the outcome is uncertain” ([5], p. 1); the focus is mainly on both perceptual and emotional dynamics, individual and collective, and on socio-cultural conditionings, communicative aspects and social representations. In this view, this research area is characterized by uncertainty and incommensurability [6]. From this complexity different analytical approaches are derived. Thus the importance attributed to the different factors involved in the definition of the concept of risk, and the inclusion (or not) of the various components that can affect risk perception, are different from one discipline to another. The factor relating to risk communication, according to some scholars, “should aim, if we wanted to define it with a mission, precisely to bring these two fields closer together, that of scientific knowledge and that of perception, for its better management” ([7], p. 8). Besides this, communication represents a variable that is increasingly fundamental for political and technical planning and for the ability to govern a plurality of situations that affect people’s lives in their different dimensions [8].

The eighteen categories of risk considered and analyzed in this contribution include some classes that converge in principle within some of the macro-categories proposed by [9], which refers in particular to western contemporary societies. Specifically, the selected categories concern environmental risks (including those referring strictly to the natural dimension, such as flood risk or seismic risk), economic risks, and those related to crime¹. However, given that the research project aimed at understanding in particular the public’s concern for the different conditions of degradation in the Italian Region of Friuli Venezia Giulia, the investigation also included specific categories of risk that can be defined as “territorial”. So elements such as the degradation of the landscape, the abandonment of buildings previously having industrial, commercial or military functions, uncontrolled overbuilding and the consequent land consumption, which rarely appear in the classical analysis of risk perception, constitute in this analysis typological categories of extreme relevance. They are in fact useful for understanding how much and in what way the conditions and evolutionary dynamics of the various regional landscapes represent (or not) a concern for citizens, and what priority, if any, locals attribute to them. In the specific case of

Friuli Venezia Giulia, the inclusion of the territorial categories of risk is reinforced by the fact that the region assigned particular importance to compromised and degraded areas in its recent Landscape Plan [10]. The analysis of how people perceive a risk plays an extremely important function as it leads to an understanding of how locals can face potential risks and tackle them. To this aim, the research prioritized involvement of residents of the study area to understand the relevance assigned by them to each category of perceived risk [11].

Data collection

In order to explore the territorial dimension of risk, the usual research process was followed. This section focuses on data collection, while the statistical procedure used in data analysis will be detailed in the following section. The medium used to build up the empirical base is a structured questionnaire, whose antecedent is found in the research carried out by [12] on students’ perceptions of the civil protection system. The invitation to fill in the online survey, which was developed on Google Form, was sent by email to the members of the academic community of the University of Udine (about 16,000 recipients). The Internet made it possible to reach people who are geographically dispersed. Specifically, the target population includes individuals who mostly reside in the region or who are at least familiar with the reality of the municipality that they attend because of their formal link with the academic institution (the university is present in the Municipality of Udine, and also in the cities of Gorizia, Pordenone and Gemona). This methodological choice was taken in light of the regional research scale of the project. Moreover, the surveyed population is characterized as being very heterogeneous. By encompassing people whose roles range from those of students to full professors, it was possible to elicit the judgments of those who, for personal experience, education and knowledge, may have different definitions (and perception) of risk. Another important note relates to the fact that the collection of data on risk perception took place in a broader research context (a detailed account of the landscape studies in Friuli Venezia Giulia can be found in [13], [14]). The research project on which this paper is based concerns the relationship between the local population and situations of degradation and risk in the Friuli Venezia Giulia Region. This

means that, in addition to the data considered in this contribution, other subjective data were collected. The survey contained traditional Likert-scale questions aimed at eliciting citizens' opinions and judgments on the status of regional landscapes, and spatial questions asking respondents to identify the sites that are perceived as of quality and of degradation [15]. It is important to emphasise that respondents' participation in the project was voluntarily, and to overcome this limitation the following statistical analysis takes into account the demographic characteristics of participants. A similar methodological approach is present, for example, in [16], on the public's risk perception of air pollution. For these authors, the study of the influence of demographic and socio-economic variables on risk perception can serve to identify groups with a greater risk perception and implement targeted educational strategies. Analogously, this research has the potential to provide a basis for understanding whether some categories of people think differently from others about risk, and, consequently, how public authorities' efforts should tackle the existence of different opinions.

Results

The administration of the survey occurred between February and March, 2018, and it resulted in the collection of 534 valid questionnaires. As a detailed analysis of respondents' profiles has already been proposed in [17], this work will focus exclusively on the section of the questionnaire on risk perception, those questions and typology of answers are listed in Table 1. These are a series of Likert scale questions, where non-replies were associated for hypothesis to the absence of that risk.

The Likert scale questions received 9,127 replies overall. In only 37 cases (0.4%), no answer was given. This first result demonstrates how, in general, the perception of risk is present, albeit to varying degrees, in all 534 respondents. The mean of replies per person is 17.1. The option of signaling an additional risk (RALT) was scarcely used, confirming that the previous seventeen risk categories considered in the questionnaire were adequate. Finally, a note should be made on the overall frequency of the highest levels of the Likert scale (i.e. 3 and 4), also known as Top-Box (TB). This latter reaches 45% when all categories are considered jointly, indicating a medium-high or high level of risk perceived. Table 2 shows the main descriptive statistics of each category of risk: the value of the median allows for the distinguishing of risks that are perceived with greater intensity (i.e. having a value of at least 3), from those perceived with less intensity (i.e. 1). The Top-Box of the first 17 categories (that is, excluding RALT) shows how the risks most perceived by respondents are those concerning the abandonment of industrial, commercial and military buildings (RABB) with 66.5%, followed by those related to air pollution from exhaust emissions (RINA) with 60.1%, and those to seismic events (RSIS) with 59.8%. All these risk categories have a median value equal to 3. The less-perceived risks are those related to industrial accidents (RIND) with 29.4% (with median of 2), and to terrorist acts (RTER), with only 9.2% (the median is 1). In summary, the most reported risks are those related to degradation caused by human activities,

Categories	Reply type
1. RIND Industrial accidents and consequent leaks of harmful substances	Likert scale (1 "low" to 4 "high")
2. RSIS Seismic events	Likert scale (1 "low" to 4 "high")
3. RALL Floods, overflows and sea storms	Likert scale (1 "low" to 4 "high")
4. RIDR Hydrogeological instability, landslides and avalanches	Likert scale (1 "low" to 4 "high")
5. RMET Extreme weather events	Likert scale (1 "low" to 4 "high")
6. RINA Air pollution from fossil fuels exhaust gas emissions	Likert scale (1 "low" to 4 "high")
7. RCRI Crime	Likert scale (1 "low" to 4 "high")
8. RECO Effects of the economic crisis	Likert scale (1 "low" to 4 "high")
9. RTER Terrorism	Likert scale (1 "low" to 4 "high")
10. RDEP Landscape degradation	Likert scale (1 "low" to 4 "high")
11. RIMM Immigration	Likert scale (1 "low" to 4 "high")
12. RABB Abandonment of buildings and warehouses used for industrial, commercial and military purposes	Likert scale (1 "low" to 4 "high")
13. REDI Uncontrolled overbuilding	Likert scale (1 "low" to 4 "high")
14. RSUO Land consumption	Likert scale (1 "low" to 4 "high")
15. RIST Road accidents	Likert scale (1 "low" to 4 "high")
16. RINE Electromagnetic pollution	Likert scale (1 "low" to 4 "high")
17. RINC Noise pollution	Likert scale (1 "low" to 4 "high")
18. Other (specify what)	Open-end
18.1 RALT Assessment of the risk category identified in Other	Likert scale (1 "low" to 4 "high")

Tab. 1. Question of the survey concerning the risk perception: "What is your perception of risk, with reference to a series of categories of risk, in the area where you live?".

especially economic ones, while the presence of a seismic risk is linked to the fact that Friuli Venezia Giulia is an earthquake-prone area. The existence of a demographic section in the questionnaire allows for the analysis of replies according to respondents' sex and age. Participants were divided into two groups: the first, 15-29 years old, and the second, 30 and over. The comparison of the Top-Boxes, when all the answers are considered, shows a difference between the sexes of 3.3% (the overall frequency of the 3rd and 4th level is 42.9% for males, 46.2% for females); and for age groups a difference of 6% (48.8% for the over 30s; 42.8% for the younger group). Females and the less

young are, therefore, more sensitive to the presence of risks, to varying degrees. In order to confirm the results obtained from the analysis of the Top-Box, the Nonlinear Principal Component Analysis [18], specifically the Categorical Principal Components Analysis (CATPCA), which is its best-known software application, was used. This statistical technique is a generalization of the Principal Components Analysis (PCA) for non-cardinal variables. Its aim is to reduce the columns (i.e. the variables) of the data matrix and at the same time to retain most of the information contained in it [19]. When all variables are ordinal, as in this

Category	RIND	RSIS	RALL	RIDR	RMET	RINA	RCRI	RECO	RTER
Number	534	534	534	534	534	534	534	534	534
Top Box	29.4	59.8	34.1	35.8	48.1	60.1	35.1	56.4	9.2
I quartile	1	2	1	1	2	2	1	2	1
II quartile	2	3	2	2	2	3	2	3	1
III quartile	3	3	3	3	3	4	3	3	2
Category	RDEP	RIMM	RABB	REDI	RSUO	RIST	RINE	RINC	RALT
Number	534	534	534	534	534	534	534	534	49
Top Box	47.0	40.4	66.5	57.1	56.4	48.7	43.8	35.4	67.4
I quartile	2	1	2	2	2	2	2	1	2
II quartile	2	2	3	3	3	2	2	2	3
III quartile	3	3	4	4	4	3	3	3	4

Tab. 2. Descriptive statistics for each category of risk (source: Authors' elaborations).

First principal component		15-29	Over 30	Total
Female	Mean value	-0.0325	0.2582	0.0594
	Number of cases	210	97	307
Male	Mean value	-0.1967	0.0867	-0.0889
	Number of cases	127	78	205
Total	Mean value	-0.0944	0.1817	0.0000
	Number of cases	337	175	512

Tab. 3. Mean values of the standardized scores, by sex and age group (source: Authors' elaborations).

case, the results from CATPCA can be interpreted as those of the traditional PCA [20]. For this analysis, the existence of an "underlying component" of the perceived risk is assumed, which is measurable through the reduction of the 17 observed variables (the RALT category is not considered for the reasons mentioned above). This hypothesis can be verified if the "polarity condition" is first met: in the first main component of the estimated model, all risk categories must have positive weights. This is a logical consistency criterion, which is equivalent to requiring that the level declared for each category of risk is directly proportional to the underlying component measured through standardized scores. A note should be made on the fact that 22 participants were excluded: these are the respondents who reported the absence of risk for at least one category. As a result, the complete data matrix consists of 512 cases x 17 variables. The eigenvalue relating to the first component is very high compared to the subsequent eigenvalues and it is equal to 5.72. The Cronbach's alpha is 0.88, which is considered as good [21], and this value corresponds to 33.7% of the explained variability. The polarity condition is met by all risk categories. To sum up, the existence of an underlying component is empirically demonstrated and it represents one third of the overall variability of the data matrix. In Table 3 the mean values (overall and conditional) of the standardized scores resulting from the CAPTCA analysis are presented. In addition to the information reported in Table 3, it should be noted that the range of the standardized scores is between -2.43 and 3.01. As expected, the overall mean value (that is, when 512 respondents are considered) is zero. The analysis of the conditional means immediately highlights that the values for the younger classes are all negative, while the values for the males are always lower than those for the females. It is therefore confirmed that females and the less young are, to varying degrees, more sensitive to risks. In addition, the comparison between the means of the young males (-0.1967) and the less young females (0.2582) is rather considerable, emphasizing the differences in perceptions when both age group and sex are accounted for in the analysis.

Conclusion

The study examined the judgments that members of the academic community of the University of Udine made when asked to characterize and evaluate risk of the landscapes surrounding them. The collection of survey data

shed light on the types of risk that are most perceived by locals. Environmental and socio-economic dynamics, in light of the tangible impacts on everyday landscapes, emerged as an important type of risk for the surveyed population who reside or who habitually frequent the Friuli Venezia Giulia Region. This suggests that the critical situations that one observes on a daily basis - abandoned industrial, commercial and residential buildings, poor maintenance of green areas, etc. - are considered as sources of risk on par with the more "traditional" risks characterizing the region, such as the seismic and hydrogeological ones. In addition, the statistical procedure conducted on survey data showed that, in their assessment of the various risks considered in the research (Table 1), women and those over 30 tend to use higher values of the Likert-scale compared to males and the younger population. It therefore is demonstrated that demographic characteristics influence the perception of the selected risks. Despite the explorative nature of the survey, the statistical analysis suggests the importance of risk perception studies for policy-making. Preventive actions often are managed by decision-makers without investigating the feelings of the various actors, and their effectiveness, therefore, is certainly reduced. The specific interest in situations of landscape degradation involving conditions of uncertainty and insecurity may prove to be a useful field of study, putting risk research at the service also of landscape planning and management. Above all, the existence of a different public concern over situations of risk, as emerged from the research, suggests the need for targeted actions and risk communication to inform and educate people about risk.

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NOTES

1. It should be noted that, despite not having foreseen the presence of the health risk, the survey contained an optional question so that the respondent could add a further typology not included in the initial list. We anticipate that no reply made reference to health risk. Presumably, the administration of the same questionnaire after the Coronavirus emergency would have led to different results.