Community-based risk management strategies: a survey on landslide risk knowledge and perception

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ABSTRACT: People know and perceive risk differently. The study herein presented investigates the perceptions, knowledge and opinions on landslide risk by the residents of Sarno, a small town in southern Italy significantly affected by disastrous landslides on 5-6 May 1998. The paper presents the main results of a survey conducted in the months of March, April and May 2013, using a purposefully developed questionnaire. The questionnaire was administered through individual interviews to 100 residents, chosen to include a significant percentage of people living inside (60) and outside (40) of the so-called “red zone”, a territory declared at high residual risk after the events of 1998.

Keywords: risk, perception, landslide, communication, education, community, resilience.

1. INTRODUCTION

The resilience of a community faced with risks deriving from natural disasters is greatest when the local population can participate in decisions about risk management systems. Perceptions of risk are one of the fundamental elements that condition the behaviour of local residents (Lupton, 2013) and thus have a decisive impact on community resilience. This topic has arguably not received sufficient attention in the scientific literature dealing with landslides, with the exception of some scattered examples (e.g. Finlay and Fell, 1997; Wagner, 2007; Nathan, 2008; Scolobig et al., 2011). Herein we present a study on the perception of landslide risk amongst residents in a community which underwent enormous damage and loss of life 15 years ago as a result of a landslide. The community in question has experienced a number of qualitatively different phases of risk management characterised by varying levels of involvement and investment (including periods of very substantial investment and intense activity) at specific moments over the course of this period. The aims of the study are multiple, starting with the need to understand and measure how risks are perceived in this area, in comparison with other contexts in which similar events have not occurred. Secondly, we aim to establish the degree of trust which exists in relation to the organisms charged with managing hydrogeological risk. Thirdly, we examine satisfaction levels in relation to various kinds of risk-reduction interventions.

2. THE SURVEY

The study was carried out in Sarno, a town in the Province of Salerno which experienced disastrous landslides in May 1998, which provoked widespread damage to property as well as 137 victims amongst local residents (see, for example, Cascini, 2004). The landslides in question, known as “rapid flowslides”, are frequent phenomena in the pyroclastic terrain that covers the carbonate rock surrounding Mount Vesuvius (see, for example, Cascini et al., 2013). Numerous studies of the rainfall characteristics that trigger landslides have been carried out over the years, including the various triggers, flow propagation dynamics and interactions with urbanisation (see, for example, Cascini et al., 2008; Martino and Papa, 2008). As far as we are aware, however, there are no published studies of the economic and social acceptability of interventions carried out to reduce and manage residual risks, despite the fact that these interventions involve enormous public investments and deployment of other technical and organisational resources. The questionnaire survey was carried out in March, April and May 2013. The sample comprised two sub-samples (Figure 1a), the first of which involved residents living inside the so-called “first red zone” (the area considered to be exposed to residual risk following the events of 1998), and the second of which included residents outside this area. The first sample, which we will refer to as the “red zone”, is based on 60 people, whilst the second includes data from 40 individuals. Within each area, a combination of sampling techniques was used to identify respondents, including both random selection of addresses and snowball sampling guided by the aim of maximising the heterogeneity of the two samples. The questionnaire was designed specifically with the aims of this study in mind, and contains four distinct sections: (a) socio-demographic and socio-economic characteristics of the respondent; (b) perceptions, knowledge and opinions in relation to past events; (c) perceptions, knowledge and opinions in relation to classifications of risk; (d) perceptions, knowledge and opinions in relation to the alert system. Each of these four sections contained a series of bespoke items which were developed on the basis of
the main research questions underlying the study (the full questionnaire is available online at the following URL: http://landslideriskperception.wordpress.com/sarno-italy-case-study/the-questionnaire/). The question items rely on a range of different response scales, including Yes/No/Don’t know categories, 10-point Likert scales, multiple choice and open questions. The sample of 100 respondents (Figure 1b) comprises a similar number of men (51%) and women (49%), with an age range of 19-85 years. More than 70 per cent of the sample has at least a High School diploma, and the sample has the following composition in terms of economic status: at work (58%), homemaker (17%), retired (14%), student (7%), unemployed (4%). Unsurprisingly, given that the sample is drawn from the population of the area of Sarno which was worst-hit by the events of 1998, almost all respondents define themselves as having been strongly and directly affected by the devastating landslides that occurred that year.

Fig. 1: (a) study area within the town of Sarno and indication of sub-samples of respondents living inside or outside the so-called “first red zone”, i.e. the area considered to be exposed to residual risk following the events of 1998; (b) distribution of respondents by sex, age group, education and employment status.

3. MAIN RESULTS AND DISCUSSION

The main results of the conducted survey are herein presented and discussed (the item-by-item breakdown of all answers is available online at the following URL: http://landslideriskperception.wordpress.com/sarno-italy-case-study/raw-data/). With a view to assessing the respondents’ awareness of the restrictions imposed by the public authorities following the events of 1998, we asked them to indicate whether they currently reside in an area that is classified as being at a high risk from flowslides. Figure 2a shows how almost all respondents who are living outside the red zone (34/40) and more than half (31/60) of those living inside it indicated that they are not living in a high-risk area. Although risk zoning in the neighbourhoods situated within the red zone was updated in July 2011, no one living inside the red zone cited the new zoning criteria and only two of them mentioned the existence of building restrictions. On the basis of these results, it is evident that the specificities of the planning restrictions associated with the zoning of residual risk within the red zone are not sufficiently familiar to local residents. The latter is a surprising result, particularly given the enormous consequences for the local community of the landslide that occurred just 15 years ago, and the substantial state-funded investments that were made subsequently to reduce the residual risk. Figures 2b and 2c show that almost 40 per cent of respondents believe that flowslides represent a significant threat to their dwelling, and 60 per cent perceive these to be life-threatening. What is interesting is that residents in the red zone are a little more worried about the risk to their property than all those surveyed in this town, but perceive a lower risk to their own lives. The proportion of residents who believe that their dwelling is at risk rises rapidly as one enters the red zone, but the perception of a life-threatening risk is, if anything, higher outside this area. Many of these respondents indicated that they were thinking, in particular, of the high risks that prevail in other areas of the Municipality, and the possibility of experiencing a flowslide whilst present in one of these areas. Paradoxically, those who live in the red zone appear to have a similar (or even slightly lower) perception of life-threatening risks due to flowslides. Significant differences among respondents also emerge when they are asked to rate the capacity of public bodies to manage emergencies, the efficacy of the protective structures in Episcopio and the management of emergency plans and alert systems (Figure 3). As far as public bodies are concerned, the overall perception is highly critical, increasing in the red zone and amongst those who do not believe that their lives are at risk. A similar (but rather weaker) pattern of responses is observed for the management of emergency plans and alert systems. By contrast, the protective structures which were built in the area receive quite positive scores from all groups. It is also possible that perceptions of exposure to life-threatening risks are influenced by fatalistic dispositions or an innate lack of trust man-made measures. In this vein, we asked respondents whether they were in agreement or disagreement with the following statement: “flowslides are avoidable events”. The results are shown in Figure 4a, and do not reveal significant differences between those who reside inside or outside the red zone, or between those who believe that their lives are threatened by landslides and those who do not. This reinforces the impression that real social and psychological mechanisms underlie the aforementioned pattern of response, whereby those who are directly exposed to risk may develop a lower overall perception of the nature/extent of this risk than those who are indirectly exposed. Almost all respondents, regardless of where they live or their perception of personal risk, also attribute central importance to land management for the
reduction of flowslides and related risks (Figure 4b). The impression that the specificities of the planning restrictions associated with the zoning of residual risk within the red zone are not sufficiently familiar to local residents is reinforced by the respondents’ knowledge of the public bodies which are responsible for zoning regulations (Figures 5a and 5b). Almost two thirds of respondents (65%) did not know which organism was in charge of identifying areas at risk, and many of those who stated that they knew which body was responsible for this did not subsequently provide the correct answer. The situation is rather different for the identification of organisms responsible for handling emergency situations, as only 35 per cent of respondents stated that they were unable to name these, whilst most respondents knew that the civil defence and the municipality are the key actors in emergencies. The lack of official information also emerges as a key issue in Sarno when respondents are asked how they think people in the areas at high risk should best be protected. As Figure 5c shows, most people mention additional information as the main priority, followed by such measures as population transfers, respecting nature and preparing effective emergency plans. The question of transferring residents away from areas of high risk is an interesting one, and was suggested spontaneously by 15 respondents, despite the fact that it had not been mentioned in previous questions.

Fig. 2: Answers to questions: (C5.1) “Do you currently live in an area classified at high risk for landslides?”; (C.7.1) “Rating from 1 to 10, how much do you think landslides are a hazard to your home?”; (C.7.2) “Rating from 1 to 10, how much do you think landslides are a hazard to your life?”

Fig. 3: Answers to questions: (C.4.1) “Rate from 1 to 10 the ability of the responsible institutions to cope with the emergencies.”; (B.2.3) “Rate from 1 to 10 the protective structures realized in Sarno.”; (B.2.4) “Rate from 1 to 10 the management of the emergency plan and the early-warning system.”

Fig. 4: Level of agreement with the following statements: (A.11.1) “Landslides can be controlled”; (A.11.3) “Correct land management can prevent land sliding.”
4. ADDED VALUE FOR THE POST 2015 FRAMEWORK FOR DISASTER RISK REDUCTION

Lavell and Maskrey (2013) state that disaster risk reduction has developed a specific logic and become an independent sector of research with specialist personnel. This approach, they argue, inhibits any real possibility of exploiting traditional community-based systems which encode existing knowledge on risk management as well as generating new forms of expert knowledge under other scientific paradigms. Already in 1985, Thomson stated that risks are inextricably connected with interpersonal relationships; they do not just ‘exist’, they are taken, run or imposed. For this reason, effective disaster risk management and reduction strategies cannot neglect perceptions of risk. Thus, the results of the pilot study presented here should be seen as a contribution towards identifying the key elements for designing effective community-based landslide risk management systems.

5. CONCLUSIONS

The pilot study presented in this paper explores perceptions of risks associated with landslides amongst the residents of Sarno, a town in the Province of Salerno which has received very substantial public funds for the reduction of residual risk following a disastrous series of events which caused 137 deaths in 1998. A key conclusion of this study is that the organisms which are responsible for risk management in Sarno need to develop more effective communication strategies, in order to transmit knowledge about the actions that have been taken, or which could be implemented to reduce risk below an acceptable threshold. This would have the effect of promoting awareness amongst citizen populations that they are charged with protecting, as the effective management of natural hazards cannot happen without the active involvement of local communities.

6. REFERENCES