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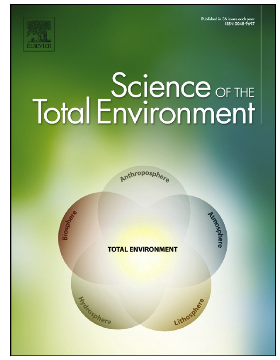

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Pablo Aznar-Crespo, Antonio Aledo, Joaquín Melgarejo-Moreno

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Social vulnerability to natural hazards in tourist destinations of developed regions

Pablo Aznar-Crespo[a]; Antonio Aledo[a]; Joaquín Melgarejo-Moreno[a]

pablo.aznar@ua.es; antonio.aledo@ua.es; jmelgar@ua.es

[a] University Institute of Water and Environmental Sciences, University of Alicante, Carretera San Vicente del Raspeig s/n, 03690, San Vicente del Raspeig, Alicante, Spain

Graphical abstract

Abstract

Tourist destinations in developed regions constitute a complex production model of social vulnerability to natural hazards. On the one hand, the high geographical exposure of tourist areas, the volatility of demand or the tourists' lack of knowledge of the local culture of risk/disaster generate sensitivity. On the other hand, the socio-economic dynamism of the tourism industry, the quality of the urban infrastructure or the protection of the institutional framework generate adaptive capacity. The interaction of these two opposing forces gives rise to highly complex adaptive situations that require far-reaching conceptual frameworks. Several researchers have indicated that the mainstream approach to social vulnerability to natural hazards does not have this quality due to its descriptive, quantitative and synchronous nature. The objective of this study is to propose and apply a methodological approach directed at deciphering the complexity of the processes that generate social vulnerability of tourist destinations in developed regions. We select seismic risk of the coastal area of the province of Alicante (SE Spain) as case study. In order to construct and apply the methodological approach, we carried out desk research on the region of study and consulted local experts. This approach articulates a causal structure able to systematise the deep origin and driving forces of the sensitivity and adaptive capacity of the region. Key factors of sensitivity include: occupation of hazardous areas by tourists, low economic diversification, large residential area without earthquake-resistant regulations, lack of seismic culture or non-compliance of seismic risk management plans. Key factors of adaptive capacity include: cooperative relationships between long-stay tourists, multiplying effect of tourism activities, transport infrastructure, welfare state policies or rapid response mechanisms in emergencies. Findings offer an in-depth and holistic view of the generative process of social vulnerability, which is particularly useful for enhancing risk management tools.

Highlights

- Tourist destinations in developed regions generate vulnerability in a complex way.
- Mainstream approach of vulnerability to natural hazards shows conceptual weakness.
- We propose a methodological approach through desk research and expert consultation.
- Second-home tourism generate sensitivity, attenuated by institutional framework.
- The management of causal pathways of vulnerability enhances the scope of risk tools.

Keywords

Social vulnerability, natural hazards, tourism, developed regions, methodological approach.

1. Introduction

The impacts of natural hazards are the result of the combination of the intensity of the physical event and the vulnerability of an exposed human community. Social vulnerability comprises a series of social, economic, political and cultural factors that determine the capacity of people to face the negative consequences of stressful events and recover from the changes that they produce (Birkmann et al., 2013). The specialised literature has undergone an intense conceptual debate about the scope, features and components of vulnerability. Despite the lack of consensus, one of the most commonly adopted proposals in recent years is the integrated approach, which understands vulnerability as a function of exposure, sensitivity and adaptive capacity (Füssel, 2007; Kuhlicke, 2010; Fuchs et al., 2011; IPCC, 2012; Weis et al., 2016). Sensitivity and adaptive capacity constitute the two basic properties that determine the adaptive conditions of an exposure unit (Gallopín, 2006). Sensitivity refers to the propensity of an exposure unit to suffer the negative impacts of a hazard (IPCC, 2012). Adaptive capacity, however, delimits the conditions that help to successfully address and recover from the damage caused by a hazard (IPCC, 2012). These two components, while very different, are not selfsufficient, as they both establish feedback relationships and exercise shared influences on the processes that produce social vulnerability. One territory where this phenomenon is particularly evident and where there is also a wide margin of theoretical-conceptual exploitation is tourist destinations in developed regions. Although their high level of socio-economic development constitutes a strategic adaptive capacity factor to respond to natural hazards, these destinations also have structural weaknesses related to geographical exposure and the socio-demographic susceptibility of tourists. These adaptive contrasts render tourist destinations in developed regions (hereafter TDDR) an interesting and complex object of study requiring specific efforts of theoretical and methodological adaptation.

In this respect, the analysis of the social vulnerability to natural hazards (hereafter SVNH) of the TDDR is subject to two conceptual challenges: a) one of a ontological nature, related to the specific characteristics of TDDRs (object of study); and b) another of an epistemological nature related to the characteristics of the dominant assessment approach to SVNH (frame of study). First, the ontological challenge is related to the inherent complexity of the model producing the vulnerability of the TDDRs, which is characterised by the tangled coexistence of high levels of sensitivity and adaptive capacity (Ritchie, 2004; Thomas et al., 2013; Becken et al., 2014). With regard to sensitivity, the high demographic density (Olcina, 2009), the disorganised planning of the territory linked to accelerated processes of urban development (Harrill, 2004), massification (Faulkner and Vikulov, 2001) or the lack of familiarity of tourists with the local environment, its hazards and self-protection behaviours (Matyas et al., 2011) are characteristics that increase the disaster risk. With respect to adaptive capacity, tourism is a fundamental vector of socio-economic development and territorial articulation. Its implementation favours economic growth (Lee and Chang, 2008; Schubert et al., 2011), invigorates employment and stimulates investment in transport infrastructure, healthcare, education and urban services (Sakai, 2007; Rosentraub and Joo, 2009). Furthermore, the development of the tourism industry in developed countries is integrated within the solvent institutional frameworks that reduce the externalities of the sector (Sinclair and Stabler, 1997).

The concurrency of these two SVNH generating processes gives rise to highly complex hybrid and multidimensional adaptive situations (Crouch and Ritchie, 1999; Yoon et al., 2001).

Second, the epistemological challenge is related to the conceptual weaknesses of the dominant SVNH assessment framework. These affect many SVNH sub-fields, although their disadvantages are particularly evident in light of the complex and multidimensional nature of the SVNH generating processes of the TDDRs. We can find two principal characteristics of this assessment framework in the specialised literature: a) the predominance of the deductive approach; and b) the excessive quantification. On the one hand, the mainstream approach for assessing SVNH uses deductive strategies for selecting indicators and analytical categories (Hinkel, 2011; Yoon, 2012), that is, it imports methodological frameworks from other research without carrying out the due process of adapting to the context of the object of study. In this respect, Eakin and Luers (2006) criticise the universal use of SVNH assessment methodologies, indicating potential incompatibilities in the availability of data, the conceptual feasibility of the indicators or the usefulness of the weighting criteria between different case studies. In order to avoid these problems, some researchers have recommended the implementation of an inductive approach in order to obtain empirical data from the context where the research is being carried out through an in-depth analysis of it (e.g. Brooks et al., 2005; Adger, 2006; Füssel, 2007; Barnett et al., 2008; Fekete, 2009; Hinkel, 2011; Fuchs et al., 2012). This approach enhances the understanding of the specific conditions of SVNH of each social environment and enables the identification of effective mitigation measures on a local scale. On the other hand, after analysing a sample of more than one hundred methodologies for assessing SVNH, Beccari (2016) finds that the majority import sets of descriptive indicators from the general literature in order to produce quantitative indices. Tate (2012) indicate that quantitative data hinder the interpretation of complex social variables and do not allow the causality of SVNH to be explained, preventing the identification of its pathways and the strategic orientation of adaptation policies (Eriksen and Kelly, 2007; Füssel, 2010; Van Asselt and Renn, 2011; Tonmoy et al., 2014; Machado and Ratick, 2017). In contrast with this approach, other experts have proposed going beyond a superficial and synchronous description of SVNH indicators and opting for an explanatory and in-depth analysis of their causal process (e.g. Blaikie et al., 1994; Turner et al., 2003; Schipper and Pelling, 2006; Thomalla et al., 2006).

The limitations of the technocratic approach to conceptualise the complexity and multidimensionality of the SVNH generating processes of TDDRs and to produce proactive results able to promote disaster risk reduction constitute the research problem addressed by this study. Now that the ontological challenge concerning the object of study and the epistemological challenge related to its research framework has been described, the objectives of this paper are: a) to propose a methodological approach to systematically analyse the processes that generate sensitivity and adaptive capacity and to manage the complexity and multidimensionality of TDDRs; and b) to apply this approach to a case study to test its conceptual feasibility. First, we propose the Multidynamic Generation of Social Vulnerability (MGSV) model as methodological approach, inspired by the causal fundamentals of the Pressure and Release (PAR) model of Blaikie et al. (1994) and adjusted to the specific features of the TDDRs. The MGSV comprises a conceptual structure for the systematic and relational analysis of the root causes, driving forces and specific conditions of sensitivity and adaptive capacity. The MGSV is neither a vulnerability assessment nor a substitute for it. Rather, this model complements the quantitative assessments of SVNH, contributing to the understanding of its generating processes. To achieve this understanding constitutes the first of the four priorities for action of the Sendai Framework for Disaster Risk Reduction 2015-2030 (UNISDR, 2015). Second, we apply the MGSV to the case of seismic risk in the coastal area of the province of Alicante (SE Spain). This developed region has two optimum characteristics for testing the feasibility of the methodological approach: a) it is one of the principal centres of second-home tourism[1] of the Mediterranean; and b) it is located in the area with the highest earthquake risk in the Iberian Peninsula. On the one hand, second-home tourism is a long-stay model that

[1] Second-home tourism, also known as residential tourism or long-stay tourism (Ono, 2008), is defined as: "an economic activity that is dedicated to the urbanization, construction and sale of houses that make up the holiday home sector whose proprietors or tenants spend the summer or reside intermittently outside their habitual place or residence" (Matteucci et al., 2008: 150).

determines a more direct and multidimensional relationship between the environment and its hazards and the tourist. This relationship involves a more complex production of vulnerability in terms of the environment, migration, leisure or urban development. On the other hand, the negative correlation between development and earthquakes (the more developed the lower the risk of disaster and vice-versa) is the highest of all natural hazards (Anbarci et al., 2005). This high correlation enables us to immediately verify the influence exercised by the socio-economic development of the region on the generation of vulnerability.

2. Theoretical backgrounds

This literature review enables us to know the theoretical backgrounds around the object of study. First, we review the literature on tourism and natural hazards to find basic factors of social vulnerability. Then, having indicated the unique characteristics of tourism in the coordinates of developed regions, we explore the influence exercised by socio-economic development on the way in which natural hazards are addressed. As well as having an exploratory function, the results of this review support the methodology of this study.

2.1. Tourism and SVNH

Although the research on tourism and SVNH is a field that is attracting growing interest, it has still not reached a consolidated conceptual development (Thomas et al., 2013; Becken et al., 2014). Even though efforts have been made to generate conceptual frameworks (e.g. Burby and Wagner, 1996; Faulkner, 2001; Calgaro et al., 2014), the literature on tourism and SVNH has specialised in the proposal of instruments for managing emergency situations (Wang and Ritchie, 2012; Nguyen et al., 2016) –particularly tsunami impacts (Gurtner, 2007)– and the forecast of the impacts of climate change (Scott et al., 2012). The studies on other natural hazards and their specific factors of social vulnerability represent a part of the literature yet to be exploited (Tsai and Chen, 2011; Sajjad and Chan, 2019). According to Ritchie (2008), this field of research is eminently reactive as its scope is oriented towards the post-disaster recovery of tourism companies and not disaster risk reduction. Becken and Hughey (2013) confirm this lack of prevention research, highlighting the absence of methodologies directed at improving the understanding of the SVNH generating processes of tourist destinations.

Three of the stakeholders potentially exposed to the impacts of natural hazards in the field of tourism are: tourism companies, tourists and the local population. On the one hand, as tourism companies depend on a seasonal and exogenous demand, they are exposed to significant economic losses in disaster scenarios (Wang, 2009; Tsai and Chen, 2011). A significant part of these losses is produced during the post-disaster phase (Mair et al., 2016), when the destinations suffer a credibility crisis, the levels of perceived safety diminish and, as a consequence, the levels of demand fall (Kozak et al., 2007; Park and Reisinger, 2010).

On the other hand, the tourists of TDDRs experience a high level of sensitivity to facing the impacts of natural hazards (Faulkner, 2001). This sensitivity is related to the lack of knowledge of the local environment (Matyas et al., 2011), language barriers (Nguyen et al., 2016) or the lack of a familiar environment during the stay in the destination (Kumpulainen, 2006). The sensitivity factors linked to the knowledge of the environment are not only experienced by short-stay visitors, but also by long-stay tourists or those who reside in the territory. Residential tourists usually live in gated communities distanced from the local population (Matteucci et al., 2008; Janoschka and Hass, 2013), where they do not have access to learning about the local culture of risk/disaster. Furthermore, in the TDDRs, there are two predominant models of tourist occupation of the territory that trigger sensitivity to natural hazards: a) a compact city model, related to the development of the "sun and beach" product in urban centres, which generates a high demographic and building density and a hazardous occupation of the coastline (Snoussi et al., 2009; Tsai and Chen, 2011b); and b) an urban sprawl model, linked to the development of second-home tourism in peri-urban areas, which provokes a higher geographical exposure to natural hazards (e.g. forest fires, rock slides or floods) and a situation of isolation with respect to the emergency and rescue services (Yin et al., 2009).

Finally, as tourism is an economic sector particularly exposed to the negative impacts of natural hazards, the local population, which depends on its labour market, also constitutes a social group with significant levels of sensitivity (Pelling, 2012). The economic volatility of the sector and its exposure to destabilisation factors represent an immediate risk for the sustainability of the local economy, particularly when the levels of specialisation are very high

(Robinson and Jarvie, 2008). Furthermore, the low level of qualification for job positions in the tourism sector constitutes a strategic factor of sensitivity for addressing post-disaster economic impacts (Grenčíková et al., 2013).

2.2. Socio-economic development and SVNH

There is a solid consensus regarding the negative correlation between economic development and disasters (UNDP, 2004). This correlation is higher in the case of geological hazards than in the case of climate-meteorological hazards (Anbarci et al., 2005). As the former cannot be easily predicted, the individual capacity to alter the levels of exposure to hazard is lower and consequently they depend directly on structural socio-economic development (Skidmore and Toya, 2002; Kellenberg and Mobarak, 2008).

Specialised studies have found that developing countries are more prone to suffering from disasters than developed countries (Carter et al., 2007; Loayza et al., 2012; Sarkodie and Strezov, 2019), particularly in terms of fatalities (CRED, 2010). These inter-regional differences do not respond to strictly economic levels, but also to the social, political and institutional development of each country. The democratic quality of the political systems (Kahn, 2005), the educational level (Frankenberg et al., 2013), the support of the public institutions (Burby, 2006) or legal rights and legal security (Beron et al., 1997) are variables that significantly influence the way in which a society reacts to the effects of natural hazards. According to Raschky (2008), all of these elements together constitute the institutional framework that characterises developed countries, where as well as the public authorities there are also other relevant stakeholders such as the market, civil society or NGOs. This macro-institutional integration reduces sensitivity in these regions. Congleton (2006) indicates that the influence of the institutional framework is not limited to the allocation of resources for post-disaster recovery but can also cover the design and implementation of preventive measures. Factors such as the institutionalisation of the insurance system (Skidmore, 2001), the level of centralisation of a state in terms of territorial jurisdiction (Depoorter, 2006) or the legislation regarding the social communication of risk (Beron et al., 1997) increase the effectiveness of the institutional frameworks for addressing the impacts of natural hazards. Therefore, disasters and their management go beyond the immediate consequences of the physical event and respond to a life cycle that determines its different phases of evolution, that is, its origin in the past, its outcome and its long-term recovery (Moe and Pathranarakul, 2006).

However, development is not a guarantee of invulnerability to disasters. This phenomenon may favour a false feeling of immunity to natural hazards and generate a mistaken perception about the levels of exposure and vulnerability experienced (Cardona et al., 2012). The individuals of developed countries frequently delegate the authorities and the market to take responsibility for activating protection measures (Raschky and Weck-Hannemann, 2007). This delegation reduces individual proactive conduct and stimulates a paradoxical increase in the levels of sensitivity (Schumacher and Strobl, 2011). O'Brien et al. (2006) indicate three causes of sensitivity to natural hazards common in developed countries: a) the underestimation of the socio-institutional risk governance processes due to technological optimism; b) the capacity to quickly forget disasters due to a disregard of the long-term impacts; and c) the invisibility of minority social groups with limited capacity to address the hazards.

3. Methodology

The procedure to construct and apply the methodological approach was based on an inductive strategy, which enabled us to obtain empirical data directly related to the context that is the object of the study. We combined two data collection techniques: a) desk research on specialised literature in the region of study; and b) a process of individual face-to-face semi-structured interviews among a multidisciplinary group of local experts in seismic risk. These techniques has been used by the specialised literature on SVNH in recent years (e.g. Scolobig et al., 2012; Nel et al., 2014; Balaei et al., 2018). We divided the methodology into five stages (Fig. 1): 1) exploring the analytical categories; 2) systematizing the conceptual structure of methodological approach; 3) identifying the structural causes; 4) identifying the adaptive conditions; 5) prioritizing the adaptive conditions. Finally, we describe the main features of the case study we have selected to test our methodological approach.

3.1. Exploring the analytical categories

We carried out a literature review in order to explore the main analytical categories on the SVNH of TDDRs. We undertook a search based on two principal fields: a) tourism and SVNH; and b) socio-economic development and SVNH. We carried out a systematic search using the combination of the keywords "social vulnerability", "natural hazards", "tourism", disaster", "developed regions", "conceptual framework" and "assessment". We established a hierarchy of keywords to adjust the search scope. We distinguished between level 1 keywords, which should appear in the title (TI) and level 2 and level 3 keywords, which should appear in the topic (TS) of the document. For the field of tourism and SVNH, the keyword hierarchy was: level 1) "tourism"; level 2) "natural hazards" and "disaster"; and level 3) "social vulnerability", "conceptual framework" and "assessment". We obtained 415 results. Subsequently, we applied four inclusion criteria to narrow the search (first filter): 1) language (English); 2) document type (article and review); 3) timespan (1999-2019); and 4) WoS category (those related to environmental sciences, geography, social sciences, economics or urban planning). After this first filter, we compiled 251 documents. In order to include those documents with the greatest scientific relevance (second filter), we chose the 50 most cited documents in the WoS databases. This amount was sufficient due to two factors: a) the high number of citations of the documents ensured a high representativeness of the literature; and b) the generalist nature of the analytical categories did not require a high degree of conceptual specificity. We examined the documents and excluded those in which natural hazards were given secondary importance. In this way, we obtained 23 documents and analysed them. We discovered other relevant documents in the list of references of the manuscripts analysed that were included through snowball sampling and our final sample included 31 (n) documents.

We repeated this procedure in order to conduct an advanced search in the second field: socio-economic development and SVNH. Based on the afore-mentioned keywords hierarchy, we obtained 964 documents. After applying the four inclusion criteria (language, document type, timespan and WoS category), we were left with 344 documents. Again, we applied the scientific relevance criterion (second filter) and selected the 50 most cited documents. We examined the documents and ruled out those that were not directly related to natural hazards. Finally, we selected 32 documents, which increased to 37 (n) through snowball sampling.

As well as forming the basis for the theoretical backgrounds (Section 2), this review enabled us to identify the most frequently addressed issues in the specialised literature. These issues comprise the internal analytical categories (hereafter IAC) of the methodological approach. The first three IACs were derived from the document review carried out in the first search field, while the latter two emerged from the second. More specifically, we performed the following procedure: a) identifying key issues; b) grouping them according to similarity; and c) classifying them into thematic groups (IACs). In each document there were several key issues, sometimes belonging to different IACs. Then we listed the characteristics of each IAC and the percentage that the documents belonging to each of them represented of the total sample of each field:

1. *Adaptive conditions of tourists* (61.3%): geographic exposure (Matyas et al., 2011) and adaptive conditions (Faulkner, 2001) of tourists to natural hazards.
2. *Economic structure* (77.4%): economic assets (Tsai and Chen, 2011), labour structure (Pelling, 2012) and level of economic diversification of the tourist destinations (Robinson and Jarvie, 2008).
3. *Urban development* (58.1%): urban-demographic morphology (Becken et al., 2014), infrastructures and services (Calgaro et al., 2014) of the tourist destinations.
4. *Socio-institutional framework* (81.1%): normative structure (Skidmore, 2001) and regulatory institutions (Raschky, 2008) that provide support to the structural socio-economic conditions of the population.
5. *Risk management* (70.3%): paradigms (O'Brien et al. 2006) and policies (Congleton, 2006) of environmental risk governance.

3.2. Systematizing the conceptual structure

After identifying the five IACs, the second stage consisted in constructing the conceptual structure of the methodological approach, with the objective of systematising the processes that generate sensitivity and adaptive capacity. To do this, we implemented the basic principles of the Pressure and Release (PAR) model proposed by Blaikie et al. (1994). This model emerges as an alternative to the technocratic approach to assessing vulnerability commonly identified in the economic and engineering literature on disasters (Füssel, 2007). The PAR systematises the socially constructed nature of the risk/disaster through the conceptualisation of the processes that generate social vulnerability. In accordance with this system, the SVNH is rooted in social, economic and political structures through a progressive causal sequence that distinguishes three levels:

1. *Root causes*: economic ideological and normative systems, social and political systems that make up and legitimise the model for the production and distribution of the power and resources of a society.
2. *Dynamic pressures*: social processes that push the root causes towards specific forms of adaptability. These phenomena are better delimited in space and time and produce a destabilisation of the structural adaptive conditions (e.g. economic crises, demographic explosions, wars, etc.).
3. *Unsafe conditions*: specific factors of adaptive unsafety that exercise an immediate influence on the capacities of individuals, social groups and systems to respond to the impacts of natural hazards.

The PAR successfully synthesises the generative process of SVNH (Twigg, 2001). So much so that this seminal model continues to be implemented in several areas of knowledge, such as epidemiology (e.g. Barnes, 2014; Hammer et al., 2019), technological disasters (e.g. Fadigas, 2017), gender studies (e.g. Yumarni et al., 2014) or, most of all, natural hazards (Sandoval and Voss, 2016; Kontar et al., 2018; Afroz et al., 2018). Despite its widespread use, this model has two conceptual gaps. On the one hand, the PAR presents a lack of analytical categorisation (Adger, 2006; Saha, 2015), which prevents the specific characterisation –and weighting– of the SVNH conditions. Moreover, the PAR underestimates the capacities of individuals, groups and systems to successfully respond to the impacts of hazards (Turner et al., 2003; Ndah and Odihi, 2017; Hammer et al., 2019), hindering the incorporation of resilience mechanisms.

Therefore, with the objective of adjusting the PAR to the specific features of the TDDR, we propose the Multidynamic Generation of Social Vulnerability (MGSV) model as methodological approach. This model incorporates the five IACs identified in the first stage in order to systematise the multidimensional nature of the SVNH of the tourist destinations. Furthermore, in order to operationalise the adaptive capacity of the developed regions, the MGSV incorporates two new conceptual components: a) "dynamic attenuations", as a positive version of the "dynamic pressures"; and b) "safe conditions", as an equivalent to the "unsafe conditions". The MGSV (Fig. 2) systematises the processes that generate SVNH from a systematic, holistic and profound perspective. The process originates in the root causes (RC), based on normative and ideological systems that influence the economic, social, political and cultural structures. The RCs causally underpin the processes that modify the structural conditions of adaptation, in the form of instability or dynamic pressure (DP) or in the form of stability or dynamic attenuation (DA). The two forces interact through pressure-attenuation balances. Finally, the materialisation of these dynamic processes generates specific factors of sensitivity or unsafe conditions (UC) and of adaptive capacity or safe conditions (SC). The balance of these conditions, combined with the physical power of a hazard (H), determines the direction and scale of the impacts (I) experienced by an exposure unit.

3.3. Identifying the structural causes

After preparing the causal structure of the MGSV, we proceeded to apply the model to the case study. This stage consisted in identifying the structural causes of the model, that is, the root causes and dynamic pressures/attenuations (1st and 2nd causal level) of the generative process of SVNH on which the specific adaptive conditions to the seismic hazard of the region are based. The elements belonging to these two first causal levels are transversal. This is because as well as contributing to the generation of vulnerability to earthquakes they also have an influence on other types of risks.

We conducted desk research of the specialised literature on the region of study in order to find these causal elements in each of the five IACs. Due to the local nature of this literature, the documents could not be gathered from high-impact bibliographic data. This conditioned the search strategy and obliged the incorporation of a certain degree of flexibility. Through Google Scholar, we used the keywords “tourism”, “Alicante coast” or “Costa Blanca” combined with each of the five IACs. We extracted information from peer-reviewed articles, books and technical reports published in English or Spanish over the last 30 years that analyse some aspect of the history and development of the socio-tourism system of the Costa Blanca related to the IACs of the MGSV. Without applying other criteria, we obtained 397 results in Spanish and 231 in English (628 in total) for all the IACs: adaptive conditions of tourists (22.3%), economic structure (18.2%), urban development (47.4%), socio-institutional framework (8.6%) and risk management (3.5%). Despite the large number of documents, the majority of them were not valid due to factors such as: a) the scant reference to the Costa Blanca; b) insufficient affinity with IACs; c) little scientific reliability of certain types of documents; or d) the duplication of documents in two languages. Therefore, we selected between 5 and 15 documents for each IAC in which: a) the Costa Blanca was the principal region of study; and b) the IACs represented the main subject matter. Other relevant documents were selected through snowball sampling until a sample of 58 (n) documents was obtained and then examined. We carried out a qualitative meta-analysis which consisted in analysing and integrating the information in an interpretative rather than an aggregative way until reaching saturation. This is a specific technique for conducting systematic reviews aimed at informational saturation rather than statistical generalization (Finfgeld, 2003; Zimmer, 2006; Timulak, 2009). The information was conceptually encoded and integrated systematically into the structure of the MGSV (Section 5). These elements (structural causes) were positively rated by the twenty-five local experts consulted in the fourth stage. This methodological triangulation confirmed the conceptual validity of the causal basis of the MGSV.

3.4. Identifying the adaptive conditions

The fourth stage consisted in identifying the specific adaptive conditions (3rd causal level) derived from the structural causes identified in the third stage. This causal level represents the materialisation of the SVNH generating process. This stage consisted in identifying the safe and unsafe conditions of the Costa Blanca in order to address the effects of a potentially intense earthquake. To do this, we conducted a first consultation with twenty-five local experts. With this number of informants informational saturation was completely reached. The profile of the experts (Table 1) was defined according to the specialised nature of each IAC. To cover the thematic diversity of the IACs, we formed a multidisciplinary sample of local experts. The adaptive conditions of tourists were proposed by environmental sociologists and geographers as were the conditions relating to the economic structure. The conditions in terms of urban development were largely proposed by civil engineers and geographers. Finally, the conditions relating to the socio-institutional framework and risk management were mostly identified by individuals belonging to the emergency services, NGOs or local government institutions.

This first phase of consulting experts was based on individual face-to-face semi-structured interviews conducted between February and October 2019. This primary data collection strategy consisted in: a) explaining the causal structure of the MGSV (1st and 2nd causal level) to introduce each expert in the subject; and b) requesting the experts to identify the adaptive conditions specifically related to the potential seismic risk of the region of study (3rd causal level). The experts proposed elements in the blocks in which they were specialised, although when they were seen to have knowledge of other IACs they also had the opportunity to provide information about them. The information provided by the experts during the interviews was encoded and integrated systematically into the MGSV. At the same time, the experts labelled the conditions identified according to the phase of a potential life cycle of disaster (Moe and Pathranarakul, 2006) in which they exercised their principal adaptive influence. The labels proposed were:

- *Ex-ante*: preparation before the seismic episode (prevention)
- *During-event*: facing the immediate effects of the earthquake (short-term)
- *Ex-post*: recovery after the seismic episode (medium or long-term)

3.5. Weighting the adaptive conditions

This final stage consisted in weighting the adaptive conditions obtained in the previous stage in order to establish a ranking of priority areas of sensitivity and adaptive capacity. The weighting was carried out by the same twenty-five experts who participated in the fourth stage through a second phase of individual face-to-face structured interviews carried out between April and October 2019. In this phase, each expert had the opportunity to weight the complete list of adaptive conditions. The experts evaluated the “unsafe degree” of each unsafe condition and the “safe degree” of each safe condition through a structured questionnaire based on Likert-type scale. In order to ensure a common framework of interpretation, we provided the experts with the following definitions:

- *Unsafe conditions:* degree of insecurity that an adaptive condition triggers on the exposure units of the TDDRs to address the impacts of a potential earthquake. On a Likert-type scale from 1 to 5, 1 was interpreted as minimum unsafeness and 5 as maximum unsafeness.
- *Safe conditions*: degree of safeness that an adaptive condition triggers on the exposure units of the TDDRs to address the impacts of a potential earthquake. On a Likert-type scale from 1 to 5, 1 was interpreted as minimum safeness and 5 as maximum safeness.

The scores on the scale were converted into numerical indices oscillating between 0 (minimum safeness/unsafeness) and 1 (maximum safeness/unsafeness). The simple identification of the adaptive conditions by the experts ensured a minimum degree of safety/unsafety, so that the discrimination range of the index (practical range) was on the top half of the scale: between 0.5 and 1. We proposed three intervals to classify the results (individual and average values): *low* [0.5, 0.65), *moderate* [0.65, 0.80) and *high* [0.80, 1]. As the objective of this research is to conduct a systematic analysis of the SVNH generating processes instead of a quantitative assessment, these values should not be interpreted as an evaluative result, but an informational complement with an exploratory purpose aimed at increasing the methodological usefulness of the MGSV, and to facilitate a strategic handling of the information by policy makers. As well as increasing the degree of systematisation of the results, the indices represent potential priority areas of sensitivity and adaptive capacity.

3.6. Case study

In order to test the MGSV, we have used the case of the coastal space of the province of Alicante, located in south-east Spain (Fig. 3). This region –also known as the Costa Blanca–

comprises one of the principal tourist areas of the Mediterranean, with a model specialised in second-home tourism. The region is composed of 19 municipalities, which occupy an area of 1,637.6 km^2 and has a censored population of 1,074,036 inhabitants (INE, 2018). The demographic density is 655.86 inhabitants/km^2; seven times higher than the Spanish average. Of the total workers in the region, 71.9% are engaged in the services sector (INE, 2018). The tourism sector represents around 18% of GDP and generates approximately 6 billion euros each year (Vera-Rebollo, 2016). In 2018, this region recorded 4,421,647 visitors, of which 46% were international tourists (INE, 2018). The tourism supply on the Costa Blanca is based on the "sun and beach" product. Its activity is spatially condensed along the coastline and concentrated during the summer months. Tourism demand is seasonal and massified, causing economic fluctuations in the local economies.

The construction and sale or rental of second homes –and the carry-over effects– constitute one of the region's most important economic engines (Aledo et al., 2012). Retirees from the north of Europe are the principal demand segment of this tourism product. Their principal motivation is to enjoy their free time in comfortable climate conditions (sun and beach) which they do not have in their countries of origin. This type of tourism supply is determined by climate seasonality which explains the high percentage of second homes that are empty for several months of the year (Mazón, 2006). The territorial organisation of these municipalities is fragmented due to the accelerated processes of urban development and the construction of residential areas set apart from the urban centres. This urban morphology has favoured the socio-spatial segregation of the residential tourists (García-Andreu, 2014). On the other hand, the low qualifications required for job positions related to the development of second-home tourism has fostered the arrival of labour migrants from North Africa and Latin America, many of whom are in a situation of social sensitivity. These two phenomena (residential tourism and labour migration) explain why 25.9% of the population of the Costa Blanca is foreign, with this figure being higher than 40% in six of its 19 municipalities (INE, 2018). Second-home tourism has been a fundamental vector for the socio-economic development of the region. However, its evolution has also given rise to socio-environmental externalities, which have increased the sensitivity of this region to stressful events such as economic crises or natural hazards. In fact, in 2017, Torrevieja (a town in the south of this region) was classified as the town with the lowest average income level in Spain (INE, 2017).

With respect to seismicity, the province of Alicante is one of the areas with the highest seismic risk in the Iberian Peninsula (Giner et al., 2003). The percentage of municipalities exposed to a potential intensity equal to or higher than VII (damaging) on the European Macroseismic Scale (EMS-98) for a 500-year return period (T) is 96% (PERSCV, 2011). The southern part of the province is exposed to the highest intensities (Fig. 3) with municipalities that reach a degree of IX-X (destructive-very destructive). According to data of the National Geographic Institute (IGN, 2018), south-east Spain (area of seismic reference of the region of study) has experienced 172 episodes of an intensity equal to or higher than V (strong) in the last 100 years, 12 of which had an intensity equal to or higher than VII. One of the most destructive events in Spanish seismic history occurred in Torrevieja (a coastal municipality of the province of Alicante) in 1829 (Santanach and Masana, 2001). It had an estimated magnitude of 6.6 and an intensity of IX-X. A total of 389 deaths were recorded, together with 375 injured and the urban damage was so severe that some municipalities close to the epicentre of the earthquake had to be completely rebuilt. The most recent seismic disaster in south-east Spain was in Lorca (region of Murcia) in 2011. This earthquake, with a magnitude of 5.2 and an intensity of VII, caused nine deaths and very high socio-economic costs. These earthquakes demonstrate that the region of study could suffer from another seismic disaster in the future.

4. Results and discussion

In this section we present the results of the MGSV applied to the region of study. We have organised the results in sub-sections, distinguishing each of the five IACs. We present the information in the form of ten results tables. They should be interpreted taking into account the causal progression of the MGSV, that is, the structure of the causal pathways (root cause → dynamic pressure/attenuation → unsafe/safe condition). In order to ensure the systematisation of the causal pathways, we have disaggregated the numeration of each element following the logical sequence of the interlinkages (e.g. RC 1 → DP 1.1 → UC 1.1.1). As well as identifying and systematising the 84 elements (10 RCs, 13 DPs, 11 DAs, 28 UCs and 22 SCs) represented in Tables 2 to 6, the results contain additional information about: a) the degree of safeness and unsafeness of each adaptive condition; and b) the phase of the potential LCD in which each condition exercises its principal adaptive influence: ex-ante (A), during-event (E) and ex-post (P).

The causal pathways represent the dynamic and holistic vision of the SVNH generating process, which begins in the ideological-normative macro-structures of the social system with a high level of abstraction and ends in the form of specific conditions of adaptability. In order to reach a strategic interpretation of the results, we should pay particular attention to the *critical adaptive conditions*: a) those that generate more unsafeness and require greater planning efforts (reduction of sensitivity); and b) those that generate more safeness and need to be reinforced (strengthening of the adaptive capacity). Subsequently, we should analyse the causal pathways of the critical adaptive conditions going beyond their superficial description to provide a more in-depth explanation for their generation. To do this we must examine the dynamic pressures/attenuations and root causes of the MGSV. The former, belonging to the second causal level of the model, represent the driving forces that determine the origin and reproduction of the adaptive conditions. Finally, the root causes or first causal level represents the ideological-normative framework on which the causal process as a whole is based. Its identification enables the root origin of the SVNH to be socio-culturally referenced and the holistic view of its generation to be completed.

4.1. Adaptive conditions of tourists

The adaptive conditions of the tourists (Table 2.A) have a high level of sensitivity (.808). They exercise their main adaptive influence during the LCD phase when the seismic event begins (E). The most important unsafe condition is the hazardous occupation of second-home areas by residential tourists (UC1.1.2.). This model of territorial occupation responds to a socio-spatial segregation process (DP1.1) between tourists and natives. This process distances the tourists from the city centres, where the main access to urban services and the local culture of risk/disaster takes place. This urban sprawl model is related to the individualistic and hedonist motivations (RC1) that drive residential tourists to occupy areas of high quality landscapes where the geographical exposure to natural hazards is higher.

The adaptive capacity of the tourists (Table 2.B) is moderate (.735). The phase of the LCD that predominates is the ex-post (P), given that the short-stay tourists do no experience the long-term consequences of disasters and the long-stay tourists have a medium-high purchasing power to cope with them or they have an alternative residence in their home country. The most important safe condition is the social cooperation between residential tourists (SC2.1.2), fostered by the formation of colonies of individuals who share the same nationality (DA2.1). These colonies –a cause and also a consequence of this low level of social inclusion– respond to factors such as the low acquisition of the local language by the residential tourists or the poor level of English of the host community (RC2).

4.2. Economic structure

The economic structure (Table 3.A) of the region has a moderate level of sensitivity (.715). The long-term economic consequences of a potential disaster are significant in this area. Therefore, the most important phase of the LCD is the ex-post (P). The low level of economic diversification of the destinations (UC1.1.3) is the unsafe condition with the greatest weight. Over the last few decades, this region has experienced an intense process of tourism specialisation (DP1.1), which has generated an excessive dependence on the "sun and beach" economic activity, reducing the capacity to cope with the demand fluctuations related to the post-disaster phase. This low level of diversification is related to the intense tertiarisation and loss of strategic importance of agriculture (RC1) that the region experienced from the 1950s.

The adaptive capacity of the economic structure (Table 3.B) of the region is moderate (.693). Its adaptive influence is exercised during the ex-post (P) phase of the LCD, through actions aimed at reconstructing the image of the affected destinations and recovering the economic losses. The most significant safe conditions are the powerful marketing tools of the tourism sector for this purpose (SC2.1.2). The capacity of these instruments to recover the volume of demand of the destinations affected has a direct relationship with the growing internationalisation that the tourism market has experienced in recent decades (DA2.1). This process, reproduced around the globalised world (RC2), has significantly extended the space-time scope of the economic operations of the tourism sector.

4.3. Urban development

The urban structure (Table 4.A) of the region has a high level of sensitivity (.810). This IAC has the highest number of unsafe conditions of the MGSV. The influence of these conditions is exercised in the phase of the LCD when the event is beginning (E), that is, when the energy-absorbing capacity of the buildings and the urban infrastructure responds to the in situ effects of the earthquake. There is a high number of residential buildings that were built before the first earthquake resistance regulations (UC1.1.2), coinciding with the accelerated urban development (first real estate boom) that the tourist destinations experienced from the end of the 1950s (DP1.1). This urban process, intensified by the latest property boom (1998-2008) – which consolidated second-home tourism on the Costa Blanca (Ivars-Baidal et al., 2013)–, responds to an anthropometric paradigm of territorial occupation (RC1) based on unlimited growth and the unsustainable use of natural resources.

The adaptive capacity linked to the urban structure (Table 4.B) of tourist destinations is moderate (.670). The adaptive influence of its safe conditions is exercised throughout the whole of the LCD, although the rapid response capacity of transport infrastructures is noteworthy during the event (E). Access to secondary roads, motorways, airports, high-speed trains or high quality urban trams (SC1.1.1) is the most important safe condition in this area. These infrastructures represent one of the positive consequences of the intense process of urban growth (DA1.1) associated to the anthropometric model of territorial occupation (RC1) prevailing in the region.

4.4. Socio-institutional framework

The degree of sensitivity of the socio-institutional framework (Table 5.A) is high (.835). The adaptive conditions of this IAC exercise their main influence in the ex-ante phase (A) of the LCD, the implementation stage of the preparation measures. Preventive management is weak in the region of study. Particularly, there is an absence of seismic culture among the population and the collective loss of memory of earthquakes that generated disasters in the past (UC3.1.1).

The sensation of social invulnerability (DP3.1) of the risk culture of western countries (RC3) together with the low frequency of high-intensity earthquakes helps to explain the low seismic awareness among stakeholders.

The adaptive capacity of the socio-institutional framework (Table 5.B) is high (.795). The adaptive conditions of this IAC exercise their main influence during the ex-post (P) phase of the LCD, when the system deploys its legal and institutional mechanisms for economic recovery and the healthcare cover of the affected population. A noteworthy safe condition is the free and universal nature of the Spanish healthcare system and the European health protection system (European health card) which European tourists are entitled to during their stays in EU countries (UC2.1.1). The social accessibility and quality of the healthcare system is a consequence of the development of public policies within the framework of the welfare state (DA2.1), which represent a form of state interventionism that is still active in the region (RC2).

4.5. Risk management

The degree of sensitivity of the region of study in the area of risk management (Table 6.A) is high (.856). Risk management exercises its main adaptive influence in the ex-ante phase (A) of the LCD, through preventive measures. This management approach has a residual nature in the region. It is noteworthy that there are no Municipal Action Plans (PAM) in the event of earthquakes (UC1.1.1), a compulsory measure in municipalities exposed to a potential intensity equal to or higher than VII in the EMS-98 for a 500-year return period (T). The non-compliance with this measure is related to the technological optimism (DP1.1) of the technocratic culture of risk prevailing in the region (RC1). The non-structural measures of risk management (social dimension) are ignored, with actions aimed at reinforcing the energy-absorbing capacity of buildings and critical infrastructures prevailing. The paradigm of risk management (proactive approach) is completely surpassed by the paradigm of the emergency and rapid response paradigm (reactive approach).

The adaptive capacity of the risk management (Table 6.B) of the region is high (.835). Due to the predominance of the emergency and rapid response paradigm, the main adaptive influence of the conditions of this area in the LCD is exercised during the manifestation of the seismic event (E). The existence of civil and military emergency units with specific training in seismic disaster management is noteworthy (SC1.2.3). These units exemplify the prevalence of the emergency approach in the field of earthquake management (DA1.2). This approach belongs to the technocratic paradigm (RC1). It helps to attenuate the impacts of natural hazards, although its reactive and synchronous nature makes it impossible to implement a holistic risk management capable of acting in all the stages of the LCD from a social and technical point of view.

5. Conclusions

The analysis of the SVNH in tourist destinations in socio-economically developed regions has enabled us to examine two emerging areas of study. On the one hand, we have shown the uniqueness of the SVNH producing process of the TDDR which is based on the complex coexistence of causal pathways of sensitivity and adaptive capacity. The TDDRs have high levels of adaptive capacity linked to the economic dynamism of the tourism sector and the solvency of the institutional framework. In turn, the TDDRs show factors of sensitivity related to the volatility of their demand and the lack of knowledge of the tourists with respect to the local environment and its hazards. These contrasts give rise to particularly complex and multidimensional adaptive situations that make the conceptualisation of the SVNH in this environment an ontological challenge. On the other hand, we have explored the main weaknesses of the dominant approach to assessing SVNH and we have found it to be inefficient in deciphering the complex nature of the TDDRs. The technocratic paradigm, based on the deductive approach and quantification as an end in itself, shows difficulties to explain the processes that generate SVNH and promote effective risk management processes. This epistemological challenge is more evident in systems with a high level of adaptive complexity, such as the TDDRs.

In order to contribute to resolving this epistemological challenge, we have proposed the MGSV. This methodological approach, with an inductive vocation as it requires the integration of primary and secondary data sources directly related to the local context, is directed at systematically identifying and understanding the processes that generate SVNH. This model offers a holistic and in-depth view of SVNH, able to respond to the high complexity of the inter-related sensitivity and adaptive capacity processes of the TDDRs. This characteristic is also useful for identifying strategic spaces for action and for specialising risk management tools. Furthermore, the MGSV is composed of informational input able to reinforce the profiling of the SVNH and reinforce the baseline of the vulnerability assessment methodologies, a requisite specifically proposed by Cutter et al. (2010). In this sense, a future line of research should be based on designing strategies able to articulate the qualitative reflection of the SVNH generating processes with the capabilities that the quantitative methodologies contribute to policy makers.

With respect to applying the MGSV to the case of seismic risk on the Costa Blanca, we have identified second-home tourism as one of the main sensitivity-producing vectors. This tourism model generates social and territorial externalities such as the occupation of areas of risk, the low level of social inclusion of residential tourists in the local culture or the inefficient articulation of the urban centres and residential areas. Another key factor of sensitivity is the predominance of the emergency approach. This approach, framed within the technocratic paradigm, functions as a response mechanism to seismic events. It has an eminently reactive nature, given that it is aimed at post-disaster recovery and not at the proposal of preventive measures directed at fostering local seismic risk culture or promoting urban planning based on anti-seismic criteria. The structural measures, based on the energy-absorbing capacity of the buildings, dominate seismic risk management in detriment to the non-structural measures (risk culture, urban planning, risk communication...).

On the other hand, we have found that the principal adaptive capacity vector of the region of study is related to the solvency of the institutional framework, particularly with respect to the economic and health protection of the population potentially affected by a seismic disaster. The public policies of the welfare state, such as the institutionalisation of the insurance system or the universality and cost-free status of the Spanish healthcare system guarantee basic social protection services against the effects of natural hazards. This is paradoxical if we take into account the current state of regression of the welfare state in the region of study (Aledo et al., 2012), which is gradually being replaced by neo-liberal policies that place emphasis on a greater flexibilisation of the labour market and a reduced intervention of the state in social and economic matters. Furthermore, aspects such as the quality of the urban infrastructure –particularly transport–, the development of measures based on the energy-absorbing capacity of buildings or rapid response mechanisms in emergency situations highlight how key factors of adaptive capacity exercise a strategic influence on the management of the in situ effects of earthquakes.

Finally, we can indicate two opportunities for improving the MGSV. The first consists in articulating formulas for transferring the results of the policy makers responsible for seismic risk management. The complex nature of the MGSV implies a challenge of epistemological translation, which should be undertaken to strengthen the science/policy interface that underlines this study. Second, an extension of the community of evaluators (civil society, market and political-administrative institutions) would increase the exhaustiveness of the informational input of the MGSV and the political utility of the results. This strategy would lead the dialogue between stakeholders towards more participative and effective states of risk governance.

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Table 1

Profile of experts.

Discipline	n
Environmental sociology	4
Geography	4
Civil engineering	5
Emergency services	4
Government institutions	4
NGOs	4
Total	25

Table 2

Causal pathways of sensitivity and adaptive capacity on the adaptive conditions of tourists.

Root causes	Dynamic pressures	Unsafe conditions	Unsafety degree: Weight	Unsafety degree: LCD
	Generation of sensitivity (A)			
1. Individualism	1.1. Socio-spatial segregation	1.1.1 Scarce knowledge of the local environment (natural hazards and self-protection measures)	.838	A/E/P
		1.1.2. Occupation of isolated hazardous areas of urban centres (second-home areas)	.906	E
	2.1. Formation of linguistic barriers	2.1.1. Lack of a familiar environment of short-stay tourists	.755	E
		2.1.2. Low level of social inclusion in the host community of residential tourists	.732	A/E/P
			Average	.808
	Generation of adaptive capacity (B)			
	Dynamic attenuations	**Safe conditions**	**Safety degree: Weight**	**LCD**
2. Monolingualism	1.1. Development of leisure tourism	1.1.1. Non-exposure of short-stay tourists to medium and long-term impacts	.738	P
		1.1.2. High (north side) or medium (south side) economic capacity of residential tourists	.722	P
	2.1. Formation of tourist colonies	2.1.1. Cooperative relationships between residential tourists of the same nationality	.749	A/E/P
		2.1.2. Possibility of using the first residence in the country of origin by residential tourists	.730	P
			Average	.735

Table 3

Causal pathways of sensitivity and adaptive capacity on the economic structure.

Root causes	Dynamic pressures	Unsafe conditions	Unsafety degree: Weight	Unsafety degree: LCD
	Generation of sensitivity (A)			
1. Tertiarization	1.1. High tourist specialization	1.1.1. High exposure to economic volatility in disaster scenarios (crisis of perception)	.755	P
		1.1.2. Low level of qualification required for job positions (services sector)	.670	P
		1.1.3. Low level of economic diversification of the tourist destinations	.803	P
	1.2. Real estate speculation	1.2.1. Financing system of the local governments dependent on building permits (property booms)	.725	A
	2.1. International competitiveness	2.1.1. High competitiveness with other tourist destinations (rest of Mediterranean and others)	.624	P
			Average	.715
	Generation of adaptive capacity (B)			
	Dynamic attenuations	**Safe conditions**	**Safety degree: Weight**	**Safety degree: LCD**
2. Globalization	1.1. Promotion of construction and services sector	1.1.1. Job positions accessible for all socio-demographic groups (unskilled employment)	.691	P
		1.1.2. Powerful multiplying effect of the tourism activities in many sub-sectors	.730	P
	2.1. Development of international tourism	2.1.1. High capacity of tour operators to sell products around the world	.680	P
		2.1.2. Powerful marketing tools in the tourism sector for reconstructing the image of affected destinations	.723	P
		2.1.3. Highly diversified tourism demand (many nationalities)	.641	P
			Average	.693

Table 4

Causal pathways of sensitivity and adaptive capacity on the urban development.

Generation of sensitivity (A)				
Root causes	Dynamic pressures	Unsafe conditions	Unsafety degree: Weight	Unsafety degree: LCD
1.Anthropocentrism 2. Post-materialism	1.1. Accelerated urban development	1.1.1. Fragmented urban planning (urban sprawl) in second-home areas	.763	E
		1.1.2. Many residential buildings constructed without earthquake resistant regulations (prior to PDS-1 1974)	.937	E/P
		1.1.3. Many second homes built with a lower architectural quality during real estate boom (1998-2008)	.873	E/P
		1.1.4. Inefficient monitoring of the compliance with the seismic regulations during construction	.777	E/P
	1.2. Environment degradation	1.2.1. Insufficient open space for public use (high building density)	.795	E
		1.2.2. Road access problems in residential areas with a high building density (emergency and rescue services)	.893	E
	2.1. Life-style migration and demographic growth	2.1.1. High demographic density in urban centres (particularly in the summer)	.801	E
		2.1.2. Many labour immigrants attracted by low-skilled tourism employment with less resources and social integration problems	.645	P
			Average	.810
	Generation of adaptive capacity (B)			
	Dynamic attenuations	Safe conditions	Safety degree: Weight	Safety degree: LCD
	1.1. Development of urban infrastructures	1.1.1. High quality transport infrastructure (secondary roads, motorways, airports, high-speed trains, urban trams...)	.830	E
		1.1.2. Possibility of periodically updating the General Urban Development Plans (PGOUs).	.535	A/E/P
	2.1. Increase in environmental awareness	2.1.1. Growing concern about earthquakes (call effect with the Lorca earthquake of 2011)	.645	A/E/P
			Average	.670

Journal Pre-proof

Table 5

Causal pathways of sensitivity and adaptive capacity on the socio-institutional framework.

Root causes	Generation of sensitivity (A)		Unsafety degree	
	Dynamic pressures	Unsafe conditions	Weight	LCD
	1.2. Reduction of the State's regulatory capacity	1.2.1. Pressure exercised by private companies for constructing and selling second homes in hazardous areas	.815	A
	2.1. Political interests-based policy	2.1.1. Failure to communicate the exposure to seismic risk during the promotion and sale of second homes	.871	A/E
		2.1.2. Insufficient technical and financial resources of the local governments dedicated to seismic risk management	.774	A/E/P
1. Neoliberalism	3.1. Development of imaginary of social invulnerability	3.1.1. Lack of seismic culture in the population (no awareness of the risk) and loss of historical memory (past earthquakes)	.881	A/E/P
		3.1.2. Social unpopularity of preventive management (low frequency of high-intensity earthquakes)	.833	A
			Average	.835
2. State interventionism	Generation of adaptive capacity (B)		Safety degree	
	Dynamic attenuations	Safe conditions	Weight	LCD
	1.1. Liberalization of the tourism market	1.1.1. Few barriers for the investments of foreign companies	.600	P
3. Western risk culture	2.1. Development of welfare state	2.1.1. Free and universal healthcare system (Spain) and European health insurance card for EU tourists	.941	E
		2.1.2. Institutionalisation of the insurance system (Consortium of Insurance Compensation for earthquakes)	.875	P
		2.1.3. Legal mechanism of "Declaration of Catastrophic Area"	.826	P
	3.1. Projection of security imaginary	3.1.1. Less stigmatisation of tourist destinations in the post-disaster phase	.735	P
			Average	.795

Table 6

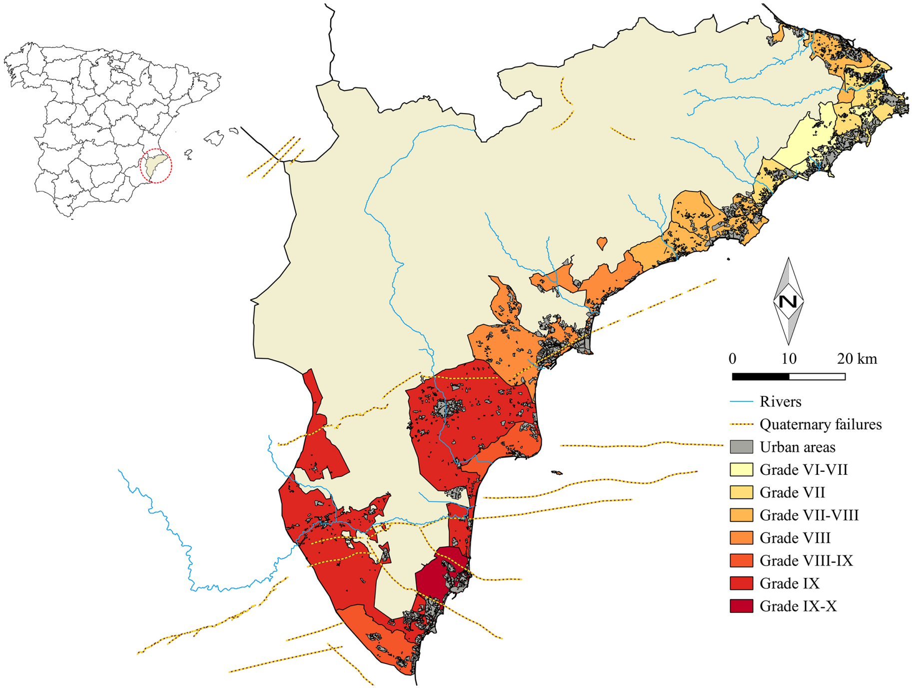
Causal pathways of sensitivity and adaptive capacity on the risk management.

Root causes	Dynamic pressures	Unsafe conditions	Unsafety degree: Weight	Unsafety degree: LCD
	Generation of sensitivity (A)			
1. Technocratic paradigm	1.1. Technological optimism	1.1.1. No Municipal Action Plans despite the legal obligation to establish them (intensity >VII)	.949	A/E/P
		1.1.2. No seismic microzonation (mapping)	.853	A/E
		1.1.3. No multi-hazard management (concatenated risks such as landslides or fires induced by earthquakes)	.789	E
		1.1.4. No Territorial Action Plan (PAT) for seismic risk (only for floods)	.819	A/E/P
	1.2. No risk management	1.2.1. No action protocols during earthquakes in educational centres (primary and secondary schools)	.893	E
		1.2.2. No risk mapping (hazard and social vulnerability layers)	.830	A/E/P
			Average	.856
	Generation of adaptive capacity (B)			
	Dynamic attenuations	**Safe conditions**	**Safety degree: Weight**	**Safety degree: LCD**
	1.1. Development of structural protection policies	1.1.1. Existence of several seismic resistance regulations (NCSE-94, NCSE-02…)	.811	E/P
		1.1.2. Protocols to ensure the supply of drinking water, energy and telecommunications	.838	E
	1.2. Emergency management	1.2.1. Special plan for seismic risk of the Region of Valencia 2011 (not Territorial Action Plan category)	.772	A/E/P
		1.2.2. Planning of earthquake drills in some municipalities (south side)	.808	E
		1.2.3. Emergency units (Civil Protection, fire fighters and Military Emergencies Unit) with training in earthquake management	.949	E
			Average	.835

Declaration of interests

☒ The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

☐The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: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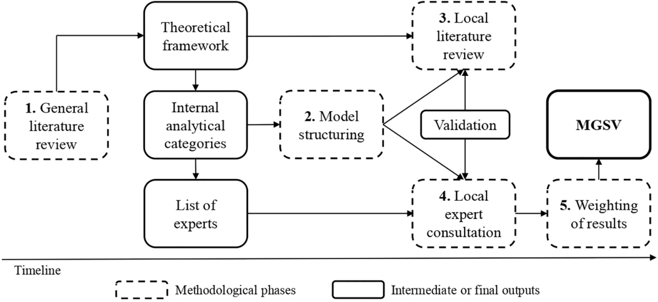
Urban areas
Grade VI-VII
Grade VII
Grade VII-VIII
Grade VIII
Grade VIII-IX
Grade IX
Grade IX-X

Figure 1



Theoretical framework
3. Local literature review
1. General literature review
Internal analytical categories
2. Model structuring
Validation
MGSV
List of experts
4. Local expert consultation
5. Weighting of results
Timeline
Methodological phases
Intermediate or final outputs

Figure 2

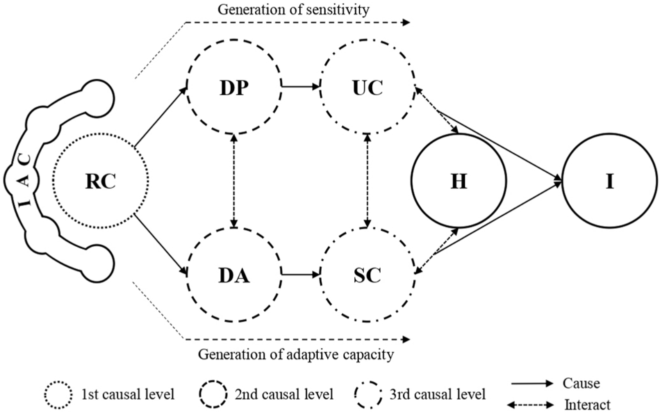

Generation of sensitivity
DP
UC
I A C
RC
H
I
DA
SC
Generation of adaptive capacity
1st causal level
2nd causal level
3rd causal level
Cause
Interact

Figure 3