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Disaster risk management and cultural heritage: The perceptions of European world heritage site managers on disaster risk management

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ABSTRACT

Research into the sustainable management of the world's cultural heritage (CH) is increasing. This is due to the vulnerability of CH to climate-related disasters and the perceived contribution of CH to the achievement of broader sustainability goals. Despite the perceived benefits of bringing together CH and sustainability, researchers have identified barriers that slow integration. These barriers are theoretical and practical, and targeted research would help improve the resilience of our CH. This article aims to explore the perceptions of a group of UNESCO world heritage site managers (WHSM) on disaster risk management. A questionnaire was sent to WHSM via professional email boxes. The questionnaire consisted of 26 questions designed to explore the perception of WHSM. In total, 58 responses were received, and the results produced findings worthy of discussion. WHSM still have limited access to disaster risk management strategies or practical implementation experience. Practitioners in this field perceive multiple risks, not just those related to climate change. The researchers noted that there was a tendency to focus on the most immediate problem, rather than the full range of risks they might face. It is clear that there is an opportunity to improve resilience through knowledge sharing and better communication across all CH. This is also true of individual world cultural heritage sites, with opportunities to engage more effectively with local stakeholders. This article pinpoints the current perceptions of WHSM for the academic community and highlights critical avenues of research that will aid in the overarching theoretical and operational integration of CH and sustainability.

1. Introduction

Scholars across the academic community have noted a paradigm shift in the cultural heritage (CH) discourse [1–3]. Within this paradigm shift, CH is championed as the fourth pillar of sustainability alongside ecology, society, and the environment [4,5,6]. Experts have also highlighted the potential harmonisation of CH protection and achieving the 2022 sustainable development goals [7, 8]. Another crucial aspect of this paradigm shift is the integration of CH into disaster risk management (DRM) theory and practice [9–13]. The reasoning behind this integration is the perceived vulnerability of CH to the increasing severity and frequency of disaster events as a result of climate change [14–16]. International organisations such as UNESCO, ICCROM and ICOMOS are key driving forces behind the integration of CH into wider DRM. These international organisations reinforce the regulatory framework with a lattice of interacting documents, frameworks, conventions, and guidelines that inform the conservation of the world's CH. For example,

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The World Heritage Convention's guiding document '*Convention concerning the protection of the world cultural and natural heritage*' [17]. This serves as a centralised text outlining the duties of state parties to protect their CH, as well as the associated operational guidelines to implement the world heritage convention [18]. This regulatory framework continuously evolves [19] and, most recently, UNESCO has attempted to engage with climate-related sciences within their Strategy for Action on Climate Change (SACC) [20]. Within the SACC, UNESCO has attempted to enhance its relevance in the international climate change regime, ensuring its framework aligns with the Paris Agreement, Agenda 2023, and the Sendai Framework for Disaster Risk Reduction (SFDRR) [21].

Overall, the publication of the SACC by UNESCO is an example of their commitment to linking climate change and cultural heritage, providing an important example of the ongoing paradigm shift within these areas. Crucially, within the context of this research paper, we highlight the explicit reference of the SFDRR in the SACC. The SFDRR is a seminal document that aims to reduce the impact of disaster risk in terms of loss of life and livelihoods, health, economic, physical, social, cultural and environmental assets of persons, businesses, communities, and countries over the next fifteen years [21]. However, despite the SFDRR being championed as a framework for guiding disaster risk reduction and DRM [21], contemporary experts have lamented and criticised it [22–25]. This criticism varies in nature [22–25], but includes the inherent difficulties in securing long-term, practical commitments with practitioners on the ground [24,26,27].

One of the key stakeholders who may help in the implementation of the SFDRR is the UNESCO world heritage site managers (WHSM). This is true, especially within the context of CH.

Currently, UNESCO does not define explicit obligations for WHSM to deliver the priorities of the SFDRR in their work. However, since 2007 UNESCO has attempted to integrate the priorities of the SFDRR into its policy and regulatory framework and rhetoric (as highlighted previously). Furthermore, for example, the World Heritage Committee approved the [Strategy for Risk Reduction at World Heritage Properties](#) in 2007. This led to a series of international and regional workshops between 2007 and 2015 [28], encouraging WHSM to create disaster risk reduction strategies for the heritage sites they managed. The integration of the SFDRR and the delivery of these workshops explicitly emphasises the responsibilities of WHSM in the development and delivery of DRM strategies.

Taking this overarching regulatory framework into account WHSM have a vitally important role in implementing the SFDRR within the context of CH. Put simply; no one knows a world cultural heritage site better than the WHSMs who manage it. UNESCO reinforces this thinking by defining WHSM as "... *the key responsibility holder who oversees and leads site-specific managerial decision-making ... from different disciplinary lenses across private and public sectors*" [29]. Under this definition, WHSMs are responsible for implementing overarching frameworks on the ground, a fact reinforced by their translation of the World Heritage Convention in the sites they manage [29]. WHSMs are also crucial in reconciling expectations [30] and requirements of the international heritage community in local contexts. They form a cross-scale and cross-sectoral bridge responsible for conserving CH through UNESCO's mandate [31,32]. As a key stakeholder that forms a bridge between experts from different sectors with different skill sets across local, regional, and national spatial scales, it, therefore, makes perfect sense to bring WHSM into the broader research currently taking place on DRM and CH. Contemporary scholars appeared to acknowledge this fact within the role of WHSM, manifesting in a growing research focus. By way of example, Graham & Spennemann conducted a postal survey investigating attitudinal barriers to disaster planning for CH. Crucially, Graham & Spennemann [33] found that even though CH experts recognised the danger of natural disasters, they did not consider them a priority risk factor for the sites they managed. More recently, Pavlova et al. [34] conducted a more in-depth, large-scale study involving 981 world heritage properties. Pavlova et al. [34] aimed to explore the 981 world heritage properties to geological hazard exposure and disaster risk awareness. Interestingly, Pavlova found that it was a challenge for WHSMs to adequately predict and react to geological hazard events, which in part may be a result of a lack of awareness on the part of heritage managers [34].

Finally, Sesana et al. [35] and Fatorić and Biesbroek [36] employed qualitative methodological approaches in the form of interviews and surveys, respectively, to explore the adaptation to climate change with CH experts in the Netherlands. Both researchers captured a myriad of experiences and perceptions from CH site managers on matters of climate change adaptation in the context of CH.

With these studies, amongst the growing number of examples that have attempted to unpack CH experts' perceptions of DRM, it is clear that this is an area worthy of further research. This article, therefore, aims to provide basic, up-to-date, semi-empirical evidence, capturing the perceptions and experiences of a sample group of UNESCO WHSM on DRM. The research attempts to provide additional empirical evidence guided by five research questions.

- 1) What core mandates are WHSM attempting to deliver within their role, and what effect, if any, could that have on DRM?
- 2) What risks and vulnerabilities do WHSM currently perceive for the sites they manage, and how does that align with broader DRM research?
- 3) How many WHSMs have access to and, have implemented a DRM strategy in practice?
- 4) Given the increasing importance placed on local stakeholders in wider literature, what is the current perceived relationship between WHSM and local community groups?
- 5) How do WHSMs communicate and share knowledge between heritage sites and countries?

The five research questions have been used to structure the article's results, methodology and discussion section. It is essential to note that this research was conducted as part of a Horizon 2020-funded programme called the SHELTER Project. As part of the SHELTER Project, an online questionnaire was created to conduct a large-scale exploration of WHSM perceptions across Europe in preparation for a more in-depth review of CH governance. The results presented in this article were distilled from that online questionnaire.

2. Materials & methods

To collect raw data from the WHSM, an online survey was developed and circulated using the survey development platform Survey Monkey. The survey included 26 questions, written in English, and consisted of multiple-choice and open-ended questions. Some questions were very explicit in nature, requiring the WHSM to choose from a pre-defined list of responses. In contrast, others allowed more nuanced responses, providing space for the WHSM to provide different points of view and personal experiences. As stated in the introduction only 17 of the 26 questions within the questionnaire are covered in this article to ensure suitability for publication. To optimise the use of available resources and to maximise the number of responses received, an email was circulated directly to 1154 UNESCO WHSM via their professional email boxes in April 2020. In terms of context, the email gave a brief introduction to the SHELTER project, explained the purpose of the survey and provided a URL link with an accompanying QR code, which directed the respondent to the first question of the survey. The survey remained open and accessible to those invited to take part for a total of 15 weeks. The dates covered by the survey were from April 18, 2020 until 31st July 2020. To maximise the number of responses, two email reminders were sent during the 15-week period - one at the beginning of June and a second in July. Only 58 of the 1154 world heritage sites invited took part in the survey - 5%. Although the number taking part was disappointing, it should be noted that no fewer than 20 countries were represented in the responses received, covering a myriad of European world heritage sites (WHS) existing in different contexts across varying spatial scales. The findings from the survey are therefore considered limited but valid, providing a valuable contribution to the initial exploration of the perceptions of DRM by WHSM.

3. Results

The following section outlines the results from 17 of the questions asked within the survey. The 17 questions were chosen for presentation within the article because they address one or more of the five key research questions.

3.1. What core mandates are WHSM attempting to deliver within their role, and what effect, if any, could that have on DRM?

As part of the survey, WHSM were asked to define, in one sentence, the core mandate(s) of the WHS they managed. This question was an attempt to capture precisely what WHSM were trying to deliver in their day-to-day work for the WHS they managed. For ease of analysis, the results for this question have been encapsulated in a word cloud - the results of which are shown in Fig. 1. The most described core mandate across all WHS was "Preservation". Synonyms such as "Conservation", "Protection", "Maintenance", and "Management" were also commonly used by the WHSM to define their core mandate. Also of note is that some WHSM highlighted alternative or additional core mandates, emphasising the multifaceted nature of the goals that drive their work. Examples of the alternative mandates described include "Research", "Teaching", and "Tourism".

3.2. What risks and vulnerabilities do WHSM currently perceive in the sites they manage, and how does that align with broader DRM research?

This section of the survey attempted to explore the different risks perceived by WHSM and the vulnerability of WHS to those risks. This section includes three sub-questions designed to identify the key hazards, as well as to grade and measure each WHS's vulnerability to those hazards. Within the survey, a total of 27 different hazards were identified by the WHSM. Flooding was the most common hazard perceived, with 18% of the 56 respondents defining it as a critical risk. Another common risk was cyclones and storms (14%), whereas other risks such as earthquakes, landslides, droughts, extreme temperature, snow and wildfires all had a similar response rate

Question – "If possible, in one sentence can you briefly outline your core mandate or central goal? (e.g. 'preservation' or 'enhanced tourism')"



Fig. 1. Word cloud encapsulating the keywords used by 58 WHSM to define their core mandate. (Created using an online word cloud generator).

within a (6%–8%) range. Interestingly, the WHSM also used the ‘other’ category available within this question to highlight hazards of a more site-specific nature. Site-specific hazards identified included a variety of biotic and abiotic hazards - seen in Fig. 2.

With the main hazards identified for each site, WHSM were asked to quantify their perceived vulnerability to those hazards on a simple scale of ‘Low’, ‘Medium’ and ‘High’. According to the 58 respondents, all WHSM perceived the common natural disasters as equal to or less than a moderate risk to the sites they managed. Only two categories of the threat posed more than a moderate risk in the responses received. These hazards were Storms/cyclones, and the site-specific hazards were highlighted using the ‘Other’ category. The perceived vulnerability to those hazards by WHSM has been encapsulated in Fig. 3.

With the different types of hazard identified, WHSMs were then asked to specify whether or not they had a system in place to regularly review the risks they perceived. 50 WHSM provided a response to this question. Of the 50, 24 felt they had a system in place to regularly review risk, 14 felt they did not currently have an adequate mechanism in place, and 12 felt they did have a mechanism in place but that it was not regularly used (Fig. 4.).

3.3. How many WHSMs have access to and have implemented a DRM strategy in practice?

Two questions were included in the survey to understand the access participants had to a DRM strategy as well as their ability to employ it in the event of a disaster. The first question in this section asked WHSMs to state if they had a DRM strategy in place for the WHS they managed (see Fig. 4). In total, 43 experts responded to this question. Of the 43, 23 WHSMs felt they had no explicit DRM strategy in place for the WHS they managed. Only 4 respondents felt they had an explicit, relevant, and accessible DRM strategy in place.

The second question in this section asked WHSMs if they had any experience delivering a DRM strategy in practice. The results of this question are shown in Fig. 4. Of the 50 respondents, 34 highlighted that they had never implemented a DRM strategy, and only 5

Question - "What are the hazard(s) to the heritage site? (please select all relevant)"

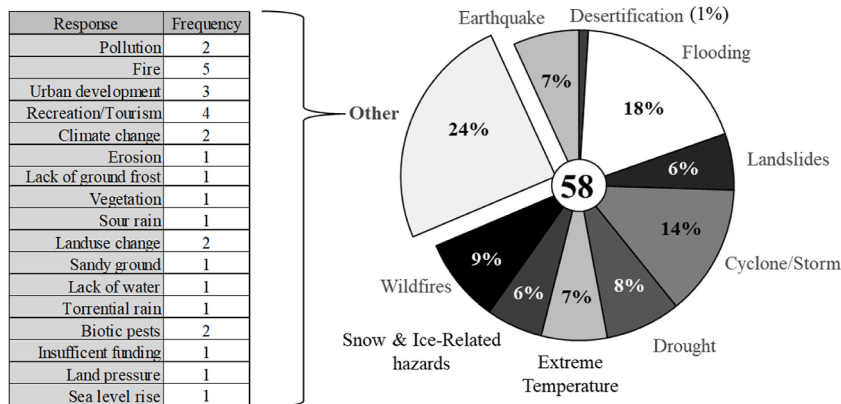


Fig. 2. The different types of climate-related hazard(s) perceived by the WHSM and the breakdown of the other hazards they perceived.

Question - "How would you grade the vulnerability of the site to those hazards? (please select one for each)"

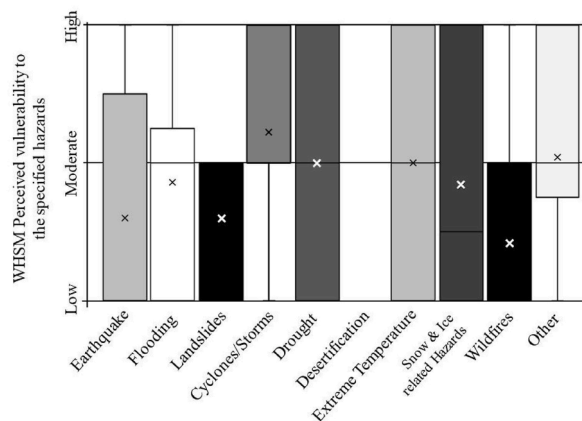


Fig. 3. The WHSM perception of vulnerability to the hazards identified within the survey, including the range of responses and the mean (signified by an X).

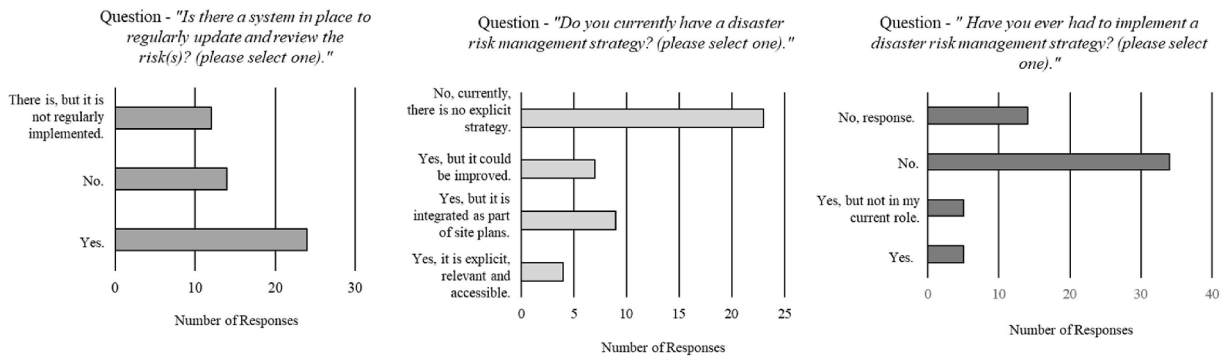


Fig. 4. Three bar charts demonstrating the ability of WHSM to review risk, their accessibility to a DRM, strategy and finally their experience in delivering a DRM strategy.

had implemented one before but not in their current role. Furthermore, only 5 respondents had experience implementing a DRM for the WHS they currently manage.

Finally, with so few respondents having experience in implementing a DRM strategy, the opportunity was taken to explore the WHSMs perceptions of the stages of the DRM cycle. The objective behind this question was to better understand how WHSMs perceived DRM within the context of CH as well as the overarching theory of DRM. The responses to this question uncovered a diverse range of views which have been encapsulated below in Table 1.

3.4. What is the current perceived relationship between WHSM and local community groups?

This survey section explored the ability of WHSM to identify and engage with different stakeholders at the local scale. This topic was explored because of the growing importance of local communities and local knowledge of DRM. Primarily, the respondents were asked to outline if they had an explicit process for stakeholder identification and stakeholder engagement. In total, 38 of the 58 experts responded to the question. 23 of the 38 participants felt they did not have an explicit process to identify stakeholders. Regarding engagement, the WHSM were asked to highlight the tools they used to engage with stakeholders with an emphasis on the local communities. The result is encapsulated in Fig. 5. Face-to-face meetings were the most popular form of interaction around disaster risk issues, with 18 WHSM highlighting this method. Awareness campaigns were also a popular method of community engagement within 13 WHSM pinpointing it. Finally, newsletters and social media campaigns were the least popular mechanism for involving local communities in matters of DRM.

With the mechanisms for stakeholder engagement determined, the survey then asked about the strength of the current relationship as perceived by the WHSM. WHSM were asked to grade their current relationship as 'Strong', 'Satisfactory', or 'Room for improvement' Fig. 6 summarises the results of this question. 20 WHSM felt that their relationship with their local community was Satisfactory. To explore the topic of relationships further, WHSM were asked if they had a 'community representative' or other explicit lines of communication with local community groups.

3.5. How do WHSM communicate and share knowledge between heritage sites and countries?

To explore the mechanisms in place for knowledge sharing, WHSM were asked to stipulate if they had a platform for sharing knowledge and experiences between different WHSM and WHS. In addition, WHSM were asked to describe the platform they use. The results of this question are shown in Fig. 7. 23 WHSM indicated that they did have mechanisms in place for collaboration and knowledge exchange. Only 7 WHSM felt they did not have a mechanism in place. Of the 23 WHSMs who had a mechanism in place, a total of 20 different knowledge-sharing platforms were indicated.

4. Discussion

In line with the earlier sections of this paper, the discussion section has also been structured around the five research questions. By way of reminder, the five research questions were as follows: 1) What core mandates are WHSM attempting to deliver within their role, and what effect, if any, could that have on DRM? 2) What risks and vulnerabilities do WHSM currently perceive in the sites they manage, and how does that align with wider DRM research? 3) How many WHSMs have access to and have implemented a DRM strategy in practice? 4) What is the current perceived relationship between WHSM and local community groups, given the increasing importance placed on local knowledge and local communities in the preparedness phase of the DRM? 5) How do WHSM communicate and share knowledge between heritage sites and countries? Each research question is used as a heading in the discussion and the results from the survey are discussed underneath. First, it is important to acknowledge that only 58 WHSMs responded to the survey - circa 5%, significantly lower than the minimum anticipated of 100 responses - just below 10% of the sample size. This was disappointing for the research team. Despite the measures taken by the researchers to maximise potential response rates, it is unclear why the questionnaire only received 58 responses. In comparison to wider research, Fatorić and Biesbroek [36] explored the perceptions of 57 experts in their research around the barriers, interdependencies, and strategies to climate change adaptation within CH in the Netherlands.

Table 1

Table encapsulating the perceived stages of DRM outlined by the WHSM who responded to the Survey (amended for publication).

WHSM respondent	11. What are the main stages of the disaster risk management cycle? (Please specify below)				
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
1	Monitoring the state of world heritage sites	Work of steering group and site manager	Cooperation with state and city administration		
2	Analysis of the current risks	Involvement of stakeholders	Develop strategies	Implementation of the strategies	Monitoring & evaluation
3	Identifying the threats	Monitoring	Finding the best suitable measures	Implementing the measure	Change assessment
4	Identify risks	Identify responsibility	Suggest actions	Establish the responsibility and action plan	Make it happen
5	Disaster recognition and defining	Establishment of a control system	Determining actions in case of a natural accident	Designation of stakeholders for emergency response	
6	Roof damage	Further inside water damage	Not enough budget to repair		
7	Find out what has happened in the site/site area	Evaluate the situation on the site	Make or clarify the recovery plan	Do as planned/make the steps to the normal situation	Business as usual if possible
8	Preparation of the risk management strategy	Periodic monitoring			
9	Recognising the polluters	Warning to responsible institutions	Preparing a project to improve the situation		
10	Identify	The context at the regional level (plans etc.)	Propose actions	Integrate into the Management plan for the site and relevant physical planning documents (Local and Regional authorities)	Follow-up, evaluation
11	Climate change	Fire	Water hazard when snow and ice are melting		
12	Response	Mitigation	Preparedness	Rehabilitation	
13	Identify risk	Make appropriate personnel aware of the risks	Implement all possible mitigating procedures	Monitor the impacts of these procedures at the next flooding event	Review
14	To carry out the necessary analyses of the current situation and conditions.	To establish a strong and sustainable framework for coordinating	To establish the monitoring mechanism	To strengthen the administrative capacity	To raise awareness
15	Risk analysis	Preparedness	Early warning	Coordinated response	Recovery
16	Monitorisation	Modelling	Management planning	Formation	
17	Risk evaluation	Risk management priorities	Goal and strategy by monitoring	Continuously evaluate monitoring indicators	Access knowledge on efficiency in management
18	Prevention and mitigation	Preparedness	Disaster	Response	Rehabilitation and recovery
19	Planning	Updating	Visible	Flexible	Regular evaluation
20	Disaster	Response	Rehabilitation/ Reconstruction	Prevention/Mitigation	Preparedness
21	Get information about the disaster (inform)	Develop strategy			
22	Analysis of the risk	Development of measures to limit the consequences of the risk worldwide	Enactment of laws to implement the measure	Education, training of the population on climate change what everyone can do in their consumption behaviour to protect natural resources	
23	Definition of risks	Evaluation what impact each risk will make	Prioritising of risk assessment	Developing risk assessment plan, allocating funds	Take action and evaluate
24	Wayfinding	Monitoring	Evaluation	Improvement	
25	Disaster	Response	Rehabilitation	Prevention	Preparedness
26	Scoping	Set up monitoring schemes	Permanent observation, reaction, and adaptation of the scheme		
27	To get immediate information about the disaster	Consultation of the risk management strategy, to decide which measure has to be taken	Consult stakeholders to decide about specific emergency measures	Execute measures	Control and monitoring of implemented measures

(continued on next page)

Table 1 (continued)

WHSM respondent	11. What are the main stages of the disaster risk management cycle? (Please specify below)				
	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
28	Finding	Solution of the main crisis	Analysis of systemic threat - prevention	Systemic solution	Prevention
29	Detect	Communicate	Act	Collaboration	Evaluate
30	Preparedness incl. monitoring and analysis	Responsive actions to manage the change within accepted limits	Preventive actions to stop sudden and unaccepted change	Recovery or managed and monitored change	
31	Respect the Plan	Permanent watch over the situation	Sanction and force to restore	Coach and train those who destroy	Support by public finance to preserve as well as to restore
32	Keeping the staff educated and informed	Fire station cooperation	Keeping the alarm systems update	Keeping the risk plan update	Informing visitors about safety rules
33	Assessment of risks and potential risks	Mitigation measures for prevention	Emergency response measures	Assessment of damage	Rehabilitation where necessary

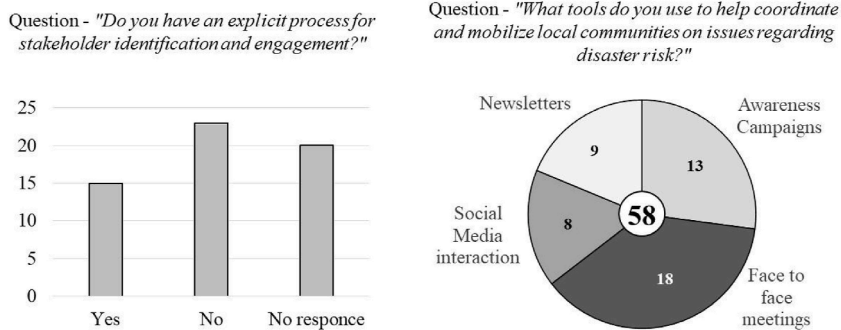


Fig. 5. Series of graphs encapsulating the WHSM perceived relationships with local communities, their ability to engage with them and the methods used.

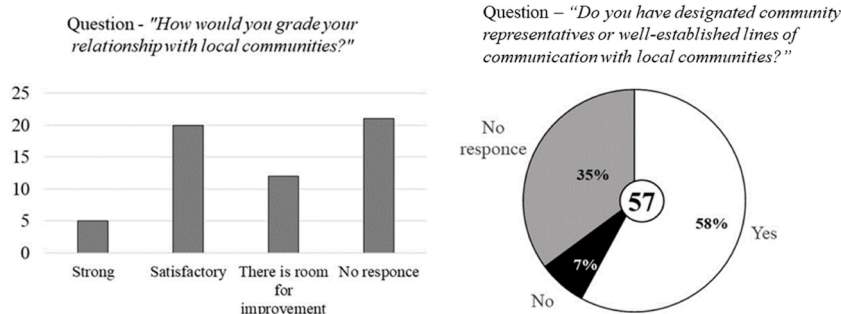


Fig. 6. Series of graphs encapsulating the WHSM perceived relationships with local communities, their ability to engage with them and the methods used.

Within this questionnaire, the perceived low response rate may have been a result of the questionnaire only being provided in English. English may not be the primary language of some of the WHSM. Alternatively, the busy schedules of the WHSM may have restricted their available time to complete the survey. With this limitation in mind, the participants who did respond to the questionnaire represented a variety of WHS spread across 20 different European countries and included rural and urban sites operating at a myriad of spatial scales. In this context, although the number of responses received was disappointing, the spectrum of WHS included within the sample provides a rich source of data, making the results worthy of consideration by other researchers in the field. It should be noted, however, that the conclusions drawn, and recommendations made should be considered preliminary only and, as such, designed to stimulate and support further research work.

4.1. What core mandates is WHSM attempting to deliver within their role, and what effect, if any, could that have on DRM?

The most common core mandate expressed by WHSM was some form of "Preservation". The terms "Conservation", "Protection", "Maintenance", and "Management" were also used, all of which fall under the same semantic umbrella of preserving our cultural heritage for future generations (see Fig. 1). That 'Preservation' features strongly as a core mandate for WHS is unsurprising, as the Preservation of tangible and intangible heritage is a core underlying aspect of the World Heritage Convention [37] and, as such, forms a critical part of WHSM's responsibilities.

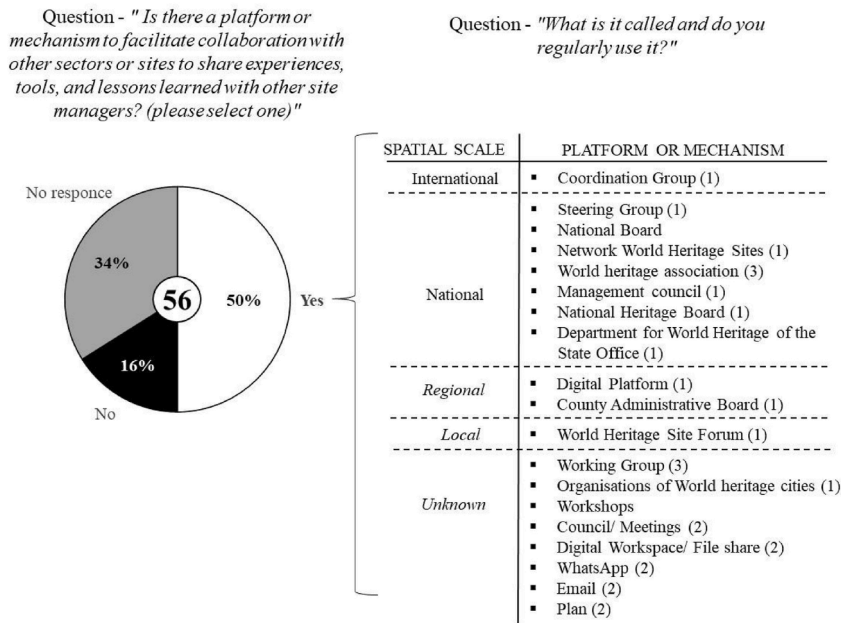


Fig. 7. The generalised response from the WHSM refers to the knowledge-sharing platforms they use to share information between WHS.

It is worthy of note, however, that some WHSM highlighted alternative or additional core mandates within the scope of their work. These alternative/additional mandates included terms such as “Research”, “Teaching”, and the propagation of “Tourism” (see Fig. 1). For example, one WHSM stated that “Preservation, maintenance, making it accessible for visitors and a resource for the local community”.

Reference to these alternative core mandates highlights that while preservation is a central aim for many WHSM, the delivery of this as a core mandate may be set alongside other goals. By way of example, when asked to identify their core mandate, one WHSM responded that their main objective was to “Maintain the outstanding universal value [of their World Heritage Site] by protecting, conserving, presenting, enhancing and transmitting its culture, economic value, unique heritage and landscape in a sustainable manner.”. Clearly demonstrating the range of aspects, they have to consider in the management of the WHS they manage.

Crucially, however, the WHSM were clear to emphasise that preservation was never superseded by a secondary objective. For example, one WHSM stated that their core mandate was “Preservation and as far as possible tourism” and a total of six WHSMs referred to sustainable tourism in the management of their CH sites. For instance, one WHSM stated that “Our central goal is the preservation of both built and intangible heritage, associated with the core maintenance of its original function, and, at the same time aspiring to achieve balance with tourism in a sustainable way.”

Balancing the need for ‘preservation’ with the need to educate, inform, or maintain a revenue stream that keeps a site financially viable is a well-established challenge. This challenge has been recognised by both UNESCO [37] and broad research for decades [38]. Evidence of this juxtaposition can be seen explicitly in the survey results, with some WHSMs pointing to visitors and tourists as their most immediate risk to the site they managed. For instance, one WHSM stated directly. “over-tourism, economic interests and development”. And others state “Development pressure, mass tourism”, whilst, at the same time, other WHSMs cite that tourism is part of their core mandate (see Fig. 1).

The wider academic research has also explored the interface between preservation and tourism. For instance, Boudiaf [39] emphasises, with examples, that tourism should remain a tool to enhance a cultural heritage site rather than an explicit goal in its own rights. Going even further to emphasise the importance of sustainable tourism, much like many of the WHSM who responded to the survey. However, alternative authors such as Lai [40] and Weber et al. [41] explore whether the two mandates can be compatible or even codeveloping as a dual mandate. Ultimately in which tourism serves as a mechanism for the preservation and conservation of a CH site [42]. But this depends on a variety of factors, including. level of use of the WHS, the enabling of an institutional framework and or mechanism, the mindset of stakeholders, careful planning, and education.

The conflicting nature of some of these mandates is not a surprise; other researchers have highlighted this challenge in their work [41–44]. However, the variety of terms used to describe the core mandates was surprising. In total, the WHSM used 23 different words to define the core mandates of the site they managed (see Fig. 1). Highlighting the multifaceted nature of the challenge WHSMs face and the juxtaposition they have to maintain in their daily work.

Secondly, it is important to explore the nuances between the words used by the WHSM to describe the WHS they managed. by way of example, we choose to focus on the terms ‘Preservation’, ‘Protection’ and ‘Conservation’. Upon first glance, these terms could be considered an expression of the same goal - To safeguard the outstanding universal value of a WHS for future generations. Which is in line with the broader regulatory framework of the WHSM (see introduction).

However, upon greater analysis, past research has pointed out that preservation and conservation may be considered different terms [44] and in fact, are not interchangeable. In broad terms, academic literature differentiates highlights that the difference between the two terms is a result of human management or motives. In short, Preservationism is a philosophy that expresses a non-anthropogenic rationale whereas Conservatism, as a philosophy, expresses anthropogenic motives [45,46]. The subtle differences in these core mandates may be because of the locations the WHSM were responsible for. By way of example, WHSMs who are responsible for natural heritage sites attempt to ‘preserve’ the natural value of a given WHSM. Conversely, Site Managers responsible for a built WHS attempt to ‘conserve’ that site. However, alternatively, it could indicate differences in the underlying management philosophies between different WHSMs. Within the survey, this appears to be the case as there are many examples of WHSM within Mixed or Rural WHS attempting to preserve the WHSM they managed rather than conserve them. The differences between preservation and conservation could potentially open up an interesting debate around the protection of our WHS and the underlying philosophies and motivations for doing so.

The presence of conflicting mandates requires compromise and the need for compromise must therefore be reflected in strategies devised for DRM. Furthermore, when attempting to integrate WHS into pre-existing DRM strategies greater clarity must be developed around why and how WHSM are attempting to deliver specific core mandates.

4.3 WHSM acknowledge the diversity in unique and context-specific risks with wide-ranging vulnerabilities despite underlying similarities between different cultural heritage sites.

According to the survey, WHSMs perceive a wide range of risks to their CH sites. In total, 27 different hazards were identified (see Fig. 4). These hazards were not limited to natural disasters such as flooding, earthquakes, or wildfires. Instead, site-specific hazards such as “pollution” and “abiotic pests” also featured prominently, along with other anthropogenic hazards such as a “lack of funding” or “land-use changes”. In this context, this research reaffirmed a clear focus on the vulnerability of CH to climate-related disasters - a finding consistent with other academic literature [13] but also pointed to other hazards not related to climate change being considered as pressing. The most pressing of these risks were anthropogenic or economic hazards (see Fig. 4). When asked to grade the perceived vulnerability of their sites to the different hazards they faced, the category of ‘Other’ was one of only two categories with higher than ‘moderate’ vulnerability (See Fig. 4) and this was where many WHSMs chose to identify site-specific risks. This would suggest WHSMs perceive greater vulnerability to more immediate, site-specific hazards or that they prioritise the most immediate hazards to their sites above all others, which were not always climate-related risks. This finding is important given that a great deal of contemporary literature explores the vulnerability of cultural heritage to climate change-related risks [44–47]. Climate change is an undeniable risk to cultural heritage, but the responses to the survey indicate that WHSM may prioritise other indirect or anthropogenic hazards.

The fact that WHSMs may have different perceptions of risk to the broader research trend is key for practitioners, policymakers, and the wider research community to appreciate. The successful integration of CH into wider DRM and DRR requires policymakers to act proactively at the national scale, as well as bottom-up participatory approaches [47]. The message for experts in the fields of DRR, CCA and DRM would be to work in close collaboration with WHSMs and not to assume that vulnerability to natural hazards is perceived as an immediate priority, particularly where there are conflicting concerns.

4.2. How many WHSMs have access to and have implemented a DRM strategy?

The survey provided clear, empirical evidence to reinforce the disconnection between WHSM and DRM governance. 39 of the 58 survey respondents stated they did not have an explicit DRM strategy in place for their site - see Fig. 6. Only 4 felt they had an explicit and accessible DRM strategy they could implement in the event of a disaster (see Fig. 6). These results support the findings of other academic research, highlighting the disconnect between CH, DRM and WHSMs [35,36]. As well as identifying the immediate necessity to integrate CH stakeholders and WHSMs in strategies for DRM to better protect against climate-related hazards. The extent to which WHSMs are disconnected is alarming. The survey results suggest that little progress has been made to integrate CH into DRM governance more effectively, despite the vulnerabilities highlighted by international organisations [28] and the wider research community [13,46] for decades.

To exacerbate this problem, 34 (57%) of WHSMs who took part in the survey felt they had no experience in implementing a DRM strategy. It is, therefore, unlikely that WHSM would be able to effectively implement a DRM strategy even if one were available. CH is often unique and irreplaceable, there are no ‘second chances’. WHSMs must therefore have the necessary knowledge and skills to implement a DRM strategy the first time and to do it effectively. The findings of the survey, therefore, suggest the inclusion of CH stakeholders and WHSMs within pre-existing DRM strategies is a necessary step, but in and of itself, would not be sufficient to better protect against disasters. Rather, explicit training and access to knowledge gained by individuals with first-hand experience in implementing DRM in disaster situations are vital. What is clear at present is that even where WHSMs understand the theory of the DRM cycle {i.e. preparedness, prevention, response, recovery} - see Table 1, this theory is often interpreted locally and translated to tasks in ways that are incompatible with the wider, strategic implementation of DRM. Conversely, where local interpretation and implementation of DRM is relatively unknown, this can exacerbate any disconnect, undermining efforts to work together with local stakeholders and to develop more effective policies. With this interesting empirical data in mind, it is also important to point out that the high degree of variation across the WHSM may also underpin the integration of CH into DRM. A consistent understanding of the DRM cycle across different disciplinary lenses is crucial when attempting to build DRM strategies as it allows for clear coordination.

4.3. What is the perceived relationship between WHSM and local community groups?

Interestingly, 60% of WHSM who responded to the survey felt they did not have direct stakeholder engagement or identification processes. Effective stakeholder engagement is widely recognised within academic literature as a critical component of decision-making processes. Especially when attempting to operationalise frameworks such as the SFDRR [48]. The apparent absence of these

tools within cultural heritage management is a significant concern. WHSM may be missing an opportunity to build relationships with public and private stakeholders leading to an untapped sharing of resources and knowledge. Furthermore, they may also be missing an opportunity to enhance the role of the WHS within local communities. For example, Mydland and Grahn [49] highlighted how central authorities protecting CH didn't meet the perceptions of the local communities. Also, in some cases, CH is key in the economic development of an area [50]. As a result, facilitating effective engagement can lead to mutually beneficial outcomes for both WHS and local businesses and people.

Secondly, another significant finding from the survey was related to the relationships between cultural heritage sites and local community groups. According to the WHSM who responded, 89% of the WHSM had designated community members and explicit lines of community with those communities. However, many WHSM felt that their relationship required improvement or could only be categorised as satisfactory. This finding uncovers an ongoing disconnection between the local community and WHS.

4.4. How do WHSM communicate and share knowledge between heritage sites and countries?

A variety of results from the electronic survey pinpointed a potential lack of tools to help WHSM develop holistic solutions and establish a broader platform for knowledge exchange and peer learning. First, as seen in Fig. 7, only 48% of site managers had access to a system that allowed them to update and review risks regularly. Furthermore, of those with access to a platform, 24% do have one, but regularly do not use it in their daily activities. Given the rapidly evolving nature of risks and the frequency of disaster events, continuous risk review is a fundamental aspect of decision-making. It is difficult to prepare adequately for a disaster event. As a result, this empirical evidence highlights the pressing need for Cultural heritage sites to access the current, up-to-date DRM tools.

5. Conclusion & recommendations

Based on the results from the survey, we propose four recommendations for researchers exploring the integration of CH and DRM. The recommendations have two functions. First, to provide some preliminary empirical evidence to support further research. Second, we hope that the research will help empower WHSM and other CH stakeholders to engage with DRM.

The **first recommendation** emphasises that every WHS is unique, not only in its cultural value but in the risks that it faces. The unique nature of each WHS requires the need for tailored DRM strategies that allow CH experts and the WHSM to mould the details of a DRM strategy to fit the needs of the particular WHS. However, allowing for a degree of flexibility in the development and implementation of a DRM may require us to reflect on the highly controlled and pre-defined process of DRM. Furthermore, the delivery of DRM is often coordinated at higher levels of governance by governments, ministries and civil protection authorities [9]. This may hinder the degree of flexibility WHSM may have in the design and delivery of a DRM in the drafted phases of the strategy.

The **second recommendation** explores the WHSM perceptions of the DRM cycle. The WHSM were familiar with the DRM cycle. However, there was no consensus on the different stages of DRM across the WHSM. In fact, every WHSM who responded expressed subtly different stages of DRM. The survey highlights a greater need for WHSM and CH experts, in general, to be better informed on the common phases of the DRM cycle. Also, the survey pinpoints an opportunity for the wider research community to explore the differing perceptions of WHSM which may lead to an improvement in DRM for CH.

The **third recommendation** focuses on the WHSMs' accessibility to a DRM strategy and their ability to deliver it in the event of a disaster. The survey provided evidence to suggest that WHSMs lack explicit DRM strategies. This means the majority of WHS are not prepared for a disaster event. This is despite the growing research that highlights the vulnerability of the world's CH. Building on this, the survey also highlighted that the issue is not solely limited to the accessibility of a DRM strategy. But, WHSMs currently do not have the experience, training, or guidance necessary to implement a DRM strategy. In summary, there is a dire need for experts working in DRM and researchers to not only integrate WHSM and CH authorities into DRM but to also provide training and guidance on how to implement it in the event of a disaster.

The **fourth recommendation** focuses on the need for WHSM to have access to up-to-date stakeholder identification and engagement tools. The results from the survey indicated that many WHSMs do not have a process for stakeholder identification. Furthermore, many WHSMs do not have strong relationships with local community groups. Finally, WHSM may not be taking advantage of modern digital tools such as social media to engage with local stakeholders. Broader research champions the importance of local community engagement.

Finally, we acknowledge that the survey has limitations, as it provides insights from a small sample group of WHSM. We feel that the survey provides a brief but enlightening view into the perceptions and, most importantly, the potential needs of WHSM on matters of DRM.

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Declaration of competing interest

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.

Data availability

The authors are unable or have chosen not to specify which data has been used.

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