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Italian archaeological World Heritage Sites: disaster risk reduction in the management plans

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Abstract
In recent decades, the interaction of multiple factors has steadily increased the intensity and frequency of natural disasters affecting our heritage, adding to the already existing risk factors. The need to improve disaster risk reduction practices is more urgent every day. In 2010 UNESCO remarked that the number of WH properties incorporating risk management actions in their management plans was still surprisingly low. The paper examines the management plans of Italian WH sites hosting archaeological remains and traces of ancient civilizations. On the one hand, the contribution provides a recognition of management strategies for disaster risk in existing plans. On the other, it highlights gaps and weaknesses in the plans on the matter, with reference also to the risk management guidelines published by international bodies on the matter. The aim is to stimulate a reflection over the need of risk management elements integration in these documents in the interests of greater sites protection.

Keywords
archeological areas, Disaster risk reduction, Management plans, Natural hazards, Risk management.

Introduction

«Conservation is the management of change, and Climate Change is one of the most significant global challenges facing society and the environment today»[1]

Archaeological sites are characterised by a relevant natural and/or acquired fragility also resulting from the intimate relationship with a constantly changing nature. The impacts of natural hazards on World Heritage sites (WHSs) exacerbated by climate change (CC) effects are now widely acknowledged[2] and increasingly central in the debate of the scientific community[3]. According to a 2017 report, 92% of the WHSs are potentially exposed to at least one natural hazard[4]. In the last decades, these new challenges have necessarily led to the urgency of new approaches to the conservation and management of heritage sites.

At the end of the '90s, the need for a proper management planning attentive to the heritage assets was recognized as an explicit basis for decision-making[5]. However, it was only in 2002 that the World Heritage Committee (WHC) made it mandatory for all State Parties to draft a Management Plan (MP) for each WHS[6]. In 2006, Italy is the first State Party building a national regulatory framework with Law 77/2006, allocating resources for the protection and enhancement of these sites[7].

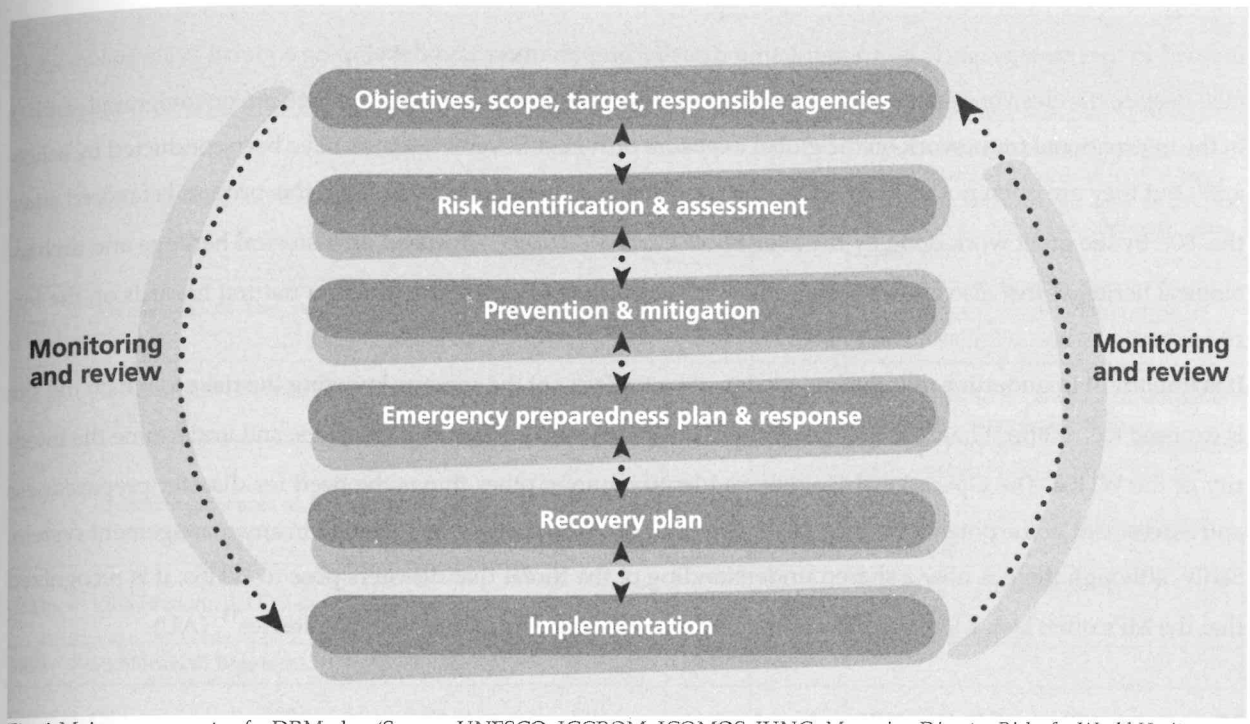

Fig. 1 Main components of a DRM plan (Source: UNESCO, ICCROM, ICOMOS, IUNC, *Managing Disaster Risks for World Heritage*, 2010).

The contribution, framed in an ongoing PhD research, aims to preliminary examine the completeness of Italian MPs - for archaeological areas only - regarding the risk management sphere, with the purpose of fostering a discussion on the topic in view of future updates of these documents. (EM, AU)

Management Plans and Disaster Risk Management

A management plan is «based on identifying cultural values which ensures they are protected by applying legal, administrative, financial and technical methods and tools, and sets out the appropriate strategies to be adopted and the specific action to be taken»[8]. Hence, UNESCO MPs should not be understood as documents that replace the territorial regulatory framework, rather as an overarching tool that systematizes and operationalizes them. The WHC does not provide a standardized template or specific indications of what should be included in the MPs. These sites inherently differ from each other, especially the archaeological ones. Site managers should define the most appropriate configuration for the MP according to the specific circumstances. Since 2010, the Advisory Bodies of the WHC worked to release a series of Resource Manuals to support CH practitioners in the definition of adequate management systems. In Italy, already back in 2004, a document to implement management planning of WHSs was released at national level[9]. The proposed management system foresees as key steps of planning: knowledge, protection and conservation, cultural and economic enhancement, monitoring.

Regarding risks, although the occurrence of hazards and natural disasters have been recognized since the ratification of the Convention, a specific strategy was adopted by the WHC only in 2007[10]. A set of actions were

defined in the Strategy, such as strengthening disaster preparedness and developing a global WHS risk map. In fact, despite the clear understanding of the risks to which heritage is exposed to, there are no integrated studies in the international framework on the global exposure of WHSs. Several research have been conducted by scholars[11], but they are often not used by site managers for a variety of reasons. In Italy, this process is favored since the '80th by the great work done by the analysis of *Carta del Rischio*[12] (focused on historical heritage and archaeological heritage) that also allows though the GIS platform to visualize the different natural hazards on the territory[13].

It is important to underline that the knowledge of hazards is not the same as knowing the risks to which the site is exposed to[14]. Natural hazards, if managers are not prepared, can turn into disasters, and undermine the integrity of the WHSs. The Operational Guidelines identify among other things the need for disaster preparedness and assessment of the potential impact of climate change, to be necessarily included in any management system. Sadly, although there is now a shared understanding of the threat that disasters pose to WHSs, it is recognized that the MPs often lack adequate risk assessment and efficient risk management strategies[15]. (AU)

Management Plans of Italian WH archaeological properties

Currently, Italy holds the highest number of sites on the UNESCO WHL of any other country - 58 - of which 11 are archaeological assets (Fig. 2). These properties, embedding the traces of the different ancient cultures that populated the territory, differ among each other in typology, territorial extension, and state of conservation. In the framework of the current research, the analysis was performed on the MPs available online[16].

As mentioned above, there is not a specific MP template available for archaeological site managers. However, on the UNESCO office of the Ministry of Culture (Mic) website an operational manual for the management of WH sites in accessible[17]. The document serves as a reference for the key aspects to be included in the plans – by also providing examples of implemented management systems - albeit lacking guidelines specific for different CH typologies.

The Cilento WHS is the only mixed site in Italy, embedding both natural and cultural heritage. Despite the heterogeneity of the assets and vastity of the area covered, bringing different conservation needs and hazards, the plan content is not developed according to the different typologies of heritage. The MP is structured according to the sections of the Management Plan model of 2004. Although the SWOT analysis of the site does not recognize any relevant natural hazards directly affecting the assets, the section on geological aspects of the area highlights the hydrogeological risk.

A similar MP structure is followed by Agrigento, the Etruscan Necropolises of Cerveteri and Tarquinia, and Syracuse. In the first one, an entire section is devoted to the opportunities, challenges, and risk factors of the site, highlighting the erosion phenomena as the main natural hazards. Analogously, the second one analyses the risks of the area, recognizing both natural and anthropogenic factors as potential hazards to the assets. In this case, the analysis is broadened also to the site context, recognizing the risk of fire on vegetation. Besides, the document contains a set of strategies to reduce the identified risks. Similarly, the Syracuse MP after highlighting a set of natural risk factors, remarks some actions already in place to reduce the risk of catastrophic events.

ID No.	WH site name	Inscription date	MP release	Reference to the document
94	Rock drawings in Valcamonica	1979	2005	Raffaella Poggiani Keller et alii (eds), *ARTE RUPESTRE della VALLE CAMONICA Sito Unesco n. 94, 2005 PIANO di GESTIONE, Stamperia Stefanoni, Bergamo, 2007.*
825	Archaeological Area and the Patriarchal Basilica of Aquileia	1998	2017	https://www.fondazioneaquileia.it/files/documenti/pdg_aquileia.pdf
829	Archaeological Areas of Pompei, Herculaneum and Torre Annunziata	1997	2016	http://pompeiisites.org/wp-content/uploads/Piano-di-gestione.pdf
831	Archaeological area of Agrigento	1997	2005	http://unescosicilia.it/wp/wp-content/uploads/2014/09/Piano-di-gestione-di-Agrigento_ITA.pdf
832	Villa Romana del Casale	1997	2020	https://www.villaromana-delcasale.it/piano-di-gestione
833	Su Nuraxi di Barumini	1997	NA	
842	Cilento and Vallo di Diano National Park with the Archeological Sites of Paestum and Velia, and the Certosa di Padula	1998	2012	http://www.cilentoediano.it/sites/default/files/pdg_unesco_parco_del_cilento_finale.pdf
907	Villa Adriana (Tivoli)	1999	NA	
1158	Etruscan Necropolises of Cerveteri and Tarquinia	2004	2008	https://www.comune.cerveteri.rm.it/turismo-e-cultura/le-necropoli/unesco/piano-di-gestione-unesco
1200	Syracuse and the Rocky Necropolis of Pantalica	2005	2005	http://unescosicilia.it/wp/wp-content/uploads/2014/09/Piano-di-gestione-Siracusa_ITA.pdf
1318	Longobards in Italy. Places of the Power (568-774 A.D.)	2011	NA	

Fig. 2 List of Italian archaeological WHSs

Again, however, the variety of heritage types included in the WHS makes the identified risks only partially valid for the archaeological area (e.g., the high seismic risk detected is valid for the elevated structures in the historic city center). Comparable risks are identified for Villa Romana del Casale, also located in Sicily. The site MP lists among the objectives the provision of measures to contain hydrogeological, fire, vandalism, and man-made hazards, but without providing specific guidance on the management of these hazards. It is emphasized that among the foreseen objectives of the working groups is the intention to conduct a risk analysis using the *Carta del Rischio* methodology.

Both the MPs of Valcamonica and Agrigento include a risk factor analysis for the two areas, with a significant focus on hazards. For the first WHS a database for conservation and monitoring action planning was developed, considering the guidance by *Carta del Rischio*. The Agrigento MP appears to be among the firsts to intend the risks as future changes that may impact directly on the results of the planning strategies.

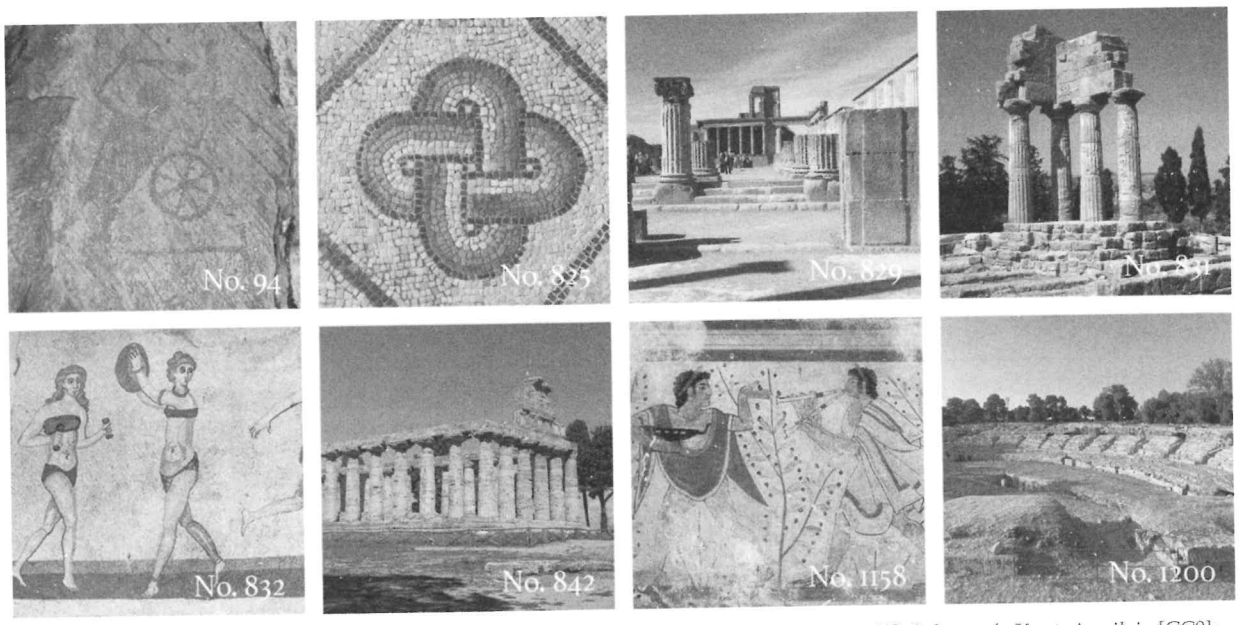

Fig. 3 From upper left: Rock no. 50, Rock Drawings National Park of Valcamonica [MP, Fig. 69]; Solomon's Knot, Aquileia [CC0]; Forum, Pompeii [E. Melandri, 2018]; Temple of Dioscuri, Agrigento [A. Ugolini, 2015]; Le Palestriti, Villa Romana del Casale [MP, cover page]; Temple of Ceres [A. Ugolini, 2018]; Tomb of the leopards, Tarquinia [CC0]; Amphitheatre, Syracuse [E. Melandri, 2022]

The Pompeii MP, updated in 2016 following a UNESCO request, results the most articulate regarding the risk sphere. The plan is structured according to a series of actions, one of which is «mitigation of the natural disaster risk». Risk analysis is developed for Pompeii, Hercolaneum and Torre Annunziata, with an assessment from "non-existent" to "catastrophic" for each of the risk types (e.g., seismic, volcanic, hydrogeological). This is also ensured by the implementation of a GIS that collects information on the risk of the area. In addition, an entire chapter is devoted to the DRM plan, in which the fundamental objective of the plan is emphasized. Indeed, it is recognized that it is not always possible to avoid risks, but it is necessary to work to minimize their effects and identify appropriate procedures to activate in emergency phase (Fig. 3). (EM)

Conclusions

Even though CC cannot be solved locally, its effects at this level must be considered to activate strategies to reduce its negative consequences on heritage. The necessity to identify and assess the natural hazards affecting the sites is clearly stated in the international reference documents. These preliminary research results highlight that MPs of Italian archaeological WHSs are only partially encompassing the elements for a proper response to disasters.

As a positive remark, all the MPs included in the research foresee a section of identification of the hazards affecting the area of interest. However, in most cases, the analysis is performed for a wide area without specific focus on the single assets and their context. Moreover, the identification of the hazards is not always followed by an assessment of risks and vulnerability. In this regard, the multi-hazard analysis available through the GIS system of *Carta del Rischio* - albeit on a large scale - may be a starting reference to integrate in the MPs. In fact,

greater correlation between ordinary administrative instruments issued by local realities with ministerial instruments would be desirable. In addition, the variable related to future changes and scenarios - already highlighted by some scholars[18] - should be considered and included in these documents.

Secondly, a periodic monitoring of the state of conservation of WHSs is essential, as recommended also by the recent *Piano Straordinario di Monitoraggio e Conservazione dei Beni Immobili*[19]. Too often the monitoring indicators in the MPs are unbalanced toward the control of the plan actions, socio-economic and tourism sphere. This leads to a gap in the analysis of the state of the property and the risks affecting it, which should periodically update.

Lastly, there is a lack of definition of DRM plans. In this regard, the case of Pompeii turns out to be exemplary. In fact, it embeds a whole chapter to actions for DRR. First, the coordination with the local emergency authorities in contingency situations allows – at least at planning level – a potential joint and prompt intervention from different fields of expertise. Moreover, the DRM plan foresees an action towards personnel training and management in view of these events. Ideally, this is one of the MP most cutting edge if related to the DRM sphere. (EM, AU)

[1] UNESCO / WHC, *Strategy to assist State Parties to implement appropriate management responses*, 30th session, 8 – 16 July, Vilnus (Lithuania), World Heritage Centre, 2006.

[2] UNESCO / WHC, *Climate Change and World Heritage. Report on predicting and managing the impacts of climate change on World Heritage and Strategy to assist States Parties to implement appropriate management responses*, Paris, World Heritage Centre, 2007; UNESCO, *Policy Document on the Impacts of Climate Change on World Heritage Properties*, World Heritage Centre, 2008; PAVLOVA IRINA et alii, *UNESCO designated sites – Natural and Cultural Heritage sites as platform for awareness raising*, Contributing paper to GAR 2019, 2019.

[3] ANGELA SANTANGELO et alii, *Enhancing Resilience of Cultural Heritage in Historical Areas: A Collection of Good Practices*, «Sustainability», 14, 9, Switzerland, 2022; RICCARDO CACCIOTTI et alii, *Climate Change-Induced Disasters and Cultural Heritage: Optimizing Management Strategies in Central Europe*, «Climate Risk Management», 32, 2021; ELENA SESANA et alii, *Climate Change Impacts on Cultural Heritage: A Literature Review*, «Wiley Interdisciplinary Reviews: Climate Change», 12, 4, 2021, pp. 1–29;

[4] IRINA PAVLOVA et alii, *Global Overview of the Geological Hazard Exposure and Disaster Risk Awareness at World Heritage Sites*, «Journal of Cultural Heritage», 28, 2017, pp. 151–157.

[5] BERNARD M. FEILDEN, JUKKA JOKILEHTO, *Management guidelines for world cultural heritage sites*, ICCROM, Rome, 1998.

[6] UNESCO, *Operational Guidelines for the Implementation of the World Heritage Convention*, Paris, World Heritage Centre, 2021.

[7] Law 20 February 2006, No. 77 (updated 2017), Siti UNESCO italiani.

[8] GIORA SOLAR, *Site management plans: what are they all about?*, Madrid, San Marcos, UNESCO, 2003, p. 22-23.

[9] MiBACT, *Il Modello del Piano di Gestione dei Beni Culturali iscritti alla lista del Patrimonio dell'Umanità - Linee Guida*, Paestum, 2004.

[10] UNESCO / WHC, *Strategy to assist…*, op. cit.

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[12] MiC / ICR, *Carta del Rischio dei Beni Culturali*: http://www.cartadelrischio.beniculturali.it [29th August 2022]

[13] ELISABETTA LAZZERI, *Un modello multi-hazard per la valutazione del rischio dei beni archeologici: il caso sperimentale della Villa Adriana di Tivoli*, «Archeologia e Calcolatori», 22, 2011, pp. 365-389.

[14] United Nations Office for Disaster Risk Reduction / UNDRR, *Global Assessment Report on Disaster Risk Reduction* 2022, 2022.

[15] I. PAVLOVA et alii, *UNESCO designated sites…*, op. cit.; ELENA SESANA et alii, *Adapting Cultural Heritage to Climate Change Risks: Perspectives of Cultural Heritage Experts in Europe*, «Geosciences», 8, 8, 2018, pp. 1–23.

[16] Despite the authors are aware of the development and implementation of the MPs for all the 11 WH properties, the ones Su Nuraxi of Barumini, Villa Adriana, and the Longobards serial site were not found online.

[17] UNESCO, ICCROM, ICOMOS, IUNC, *Managing Cultural World Heritage*, Paris, Unesco World Heritage Centre, 2013.

[18] See the Protech2Save project Risk Mapping tool: https://www.protecht2save-wgt.eu [29th August 2022]

[19] Piano Straordinario di Monitoraggio e Conservazione dei Beni Immobili: https://dgspatrimonioculturale.beniculturali.it/attivita-direzione-generale-sicurezza-del-patrimonio-culturale/bozza-automaticapiano-straordinario-di-monitoraggio-e-conservazione-dei-beni-culturali-immobili [29th August 2022]

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