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Indice | Summary | Index
vol. 2

Uomo, natura e clima: i siti Patrimonio Mondiale a rischio | Man, nature and climate: World Heritage properties at risk | Homme, nature et climat : les sites du Patrimoine mondial en danger 10

Analisi multi-rischio del centro storico di Firenze per la salvaguardia e valorizzazione 12
Chiara Arrighi, Vieri Cardinali, Maria Teresa Cristofaro, Antonino Maria Marra, Fabio Castelli, Mario De Stefano

The Management of the World Heritage Site "Venice and its Lagoon": state of the art and new challenges 18
Katia Basili, Francesco Trovò

Multidisciplinary analysis and HBIM methodology for the risk management of harmful events: the large raw earth complex of Chan Chan (Trujillo, Peru) 24
Francesca Colosi, Francisco James León Trujillo, Eva S. Malinverni, Sandra Kobata Alva, Roberto Orazi

Il Centro Storico di Firenze tra conservazione e metamorfosi urbana: appunti per un modello strategico di Valutazione di Impatto sul Patrimonio 32
Marta Conte, Alessia Montacchini

Analisi dei fattori di rischio microclimatico in casi studio operativi nel centro storico di Napoli 38
Maria Antonietta De Vivo

Documentation of Syrian lost heritage: 3D modelling to support an open information system and Mixed Reality 44
Francesco Di Stefano, Roberto Pierdicca, Zaid Zaim

Identification du cadre d'efficacité de l'évaluation d'impact sur le patrimoine 50
Souaad Fanit, Nadia Chabi

Management and protection strategies to preserve World Heritage properties endangered of armed conflicts 56
Lidia Klupsz, Krzysztof Sałaciński

Una (im)possibile universalità del patrimonio? Il ruolo di UNESCO nei processi di conservazione e ricostruzione nei Balcani 62
Emanuele Morezzi

La gestione dei siti Patrimonio Mondiale | The management of World Heritage properties | La gestion des sites du Patrimoine mondial 68

Community empowerment for cultural heritage management: from principles to practice 70
Giulia Avanza, Erica Meneghin

Piani di Gestione dei centri storici UNESCO: aggiornamenti indispensabili 76
Aldo Aveta

Servizi Ecosistemici e paesaggio: una gestione patrimoniale 82
Elisa Butelli

Olivetti come valore universale. Una proposta di ampliamento del WHS "*Ivrea, città industriale del '900*" 88
Francesca Castanò, Anna Gallo

Il sito seriale "Ville e Giardini medicei in Toscana". Revisione del modello di governance e ipotesi di funzionamento per il miglioramento dell'accessibilità 94
Elisa Fallani, Carlo Ricci

Quando l'architettura racconta di rovine.
Nuovi modelli museali per l'archeologia 100
Angela Fiorelli

Heritage Place Approach: Linking People, Nature and Culture in the Management of World Heritage 106
Nicole Franceschini, Sarah Court, Maya Ishizawa, Eugene Jo

Il parco agricolo come strumento di prossimità per la gestione attiva di un territorio dal valore patrimoniale:
il caso del Parc des Jalles a Bordeaux (FR) 110
Maria Rita Gisotti, Sophie Lebreton, Maddalena Rossi

Un percorso museale per un turismo sostenibile nell'area UNESCO di Pisa 116
Francesca Giusti

Riconoscere, conservare e gestire il Patrimonio Mondiale dell'Umanità
attraverso il coinvolgimento delle comunità locali 122
Manuela Mattone

Italian archaeological World Heritage Sites: disaster risk reduction in the management plans 128
Eleonora Melandri, Andrea Ugolini

Il Management Plan del sito UNESCO di Bologna.
Sinergie a più livelli tra tutela e pianificazione urbana 134
Valentina Orioli, Chiara Mariotti

Il centro storico di Napoli tra piano di gestione e scenari di restauro e valorizzazione 140
Andrea Pane, Maria Pia Testa

Il patrimonio UNESCO in Piemonte e il coinvolgimento delle comunità locali 146
Alessandra Panicco

"Esquilino chiama Roma"
Strumenti per affrontare complessità irrisolte nel centro storico della Capitale 152
Pietro Petraroia, Simona Salvo

Nuovi processi di patrimonializzazione per i territori post-minerari. Il caso della regione
del Bassin Minier Nord-Pas-de-Calais in Francia 158
Daniela Poli

Urban agriculture and rural landscapes in the buffer zone of the UNESCO site Firenze Historic Center 164
Maria Chiara Pozzana

Per una nuova centralità delle *buffer-zones* UNESCO: due casi studio nel Mediterraneo 170
Renata Prescia, Aldo R. D. Accardi

Notes on the contemporary challenges of the management of World Heritage properties;
Reflection on Rani-Ki-Vav (The Queen's Stepwell) at Gujarat, India 178
Mehrnaz Rajabi

Monitorare il Piano di Gestione di un bene Patrimonio Mondiale.
Il caso del Centro Storico di Firenze 184
Loredana Rita Scuto, Valentina Ippolito

Filling the Gaps. Il modello valoriale della rotta culturale ATRIUM per le future sfide di UNESCO 190
Leila Signorelli

La costruzione del modello di governance per siti UNESCO complessi. Riflessioni e casi studio 196
Silvia Soldano, Silvia Summa, Patrizia Borlizzi, Marco Valle

Safeguarding of the World Heritage properties through minds transformation 200
Tatyana Trudolyubova

Ruderi antichi, spazi vissuti. Alcune osservazioni sui fenomeni di frequentazione e partecipazione
in corso nella necropoli etrusca della Banditaccia di Cerveteri 206
Tommaso Vagnarelli

'Chi proteggerà l'Egitto libero?'. Il Cairo tra conservazione e città informale 212
Mariarosaria Villani

Paesaggi letterari e immaginario collettivo.
"I paesaggi vitivinicoli del Piemonte: Langhe-Roero e Monferrato" tra valore estetico e memoria culturale 218
Maurizio Villata

Threatening Venice and its Lagoon: the effect of international policies on management sustainability and heritage preservation 224
Luca Zan, Roberta Ferrarini

Da monumento a Paesaggio Urbano Storico | From the concept of monument to the Historic Urban Landscape approach | Du monument au paysage urbain historique 228

Heritage and development – a classification of recent changes in the City of Bamberg (Germany) against the backdrop of the UNESCO Recommendation on the Historic Urban Landscape 230
Patricia Alberth

Tutela attiva del patrimonio edilizio di base e disciplina urbanistica. Il caso di Firenze 236
Francesco Alberti

Historic Ludic Landscapes. Il gioco nell'area UNESCO di Firenze tra storia e attualità 242
Jacopo Ammendola, Francesco Caneschi, Benedetta Masiani

«Un museo a cielo aperto»: i casi emblematici del Mausoleo di Gallieno e della Villa dei Quintili 248
Lavinia Antonelli, Federica Belli

Dal "Piano Cervellati" ai portici patrimonio UNESCO: il "Modello Bologna" nella conservazione della città storica 254
Micaela Antonucci, Francesco Lipparini

Dal patrimonio urbano al patrimonio territoriale: strategie integrate per la riqualificazione sostenibile della Città Metropolitana di Roma Capitale 260
Monica Bolognesi, Eni Nurihana

Architetture nuragiche e paesaggio protourbano.
Relazioni antiche ed estese dimensioni attuali 266
Marco Cadinu

La Festa dei Gigli di Nola come strumento di tutela.
Il caso del borgo urbano di Cimitile 272
Saverio Carillo

Itinerari museali urbani a carattere devozionale e siti museali diffusi. Storia, restauro e valorizzazione 278
Alessia Comodini, Chiara Laudonio

Servizi igienico-sanitari:
strategia di welfare urbano per la città storica 284
Maria De Santis, Ludovica Gregori

Asmara e il Moderno d'Oltremare:
una città Patrimonio Mondiale tra conoscenza e valorizzazione 290
Sara Iaccarino

Towards an Integrated Assessment of Heritage
Significance for Historic Urban Areas 296
Niyati Jigyasu

A Paradox of Reusing Cultural Heritage: A Case Study of the Historic Centre of Macau 302
Teng Wai Lao

Hidden Diversity: the Water Heritage in Upper Pearl River Basin in Southwest China 308
Tiansheng Li

La valenza simbolico-culturale dei Colli Euganei come "paesaggio storico rur-bano" 314
Andreina Milan

The Franciscan monastery in Bač: From the Research of the Single Monument to the Changed Perspective of the Cultural Landscape of Bač and its Surroundings 320
Branislav Milićević

I giardini di don Luigi di Toledo: Firenze e Napoli due realtà a confronto 326
Giovanni Minutoli

Il restauro dell'Orto del San Domenico a San Gimignano. Un progetto di paesaggio retro-innovativo per la trasmissione di valori e saperi alle future generazioni 332
Lorenzo Nofroni

1972 – 2022. World Heritage in transition. About management, protection and sustainability 338
Matthias Ripp, Julia Heinzel

Monumenti e frammenti archeologici nei contesti urbani Patrimonio Mondiale. Prospettive e strategie culturali di salvaguardia, conservazione e valorizzazione 344
Emanuele Romeo

Il sistema difensivo di Verona: le mura, i forti e le campagne. Proposte per la tutela e valorizzazione di un sistema di paesaggio 350
Carlo Schiesaro

Analysis of Visitors' Sentiment Tendency in Heritage Tourism Sites Based on Multi-Source Data: A Case Study of Grand Tang Mall, Xi'an 356
Yanqing Wang, Weile Jiang, Yiqing Zhao

Conoscenza e formazione | Knowledge and capacity building | Connaissance et formation 362

La casa si vive da dentro e si tutela nella sua interezza 364
Adriana Arena, Federica Ciarcià, Emilia Garda, Raffaella Lione

Accessibilità, partecipazione e inclusione per la trasmissione dei valori del Patrimonio Mondiale 370
Michela Benente, Gianluca D'Agostino

Microprogetti per Tor Marancia per sensibilizzare alla valorizzazione del patrimonio delle torri medievali 376
Angela Bruni

Piranesi Prix de Rome. Aufklärung e Paideia 382
Pier Federico Caliari, Francesco Novelli

A mountain theatre through art and faith: how to improve fruition of Sacro Monte in Varese? 388
Giuliana Cardani

Consapevolezza e trasmissione dei valori nella Cattedra UNESCO Mediterranean Landscape in Context of Emergency 394
Natalina Carrà, Paola Raffa

World Heritage Sites vs Ecomusei: prospettive comuni e strategie condivise 400
Maria Grazia Ercolino

Firenze Forma Continua: raccontare l'evoluzione della città e del territorio 406
Carlo Francini, Gaia Vannucci

Il museo Dar Ben Abd-Allah nella medina di Tunisi. Uno strumento per la conservazione e la valorizzazione del patrimonio mondiale 412
Lamia Hadda

Architettura, cinema e memoria: un secolo di narrazioni su Matera 418
Alessandra Lancellotti

National surplus of World Heritage – Northern examples 422
Marianne Lehtimäki

The culture of restoration: a new point of view for an international framework 428
Rossana Mancini, Francesca Lembo Fazio

Le 'memorie interne' dei musei storici. Nuovi paradigmi per la conservazione e la comunicazione del patrimonio 434
Bianca Gioia Marino

Vernacular and World Heritage sites: criticality and challenging for the conservation, awareness, and transmission of heritage values 440
Lucia Montoni, Letizia Dipasquale, Mariana Correia, Saverio Mecca

Riconoscere e conservare il patrimonio: dal valore universale allo spirito del luogo 446
Lucina Napoleone

Un Museo di Storia Pubblica per Crespi d'Adda 452
Giorgio Ravasio

Resistenza.
La questione della proto-sostenibilità del patrimonio preistorico sardo 456
Andrea Scalas

Dal *tangibile* all'*intangibile* e ritorno? Per ripensare il significato della materia 462
Angela Squassina

New Materialism of Boat: Museum and Cultural Heritage practice in Contemporary Quanzhou 468
Jing Sun, Han Lin, Minghong Chen

Rigenerare e valorizzare i centri minori: strategie adattive per il borgo di Tocco da Casauria 474
Alessandra Tosone, Virginia Lusi, Renato Morganti

Convention Concerning the Protection of the World Cultural and Natural Heritage and SDGs.
Research and interviews about the role of museums as cultural hubs for the sustainable management, accessibility, and climate change in the context of urban regeneration processes 480
Gaia Turchetti

How archaeological heritage is "locked and lost" in museums 486
Kamil Zeidler, Paula Chmielowska

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

Eleonora Melandri | eleonora.melandri3@unibo.it
Alma Mater Studiorum – Università di Bologna
Andrea Ugolini | a.ugolini@unibo.it
Alma Mater Studiorum - Università di Bologna

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].

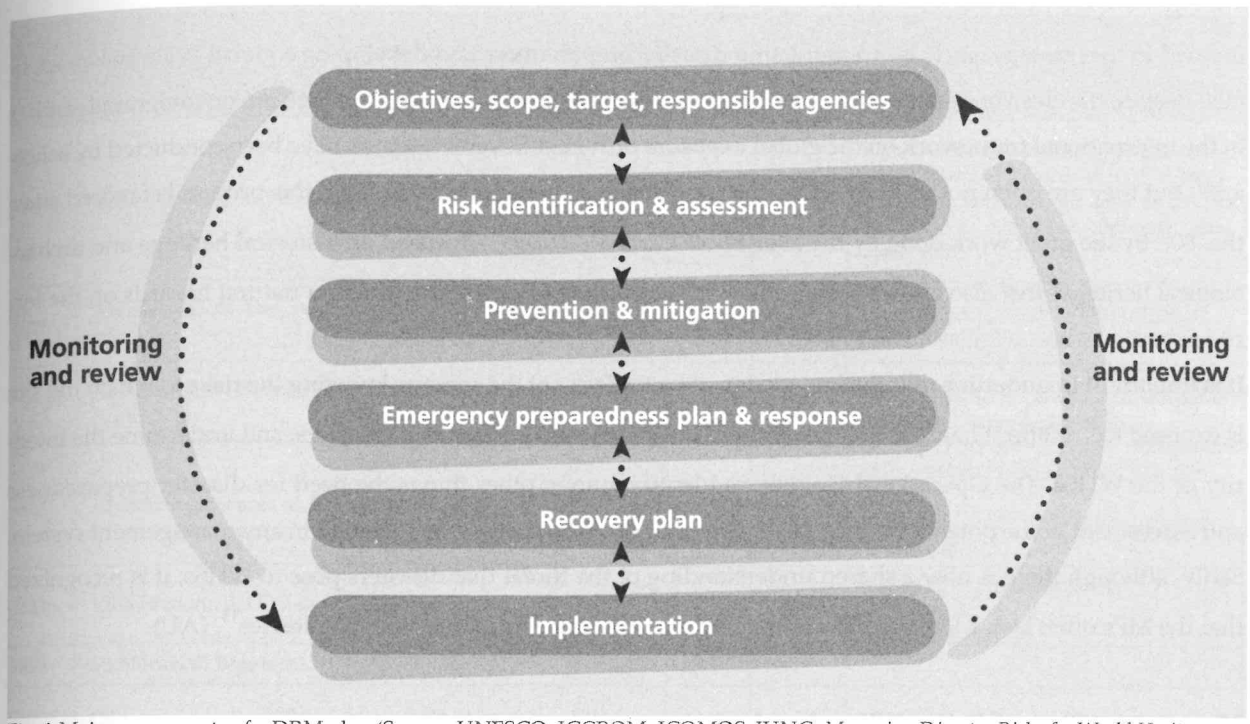

Fig. 1 Main components of a DRM plan (Source: UNESCO, ICCROM, ICOMOS, IUNC, *Managing Disaster Risks for World Heritage*, 2010).

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.

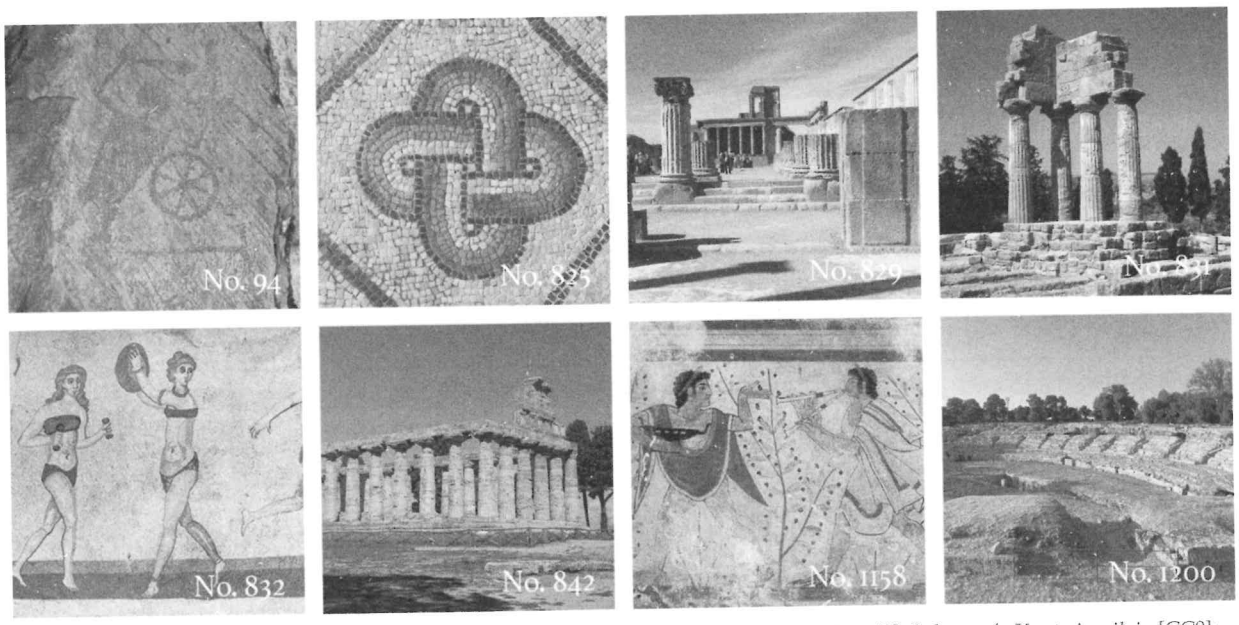

Fig. 3 From upper left: Rock no. 50, Rock Drawings National Park of Valcamonica [MP, Fig. 69]; Solomon's Knot, Aquileia [CC0]; Forum, Pompeii [E. Melandri, 2018]; Temple of Dioscuri, Agrigento [A. Ugolini, 2015]; Le Palestriti, Villa Romana del Casale [MP, cover page]; Temple of Ceres [A. Ugolini, 2018];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