RISK MANAGEMENT FOR CULTURAL HERITAGE SITES IN ITALY: THE CASE OF THE UNESCO SITE PORTOVENERE, CINQUE TERRE AND THE ISLANDS (PALMARIA, TINO AND TINETTO)

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ABSTRACT

Cultural heritage is by its very nature in a condition of potential degradation, due to occasional catastrophic events and to cyclic and continuous phenomena that may generate destructive impacts in time. To fully achieve the protection of cultural heritage, it is therefore important to identify the aggressive agents whose action threaten its preservation, in order to contain, reduce and, if possible, eliminate their effects.

Although the interest in disaster preparedness is renewed after the occurrence of any catastrophe, so far very little has been established on a formal level for the cultural heritage, which is rarely mentioned in local emergency plans and still has no actual intervention strategy, recognized and shared internationally. Despite the lack of clear guidelines, several recent studies have tackled the subject, proposing the use of innovative tools for the detection and analysis of risks and impacts on cultural heritage.

Italy is often described as a Country of culture, history and art. Its immense cultural heritage, material and immaterial, natural and man made, is a precious asset that should guide our own development in a sustainable manner, respectful of its own characteristics and qualities.

We brag about having the highest number of sites inscribed on the UNESCO World Heritage List (we have just recently reached 50 properties), never really and systematically taking into account that, along with the privileges of owning, sharing and benefit from such beauties, we bear the moral duty to conserve it, protect it and manage it. In fact only about half of the Italian UNESCO sites have a management system in place, even though it is a mandatory document in the UNESCO framework and national law (law 77/2006), entitled "Special measures for preservation and fruition of the Italian sites of cultural, natural and landscape importance, inscribed on the 'World Heritage list', under the protection of the UNESCO", expressly mentions the management plan as a typical element of World Heritage sites and gives priority of funding to the UNESCO heritage sites, which aim at managing their cultural services and tourism flows (Badia, 2011).

This paper aims at proposing risk assessment an effective as a proactive form of preventive conservation and presents the final results of the application of UNESCO Disaster Risk Management methodology to an Italian cultural landscape (Cinque Terre). This document was drafted during the 8th International Training Course on Disaster Risk Management of Cultural Heritage 2013 held at Rits-DMUCH (Institute of Disaster Mitigation for Urban Cultural Heritage, Ritsumeikan University, Kyoto, Japan) and supported by UNESCO, ICCROM and ICOMOS – ICORP.

INTRODUCTION

Italy is worldly known for being a land of natural and cultural beauty, full of prestigious cultural sites and centuries old traditions, visited by millions of tourists every year. This uniqueness has been also recognized by UNESCO, which has accepted in its World Heritage List 50 Italian sites since 1978; Italy is now the first State Member for numbers of sites inscribed.

Unfortunately this richness hasn't always been cured and valorised properly and its conservation has often been put at risk by not implementing correct management systems and approving disastrous and unsustainable territorial plans, only aimed at profit and overbuilding, despite the intrinsic fragility of the whole nation. And if a risk preparedness approach has started to be at least taken into account in planning, it doesn't always include cultural heritage.

Table 1. Top 10 natural disasters happened in Italy between 1900 and 2015, sorted by numbers of people killed (source EM-DAT The International Disaster Database http://www.emdat.be)

Top 10 Natural Disasters in Italy sorted by numbers of killed (1900-2015)				
DISASTER	**LOCATION**	**MAGNITUDE**	**DATE**	**No KILLED**
Earthquake	Sicily and Calabria	7,2	28/12/08	75000
Earthquake	Marsica (Abruzzo and Lazio)	7	13/01/15	29980
Extreme temperature	Italy		16/07/03	20089
Earthquake	Irpinia (Campania, Basilicata)	6,5	23/11/80	4689
Earthquake	Calabria	7,1	08/09/05	2500
Landslide	Vajont dam		09/10/63	1917
Earthquake	Vulture (Basilicata, Campania, Puglia)	6,7	23/07/30	1883
Earthquake	Friuli Venezia Giulia	6,4	06/05/76	922
Volcanic activity	Vesuvio		18/04/06	700
Flood	Val di Stava, Prestavel mine (Trentino Alto Adige)		19/07/85	329

Table 2. Top 10 natural disasters happened in Italy between 1900 and 2015, sorted by numbers of people affected (source EM-DAT The International Disaster Database http://www.emdat.be)

Top 10 Natural Disasters in Italy sorted by numbers of total affected people (1900-2015)				
DISASTER	**LOCATION**	**MAGNITUDE**	**DATE**	**No TOTAL AFFECTED**
Flood	Genova		07/10/70	1301650
Flood	Firenze		03/11/66	1300000
Earthquake	Irpinia (Campania, Basilicata)	6,5	23/11/80	407700
Earthquake	Friuli Venezia Giulia	6,4	06/05/76	218222
Flood	Polesine (Veneto)		14/11/51	170000
Earthquake	Sicily and Calabria	7,2	28/12/08	150000
Earthquake	L'Aquila (Abruzzo)	6,3	06/04/09	56000
Earthquake	Belice (Sicily)	6,1	15/01/68	55563
Flood	Piedmont, Valle d'Aosta, Liguria, Lombardia		14/10/00	43000
Earthquake	Umbria, Marche	6,1	26/09/97	38100

Some of the latest catastrophes clearly prove this issue: almost nothing has ever been done to safeguard the environment and outline useful contingency plans, so, when an accident occurs, the long unconsidered vulnerabilities work as a multiplier factor for the impacts, leaving the territory in complete disaster and producing huge economic and social losses.

Giving its particular geological configuration, the main natural hazards to consider for Italy are earthquakes, volcanic phenomena, landslides and floods. It is estimated that almost half of the municipalities, namely 3.500, are subjected to the risk of flooding and at least two thirds, i.e. 5.500, are threatened by possible landslides. More than half of the 57 millions Italians live in areas at risk.

The numbers of landslides, floods and earthquakes occurred since 1998 has increased at such a high rate that makes Italy one of Country more at risk of catastrophes[1] in the whole European Union.

[1] The European Environment Agency states that the numbers of natural disasters has recently increased and it's going to rise significantly in the coming years.

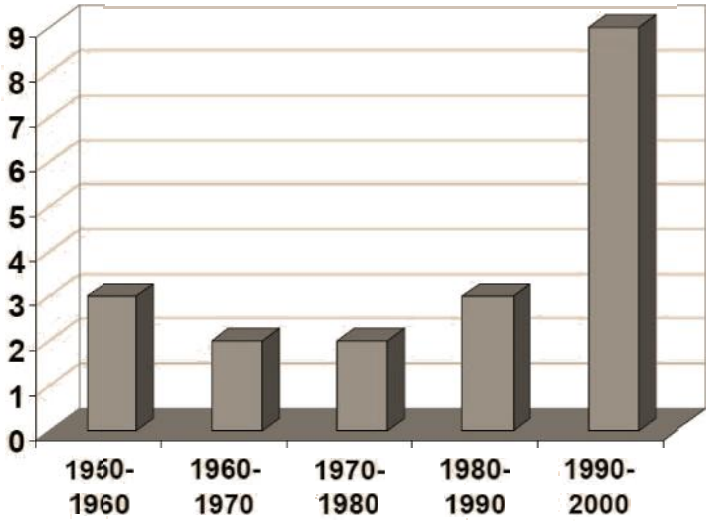

Figure 1. Trend of calamitous events in Italy summarized by decades

This negative trend, regarding the planet in general, has also been stressed by Thomas Will and Hans-Rudolf Meier *«the number and intensity of natural disasters are expected to rise in the course of the climatic changes now being observed on the earth. Up until recent times, 'classic' natural disasters had been perceived as isolated, sudden local or regional events, even if the broader context of their seismic or atmospheric causes was known. But climatic changes have now introduced a new dimension: slow but worldwide transformations, the effects of which can be experienced as a single, global catastrophe that takes many forms and evolves over an extended period of time. Reacting in a timely manner to this diagnosis is the main geopolitical challenge for us and for coming generations»*. (Will and Meier, 2008)

Table 3. Top 10 natural disasters happened in Italy between 1900 and 2015, sorted by economic damage (source EM-DAT The International Disaster Database http://www.emdat.be)

Top 10 Natural Disaster in Italy sorted by economic damage costs (1900-2015)				
DISASTER	**LOCATION**	**MAGNITUDE**	**DATE**	**DAMAGE (000 US$)**
Earthquake	Irpinia (Campania, Basilicata)	6,5	23/11/80	20000000
Earthquake	Emilia, Lombardia, Veneto	5,86	20/05/12	15800000
Flood	Pieemonte		01/11/94	9300000
Flood	Piemonte, Valle d'Aosta, Liguria, Lombardia		14/10/00	8000000
Earthquake	Umbria, Marche	6,1	26/09/97	4524900
Extreme temperature	Italy		16/07/03	4400000
Earthquake	Friuli Venezia Giulia	6,4	06/05/76	3600000
Earthquake	L'Aquila province (Abruzzo)	6,3	06/04/09	2500000
Flood	Firenze		03/11/66	2000000
Drought	Italy		01/06/12	1190000

The natural disasters linked to flooding are a major problem in Italy, in fact almost 38% of the victims of the floods throughout Europe are Italian[2], causing an estimated annual cost of 0.2% of GDP.

The frequency of this phenomena has increased by 50% in the latest years, also due to an unsustainable planning strategy: areas once belonged to rivers are now cemented and waterproofed surfaces (cement and asphalt) have increased by 500% since 1950s. The results of this unfortunate combination of factors is that circa 6 million people live in areas considered at hydrogeological risk (29.500 square km) and the Italian Ministry of Environment's reports estimate in 40 billion euro the necessary funds to properly address the issue.

[2] Source: CINEAS http://www.cineas.it

The urban and social impacts are big and even bigger on items as intrinsically fragile as cultural heritage sites.

In order to provide empirical data about the Italian situation of cultural heritage sites, a case study has been chosen among the ones inscribed on the UNESCO World Heritage, the cultural landscape of *Portovenere, Cinque Terre and the Islands (Palmaria, Tino and Tinetto)*, on which the author of the paper has drafted a Disater Risk Management Plan (DRMP), following the scheme proposed by UNESCO (UNESCO-WHC, 2010).

CASE STUDY. THE UNESCO SITE OF CINQUE TERRE PORTOVENERE AND THE ISLANDS (Palmaria, Tino and Tinetto).

Portovenere, Cinque Terre and the Islands is a multilayered, multifaceted and complex site, located in northern Itlay, along the Ligurian coastline. Because of its exceptional values, it was inscribed on the UNESCO World Heritage List in 1997 as a cultural landscape: comprises circa 4,689 ha, where five small seaside colorful little hamlets (Cinque Terre) plus one (Portovenere), long terraces cultivated with vineyards and olive trees and small uninhabited islets, perfectly merge, creating a most unique and charming ensamble.

Inscribed for criteria (ii) (iv) (v), it was described by the Committee as "a cultural site of outstanding value, representing the harmonious interaction between people and nature to produce a landscape of exceptional scenic quality that illustrates a traditional way of life that has existed for a thousand years and continues to play an important socio-economic role in the life of the community"[3]).

VALUES AND ATTRIBUTES OF THE SITE

Being a multifaceted and really vast property located on more than 15 km of coastline, the site can be considered and read at different scales, thus showing diverse attributes related to particular values. Three main parts can be identified, homogenous in geomorphology, social features, history and actual management system, as components of the whole site: the Cinque Terre National Park, the small town of Portovenere and the three islets.

Beyond this apparent fragmentation, some important common values and issues link all the parts together at a large, comprehensive scale:

- the characteristic jagged, steep coastline, which the work of man over the millennia has transformed into an intensively terraced landscape so as to be able to wrest from nature a few hectares of land suitable for agriculture (**growing vines and olive trees)**.
- The adaptation process of human communities to this seemingly rough and inhospitable nature by building **compact settlements directly on the rock, with winding streets**. The general use of **natural stone for rooting** gives these settlements a characteristic appearance (they are generally grouped round religious buildings or medieval castles).
- The change in the socio-economic dynamics that started in the 1990s: the territory has been transformed to an internationally recognized touristic destination among the favorite ones in Italy; the once close agricultural based community is now a population almost entirely devoted to hospitality.

RISK ASSESSMENT

The transformations in dynamics along with the consequently generated touristic pressure and the absence of a coherent and comprehensive management strategy, has lead to some key changes in the whole territory's structure: once cultivated terraces, are now abandoned, because their owners are occupied in the tourism sector, soil got fragile and little riverbeds have been covered in order to become driveways.

[3] 21COM VIII.C Inscription: Portovenere, Cinque Terre, and the Islands (Palmaria, Tino and Tinetto) (Italy).

What once were little inaccessible places, are now visited by million of people every year. The land is vulnerable, because of its own geomorphological structure and a dangerous lack of maintenance, to external "climatic" factors, working as a multiplier of the impacts.

Table 4. Detailed description and analysis of the main risk factors.

PRIMARY HAZARD	SECONDARY HAZARD	VULNERABILITY	IMPACTS (site scale)	IMPACTS (on specific attributes)
Flood	• Landslide	• Hydrogeological structure • Fragile soil (abandoned terraces: in 2011 50% of the surveyed landslides happened in abandoned terraces and 48% in not managed forest areas) • Difficult relationships among Portovenere and Cinque Terre managers • Lack of a comprehensive management system • Improper urban interventions that increase not permeable surfaces • Difficult accessibility (mainly footpath)	• Loss of lives • Partial/total collapse of buildings • Partial/total collapse of infrastructures • Reduction in structural efficiency • Economic damages • Erosion of soil • Changes in the coastline • Damages to buildings' systems • Loss of traditional skills • Infiltration • Damages/loss of artefacts • Damages to surfaces • Loss of biodiversity	TERRACED LANDSCAPE Terraces Drywalls COASTAL SETTLEMENTS Urban pattern Historical buildings NATURAL ENVIRONMENT MARITIME LANDSCAPE INTANGIBLE HERITAGE Traditional building techniques Traditional farming techniques
Touristic pressure	• Vandalism • Improper urban planning	• Lack of a comprehensive management system • Lack of a comprehensive TCC analysis • Profitability of tourism related activities • Lack of buffer zone • Lack of a touristic plan (it should apply also to the centres in the buffer zone) • Incoherent settlement of Fegina (Monterosso)	• Abandonment • Damages to the maritime biodiversity • Increase of pollution • Increase of waste • Damages of the maritime landscape • Change in the local economic system • Loss of traditional skills and knowledge • Increase in resources use	TERRACED LANDSCAPE Terraces Drywalls COASTAL SETTLEMENTS Urban pattern Historical buildings NATURAL ENVIRONMENT MARITIME LANDSCAPE INTANGIBLE HERITAGE Traditional building techniques Traditional farming techniques
Fire	• Combustion/increase of temperature • Explosion • Use of improper extinguishing methods	• Lack of maintenance • Lack of control/monitoring • Increase of dry season and high temperatures • Urban and landscape pattern • Presence of a big gas plant in La Spezia area • Massive presence of vegetation	• Loss of biodiversity • Loss of lives • Damages to buildings • Blockage of common infrastructure	TERRACED LANDSCAPE Terraces Drywalls COASTAL SETTLEMENTS Urban pattern Historical buildings NATURAL ENVIRONMENT MARITIME LANDSCAPE INTANGIBLE HERITAGE Traditional building techniques Traditional farming techniques

On October 25th 22 inches of rain (a third of an average year's total) fell in only four hours. Because of the topography and the ability of the flash flooding to drain, Riomaggiore, Manarola, and Corniglia were undamaged, while Monterosso and Vernazza were buried under three meters of mud and debris and left without water, electricity, or phone connections. Homes, infrastructure, businesses and the surrounding territory were washed away (over 100 million Euros of damages), six people died and several were missing before the National Coast Guard could reach the two villages.

Giving all these assumptions I decided to list as main risk factors for Cinque Terre, Portovenere and the Islands flood, touristic pressure and fire and since a devastating flash flooding event occurred in October 2011, I decided to analyze this as most dangerous and probable and to use it to define my "worst case scenario": imaging a catastrophic situation due to a flood and trying to outline all possible consequences, helped me finding out the main goals a Disaster Risk Management Strategy for this site should have.

DRAFTING THE DRMP STRATEGY FOR PORTOVENERE, CINQUE TERRE AND THE ISLAND

After the evaluation of the current state of conservation, the management policies and the risk factors threatening the site, I set two main goals the DRMP strategy needs to reach:

- to strengthen the protection of the site in a wide and comprehensive perspective. The principal problem of this site is, in my opinion, that it was never thought and therefore managed as a whole: no effective common policies were ever implemented;
- and to implement a sustainable development plan of the site, that combine Cultural Heritage protection and socio-economic strategies.

In this perspective, previously detected vulnerabilities may be overcome as follows:

Table 5. Measures to mitigate the vulnerabilities.

VULNERABILITY	MITIGATION MEASURE
Hydrogeological structure	• Survey and assessment of the current condition of the soil • Strengthen the resistance of not cultivated areas (new plantation) • Put in place a remote sensing system to progressively assess modification and activate early warning • Organize periodic cleaning of the riverbeds • Watertight windows and doors at ground level
Fragile soil (abandoned terraces)	• Survey and in depth analysis of abandoned terraces (location, s.o.c., property status…) • Implement policies to favour the maintenance of terraces
Difficult relationships among Portovenere and Cinque Terre managers	• MoU among all the parties involved • Organize regular communication meetings
Lack of a comprehensive management system	• Draft of a comprehensive management plan. Current management policies need to be taken into account and implemented (Plan of Cinque Terre National Park, PTCP, Civil Protection Emergency Plan) • Provide and implement a DRR framework to be integrated with the Management Plan
Improper urban interventions that increase not permeable surfaces	• Discourage new constructions • Forbid coverage of riverbeds
Difficult accessibility	• Provide alternative emergency escape routes • Signage system available on site

A PRELIMINARY ACTION PLAN

After having set the methodological approach, I tried to outline the activities to be designed and completed in order to fulfill the DRM strategy, to ensure a more effective management of risks, overcoming the present problems and issues.

Actions to be implemented in the short period (6 months):

- figure out the "lesson learned" form the experience and disseminate results and considerations;
- organize Capacity building for quick response activities;
- provide a proper damage assessment methodology;
- design a framework of activities for post-event quick assessment implementation;
- update/make geometrical surveys of buildings;
- install automatic environmental detection systems;
- organize training meeting with the population (share the content of the plan, make demonstrations and rehearsals);
- develop criteria to prioritise buildings for assistance after disasters;
- develop conservation case studies as best practice to look up to;
- examine and update existing inventories and databases;
- make a list of contacts of personnel with emergency responsibilities;
- list contacts of trained conservators available.

Actions to be implemented in the long period (1-2 years):

- construction of safety measures (riverbed and mountainside along the highway);
- review existing policies and procedures for cultural heritage structural reinforcement;
- raise awareness and build memory: develop techniques and an interpretive programme for awareness of heritage buildings and places;
- establish maintenance systems;
- verify and update insurances.

CONCLUSIONS

Portovenere, Cinque Terre and the Islands is a very interesting case study for the application of DRM methodologies, being able to provide substantial proof of the utility to integrate risk preparedness strategies into a comprehensive management plan for sites and to consider cultural heritage as a fundamental factor to promote a sustainable development.

It is fundamental to stress out how culture in general may positively affect disaster risk reduction (and also how disasters and risk may influence culture and cultural heritage itself) and be a key factor in sustainable development processes, becoming a focal point around which build and enhance the level of resilience of populations and the environment. Cultural heritage should then be considered as part of the environmental/cultural resources that need to be protected and transmitted to future generations to guarantee their development, giving the contribution that heritage and heritage conservation can make to the environmental, social and economic dimensions of sustainable development (Boccardi, 2007).

The potential of heritage to contribute to environmental protection, social capital and economic growth is being increasingly recognized. The artificial isolation of heritage concerns from other sectors would be simply unfeasible, since external factors would 'continue to penalize heritage practice just as isolated heritage management decision-making would penalize the relationship of heritage to its context (Boccardi, 2012).

The basic lack of any form of strategic territorial government characterizing the Italian territory, also affect almost every cultural heritage site and this neglect has made the territory more and more vulnerable to the impacts of different kind of threats.

Assuming that risks happen and they are not even possible to be predicted in some cases, disasters only happen when we are not properly prepared and haven't significantly reduced the vulnerabilities, since they are a direct consequence of development and risk accumulation. At this stage we must start to solve this issue by considering whether the development model we have been implementing can continue at its current rate and guarantee a more sustainable planet give the current rate of decline in natural resources and generation of vulnerable areas, or if we need to seriously question current development practices.

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