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Integrating Climate Change into Protection Policies in Greece

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Summary

Rising sea levels and intense waves threaten the sea fortress of Koules in Heraklion, Crete, ©Hellenic Ministry of Culture and Sports

The emerging need to secure the long-term preservation of the archaeological sites and monuments of Greece against the growing threats of climate change is considered a pressing issue for the Hellenic Ministry of Culture and Sports. The impacts of climate and weather-related risks (extreme weather events associated with floods and intense and gusty winds, forest fires, drought-erosion-landslides, rising sea-levels, etc.) are recognised as emerging threats that compromise the integrity and values of the cultural and natural environment.

In recent years, a systematic and targeted national effort has been implemented to improve the resilience of cultural sites to climate change by planning and implementing central and regional policies that address heritage needs and provide the methodology and technical tools to identify, measure, evaluate and counter the impacts of climate change on cultural heritage on a medium and long-term basis. As part of this process, climate change is being taken into consideration within the framework of drafting integrated management plans for 15 Greek sites that are included on the UNESCO World Heritage List, an ongoing project implemented by the Directorate of Prehistoric and Classical Antiquities of the Ministry.

In this article we attempt to highlight the pilot character of these plans for integrating into management policies climate-related aspects that need to be addressed in a coordinated manner. This will help not only to achieve the national goals regarding the preservation and adaptation of cultural heritage to counter the effects of climate change, but to prevent and mitigate the specific dangers not only for the World Heritage Properties but, gradually, for all Greek cultural monuments and archaeological sites.

1. Introduction

The aim of this article is to present and discuss the efforts and actions undertaken by Greece in order to integrate climate change into the national heritage management plans and cultural policies. This task is developed around two major axes: the first one is related to the international framework with special emphasis on the UNESCO World Heritage Convention and its strategy for action on climate change, while the second involves the National Strategic Action Plan of Greece for adapting cultural heritage to climate change impacts and related disaster risks. Regarding the latter, reflections will be presented on the ways that climate affects monuments and on how experts and competent authorities perceive the need to address mitigation and adaptation of heritage to climate change.

2. International Framework

Although climate adaptation of cultural heritage is a comparatively new research and policy area, discussion on mitigation of climate change impacts had begun as early as the 1990s, when it was realised that greenhouse gas concentrations contributed to the rise in temperature and that climate change in general could affect many aspects of human life and activity. In view of this challenge, in 1994 many countries

(currently totalling 197) signed the United Nations Framework Convention on Climate Change (UNFCCC), the first international environmental treaty concerning this issue. At the time, the main objective of the convention was to reduce and stabilise greenhouse gas concentrations in order to allow the ecosystem to naturally and gradually adapt to climate change and to secure economic development in a sustainable manner.

Over the next decade, the debate as well as the scientific research on climate change expanded and the impacts of this new threat were more and more communicated through international networks and fora. But even then, the voices relating the impacts of climate change on cultural heritage were few.

UNESCO has been at the forefront of exploring and managing the impacts of climate change on heritage. In the framework of the UNESCO World Heritage Convention, the first concerns were expressed in 2005 during the 29th Session of the WH Committee, which was mainly focused on the potential impacts of climate change on natural heritage. The Committee requested the establishment of a broad working group of experts to review the nature and scale of the risks arising from climate change and prepare a strategy and report for dealing with this problem. In taking this decision the Committee noted '… that the impacts of climate change are affecting many and are likely to affect many more World Heritage properties, both natural and cultural, in the years to come'.

In 2007, the General Assembly of States Parties to the World Heritage Convention adopted a Policy Document on the impacts of climate change on World Heritage properties. Taking into consideration that knowledge related to adaptation to, and mitigation of, climate change has drastically increased over the past years, a need to periodically review and update the Policy Document has emerged, in order to guide accordingly the decisions and actions of the World Heritage community. In this context, a new policy document was presented in 2021, during the 44th WH Committee session, updated with all the results from recent research and experience. World Heritage system has largely contributed to the international discussion on the impacts of climate change on both natural and cultural heritage, with a series of publications accessible by all through the its website.

The role of the Convention has also been pioneering in integrating the parameter of climate change into heritage management policies in practice. Climate change is mentioned as one of the 14 primary factors that affect the values of World Heritage and they are therefore incorporated into the World Heritage periodic reporting and reactive monitoring procedures. Since the adoption of the aforementioned Policy Document, an important number of reports on the state of conservation of World Heritage properties affected by climate change have been presented to the World Heritage Committee. Furthermore, the questionnaire implemented for the 2nd Cycle of Periodic Reporting during the period 2008-2015, comprised a specific section dedicated to climate change factors that affect World Heritage Properties. This inclusion was, in our view, of great value for raising awareness among the great number of site managers who participated in the Periodic Report exercise worldwide on the possible consequences of climate change on monuments, as well as helping to enhance national, regional and global efforts to counter mainstream climate change.

Greece participated in the 2nd Periodic Reporting exercise in 2014 and recognised climate change impact in four cases of WH properties: Acropolis of Athens, archaeological sites of Olympia and Epidaurus and the temple of Apollo Epicurius.

As a result, measures for climate change adaptation became an essential part of the management plans of the Greek WHS. Two ongoing projects currently carried out by our Directorate (of Prehistoric and Classical Antiquities) provide for concrete measures for the mitigation of climate change impacts. The first project entitled 'Integrated Management of Archaeological Sites and Monuments – Management Plans for the Inscribed Monuments in the UNESCO World Heritage List' is co-funded by the EU and involves the compilation of management plans for 15 properties (14 cultural, 1 mixed). These plans are drafted with a view to providing a short-term and a long-term perspective for the conservation and sustainability of the Greek listed properties and to provide guidelines for risk management strategies against various dangers, including the impacts of climate change. It is expected that the project will provide information on the analysis of the risk and vulnerability of each property against this specific risk (depending on the building material of the monuments under study or the climatic conditions of the area in which they are located) and that it will contribute to the formulation of basic principles for the establishment of a monitoring system through specific environmental indicators and to prioritise proposed actions and mitigation measures. The second project, entitled 'Disaster Risk Management Plans', involves the compilation of pilot plans concerning risk preparedness for three World Heritage Sites in Greece, each representing different chronological periods: the Mycenaean citadels of Tiryns and Mycenae (prehistoric period) the Acropolis of Athens (classical period), and the Daphne Monastery (medieval period). This project is implemented in collaboration with the National Observatory of Athens and the National Technical University of Athens, which comprise special operational units and scientists on issues regarding the climate. This collaboration is one more step towards building bridges between the humanities field and the natural sciences and, by extension, between cultural heritage practice and climate-related disciplines. The goal is to achieve the best possible and most effective tools and methodologies for compiling policy frameworks, and to establish networks that engage both climate change and cultural heritage issues.

Drafting the Impact Assessment for each cultural property – especially in regard to the geodynamic and meteorological risks - describing the vulnerability indicators, establishing monitoring mechanisms and introducing specific and targeted adaptation planning proposals, are some of the expected outcomes of this project. It will also provide a detailed report for each property on the procedures that must be followed in case of an emergency (e.g. earthquake, heavy rainfall, storms, fire, etc.), evacuation plans, proposals for installing climate change-related infrastructures (e.g. lightning protection installations) and for establishing procedures and tools for the safety of visitors.

In implementing these projects, we have also sought guidance from those international organisations and bodies that have cultural heritage within their remit and address climate change-related issues, such as ICOMOS and ICCROM. Fundamental texts and frameworks that also affect the formulation of Greece's policy are: a) The European Union Strategy on adaptation to climate change, approved by the European Commission in 2013. Towards this goal the European Commission

has recently (2020) defined a specific policy priority area under the title 'Cultural Heritage and adaptation to climate change', aiming at strengthening cultural heritage resilience for climate change. Another basic international text is the 2030 Agenda for Sustainable Development adopted by the United Nations General Assembly in 2015, which includes climate change among its strategic targets and acknowledges the transversal, synergic impact of heritage and culture across the public policy spectrum for sustainability.

3. National Policies

At the national level, a National Strategy for Adaptation to Climate Change – NAS - is provided by law. The legal framework, namely Law 4414/2016, sets out the general objectives, guiding principles and implementation tools of a growth-orientated adaptation strategy in line with EU directives and the international experience.

The NAS provides guidelines and procedures for potential adaptation actions for all environmental and socio-economic sectors that are likely to be significantly affected by climate change in Greece, including cultural heritage. These priority sectors have been identified through a climate impact and vulnerability assessment conducted by the Bank of Greece in 2011.

The NAS also sets the guidelines for the elaboration of 13 Regional Adaptation Action Plans (RAAPs) that will set the immediate priorities at a regional level upon consultation between all competent authorities and organisations. The NAS has a 10-year implementation horizon, and it is subjected to evaluation and revision at least once every ten years (pursuant to Law 4414/2016).

4. The Current Situation in Greece Through Case Studies

A number of potential dangers for cultural heritage from climate change have been recorded worldwide, depending on the particular conditions of each geographical area. In Greece the dangers that appear are largely shared with those in the broader Mediterranean region, such as extreme weather events associated with floods and intense and gusty winds, forest fires, drought-erosion-landslides, etc. (Paton 2015, 84).

Currently in Greece there is a growing scientific interest, from different fields of expertise, in climate change and its effects on cultural heritage. Various interdisciplinary research projects carried out by institutes, universities, governmental bodies, and sometimes within the framework of transnational projects, set the basis for assessing, monitoring and evaluating climate risks and effects on archaeological sites and monuments. We mention some of them below:

- CLIMASCAPE: this is an interdisciplinary research project aiming at the development of a multi-criteria platform that will support the forecasting, detection and management of climate change-related risks on selected UNESCO archaeological sites
- STORM (Safeguarding Cultural Heritage through Technical and Organizational Resources Management): this project aims at establishing a set of novel predictive models and improved non-invasive and non-destructive methods of survey and diagnosis for effective prediction of environmental changes and for revealing threats and conditions that could damage cultural heritage sites
- HERACLES: this project aims at designing, validating and promoting responsive systems/solutions for effective resilience of Cultural Heritage against climate change effects

According to the results obtained so far from all the above research programmes, as well as the data collected by governmental and scientific research institutions and organisations, the main climate change factors and impacts for the Greek monuments could be summarised as follows:

Figure 1: The archaeological site of Olympia is surrounded by extensive forestry, thus always at risk from fires that are often influenced by climate change in terms of occurrence and dispersion. ©Hellenic Ministry of Culture and Sports

Figure 2: In Crete, rising sea levels and intense waves threaten the sea fortress of Koules in Heraklion. ©Hellenic Ministry of Culture and Sports

- Increasing temperatures that may cause, especially during windy periods, extensive wildfires. In 2007 fires threatened several cultural and natural properties in the Peloponnese, including Byzantine churches and monasteries and the archaeological site of Olympia (Figure 1). High temperatures also seem to increase the amount of marine aerosols that are produced in the form of spray on the surface of the sea and are deposited on the surface of the monuments located along coasts. Such an impact has been documented for example on the wall paintings of Delos (from the House of Hermes and the House of Masks) where thermodynamic assessment, laboratory analysis and environmental monitoring has proven that sea spray has caused severe damage to paint layers, especially in combination with direct solar radiation (Prokos 2008).
- Rising sea levels, which often cause coastal erosion and flooding, are a serious threat to many coastal archaeological sites and monuments, such as Delos, where sections of the ancient port installations are partly submerged under the sea, a gradual procedure that is attributed to a certain extent to the climate change conditions (Korka 2018, 76-78). The archaeological sites of Palamari on the island of Skyros and Vravrona, East Attica, also seem to be affected by an increasing sea level that turns the site into a wetland, thus compromising the stability of the monuments. In Crete, rising sea levels and intense waves threaten the sea fortress of Koules in Herakleion (Figure 2).

- Storms, droughts and torrential rains affect many archaeological sites in Greece, with increasing incidents being recorded in recent years. Dion in northern Greece and Malia in Crete (Figure 3), for example, keep flooding every winter during the last few years owing to the intense rainfalls. The extreme weather phenomena may also cause severe damage and even human accidents as in the case of the Acropolis of Athens, where two years ago lightning struck the ticket office of the site, injuring four people.
- Rock falls are often triggered by certain climate events. Pore pressure increases due to rainfall infiltration, erosion and tectonics, which result in the falling of blocks of rock. In Delphi, for example, rock falls are partly attributed to sudden changes in the natural and physical environment caused by climate change (Figure 4).

Figure 3: The Minoan Palace of Malia, Crete, is frequently flooded during winter. ©Hellenic Ministry of Culture and Sports

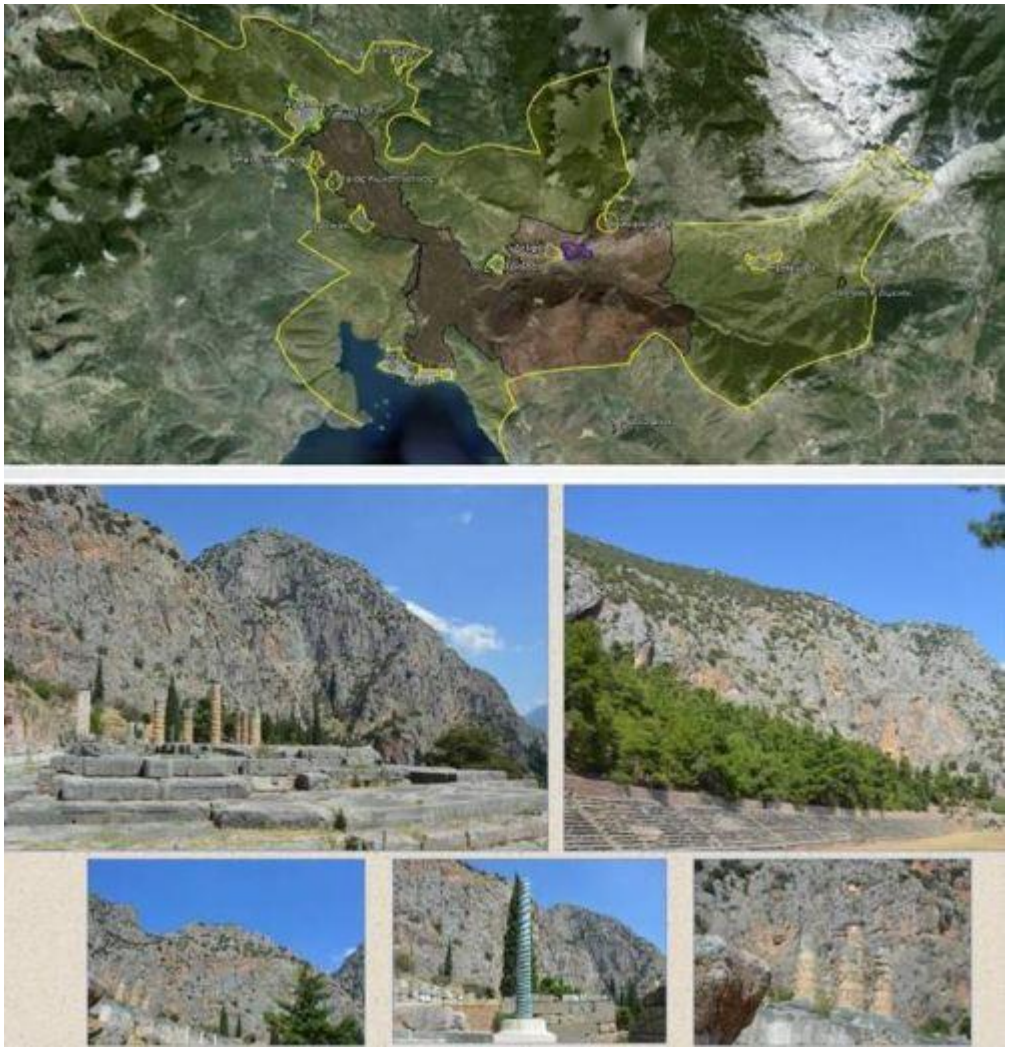

Figure 4: At the archaeological site of Delphi rock-falls could be a threat for monuments and visitors, rendering parts of the sanctuary inaccessible. ©Hellenic Ministry of Culture and Sports

In general, due to the rich geomorphology of Greece, which comprises insular and marine environments, mountainous regions, plains, big urban centres, etc. there are a great variety of risk factors associated with climate change, such as water and soil changes, strong winds and extreme snow events, sudden changes in humidity etc. depending on the different conditions in each geographical area.

At this stage a significant challenge is how to obtain resources and funding for the implementation of relevant research and technical projects. In this context a proposal has been submitted by Greece and approved by the European Recovery Fund, entitled 'Tackling the threats of climate change to the long-term viability of cultural sites of tourist and economic significance'. The project addresses all climate change-related issues in regard to the cultural heritage, and aims at securing the long-term preservation and viability of archaeological sites and monuments of Greece.

The action comprises two categories of works. Specific technical works on monuments in order to confront problems and restore damages caused by the consequences of climate change, such as in Malia, Dion, Delphi etc., mentioned above. The second category, which is to be coordinated by our Directorate, consists of a research project aimed at creating the science methodology and the technical tools needed to identify, measure, evaluate and counter the threats of climate change to cultural heritage on a medium and long-term basis. To achieve this demanding task, we are seeking partnerships with Universities and Research Institutes. At this stage, there is a great interest from research bodies and a large number of projects are being undertaken, a fact that could possibly lead to an overlapping of efforts. It is therefore essential to organise, utilise and render the information gathered fully accessible. To this end a common research platform and knowledge base will be created within the framework of this project funded by the European Fund of Recovery so that it can be used by all stakeholders, in both the public and the private sectors. It is expected that the synthesis of the gained experience, knowledge and documentation will result in a typology of infrastructural interventions as well as a catalogue of good practices that will form a guide to shape policy for the coming years and will provide directions to the whole cultural heritage sector for confronting the new challenges related to climate change.

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