



Regional Climate  
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Report of the Task Force on

# Cultural Heritage



Eastern Mediterranean and Middle East  
Climate Change Initiative

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# Report of the Task Force on **Cultural Heritage**

## **Eastern Mediterranean and Middle East Climate Change Initiative**

## **Task Force Coordination**

**Prof. Nikolas Bakirtzis**, The Cyprus Institute

## **Cyprus Institute Liaison Scientist**

**Dr. Dante Abate**

## **Task Force Members**

**Prof. Nizar Abu-Jaber**, German Jordanian University

**Prof. Seif Assaad**, Lebanese University

**Prof. Costas Cartalis**, National and Kapodistrian University of Athens

**Dr. Véronique Chankowski**, French Archaeological School in Athens

**Prof. Stella Demesticha**, University of Cyprus

**Prof. Mona Haggag**, University of Alexandria

**Prof. Sturt Manning**, Cornell University

**Mrs. Sneška Quaadvlic-Mihailović / Mr. Paolo Vitti**, Europa Nostra

**Dr. Houmam Saad**, Syria Directorate General of Antiquities and Museums

**Dr. Marina Solomidou-Ieronymidou**, Cyprus Department of Antiquities

**Dr. Jelena Trkulja**, Qatar Museums Authority

# Contents

<b>Abstract</b> .....	<b>v</b>
<b>Executive Summary</b> .....	<b>vii</b>
Gaps in research and knowledge .....	viii
Policy recommendations .....	x
<b>1 Scope of the EMME Climate Change Initiative</b> .....	<b>1</b>
1.1. Task force scope and priorities: The challenge is regional .....	3
<b>2 Geographical setting</b> .....	<b>5</b>
<b>3 Climate change and cultural heritage in the EMME region</b> .....	<b>8</b>
3.1 Expected regional impact .....	8
3.2 Knowledge and research gaps .....	9
3.3 Correlation of cultural heritage and climate change .....	10
<b>4 Policy landscape</b> .....	<b>16</b>
4.1 International framework .....	16
4.2 Regional and local framework .....	18
<b>5 Proposed policy and research initiatives</b> .....	<b>20</b>
5.1 Mapping, risk assessment, monitoring and mitigation .....	21
5.2 Linking cultural heritage with sustainable development .....	23
5.3 Cultural heritage education, community engagement and public awareness ..	23
5.4 Case studies .....	24

**6 Summary and recommendations . . . . . 28**

6.1 EMME index of cultural heritage vulnerable to climate threats . . . . .28

6.2 Regional cultural and natural heritage monitoring mechanism . . . . .29

6.3 Risk planning for cultural heritage . . . . .30

6.4 Greener cultural heritage . . . . .30

6.5 Climate cultural heritage education and outreach . . . . .31

6.6 Regional toolkit of best practices, services, communication, and social  
and economic responses . . . . .31

**Selected bibliography . . . . . 32**

**Figures**

1 Countries included in the Climate Change Initiative . . . . . 4

**Tables**

1 Population (medium variant) and GDP trends in each of the countries  
in the EMME region . . . . . 6

2 The United Nations Sustainable Development Goals . . . . .16

# Abstract

Climate change has emerged as one of the most serious threats to world heritage. The Eastern Mediterranean and Middle East (EMME) will be seriously affected by climate change, with preliminary evidence showing negative effects on sites and monuments. This development is projected to worsen as most EMME countries are presently moving in a direction opposite from that recommended by the Intergovernmental Panel on Climate Change related to limiting the rise in global temperatures.

Despite the enormous economic importance of cultural heritage to many EMME states (through tourism), cultural heritage remains a low priority in governmental responses to climate change, if it is addressed at all. As a consequence, there are serious gaps in knowledge about the impacts of climate change on cultural heritage in the region. Beyond the framework of UNESCO, the International Council on Monuments and Sites, the European Union, and other international organisations and institutions that have identified the threat, local policies in the EMME region remain limited, fragmented and lacking in regional focus. No systematic coordinated monitoring has been done to provide baseline data across the region and make it possible to assemble a platform for future research and actions.

Because regional coordination is an essential precondition to tackle this major challenge, this task force and its report aim at identifying threats, highlighting knowledge and research gaps, and mapping the current situation. The effort sets the basis for a policy toolkit that contributes recommendations towards a framework for regional collaboration to foster the exchange of know-how, expertise and good practices, and to support capacity-building activities among regional stakeholder states.

The toolkit offers a range of policy recommendations and directives to address a broad array of problems and challenges. It is flexible to allow stakeholder states to use it in ways that suit their particular needs while also respecting science and maintaining vital channels of regional communication and coordination. The report's vision is to first capture where the region stands regarding the impact of climate change on cultural heritage, and second, to articulate a much-needed policy framework to build regional capacity and a more resilient cultural heritage.





# Executive Summary

Climate change has emerged as one of the most serious threats to world heritage, now and into the future. The loss of heritage has devastating societal implications, as heritage is the connecting tissue for communities and societies. The Eastern Mediterranean and Middle East (EMME) region, in particular, will be seriously affected by climate change, which is already affecting sites, monuments and landscapes while pointing to serious future threats to cultural and natural heritage.

Despite the enormous socio-economic importance of cultural heritage and the grave threat posed by climate change, heritage remains a low priority (if it is addressed at all) in EMME region states' response to the climate threat. As a consequence, there are significant gaps in knowledge and data regarding the specific impacts of climate change on cultural heritage (both tangible and intangible<sup>1</sup>) in the region. The region lags considerably behind the rest of the world in this regard.

While international initiatives attempt to address the challenge, major gaps persist in knowledge, policy and coordination. Beyond the framework of bodies like UNESCO, the International Council on Monuments and Sites (ICOMOS), the European Union, and other international organisations and institutions that have assessed the climate threat and offered proposals for mitigation, adaptation and sustainability, policies at the local, national, and regional levels remain limited, fragmented and lacking the necessary regional focus. Moreover, there is no coordinated monitoring of a nature that can provide baseline data across the region and build the foundation for a platform for action, policy and research.

The EMME region is considered one of the epicentres of world cultural heritage. It is the cradle of several world civilisations—the Old World—with the rich archaeology of the region tracing the formation of prehistoric and ancient cultures, civilisations and empires through time. These include the southwest Asian Neolithic and first sedentary villages, as well as the Babylonian, Egyptian, Assyrian, Hittite, Levantine, Cycladic, Minoan, Cypriot, Phoenician, Persian, Greco-Roman, Parthian, Sasanian, Byzantine and Umayyad, and Abbasid and Seljuq civilisations, among others. All flourished in the region, which also gave birth to the three great monotheistic religions of Christianity, Judaism and Islam. As a result, the EMME region is home to an extremely rich and diverse body of cultural

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1. 'Tangible heritage' refers to physical monuments and sites; 'intangible heritage' refers to the broader 'cultural landscape' as defined by UNESCO (see footnote 2).

properties and traditions, amplifying the challenge to protect them through measures to mitigate and adapt to climate change.

The region's cultural heritage is also an economic resource, as it is central to much tourist activity in the region. The region comprises states and territories of various sizes and populations, in different economic stages of development, and with particular political, social and cultural conditions and characteristics. Yet they all share a common challenge in climate change, which threatens their well-being and growth in coming decades. The region's rich cultural heritage is already affected and is expected to suffer further effects from climate change. Natural events include rising temperatures, rising sea levels and attendant coastal erosion, extreme weather events (storms, droughts, fires, floods, etc.), soil erosion, desertification and dwindling water resources, and environmental and atmospheric pollution. These threats to heritage sites are matched by destructive development, looting, neglect, migration and war. Together, they threaten both tangible and intangible heritage and the cultural landscapes that have been the backbone of local communities and societies across the region since antiquity.<sup>2</sup>

Regional coordination is an essential precondition for tackling this major challenge. For that reason, the Task Force on Cultural Heritage aims to identify the full range of threats, highlighting knowledge and research gaps and mapping the current situation. This effort forms the basis for a policy toolkit that offers a framework for regional collaboration, thus fostering the exchange of know-how, expertise and good practices and suggesting capacity-building activities that regional stakeholders can take. The report's vision is to first capture where we stand at the present, touch upon existing policies and strategies, and then articulate a policy framework to enable the region to build regional capacity for a more resilient cultural heritage. In this effort, science and technology play essential roles in the documentation, monitoring, prediction and assessment of climate change effects. This report also points to the regional relevance of existing international policies and strategies and identifies gaps in relevant knowledge and research. Finally, it is important to underscore the role of cultural heritage as a change-agent in sustainable development, which is a key regional need.

## Gaps in research and knowledge

A comprehensive knowledge scan will enable stakeholder countries to identify gaps in research, arrange priorities and address the challenges that pose existential threats to cultural and natural heritage.

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2. According to UNESCO, a cultural landscape embraces a diversity of manifestations of the interaction between humankind and its natural environment.

Major gaps are found in the following areas:

- Documentation, mapping and monitoring of endangered heritage
- Correlation of climate change parameters with effects on cultural and natural heritage
- Links between cultural heritage and sustainable economic growth
- Cultural heritage and climate transition for societies and local communities
- Awareness
- Regional collaboration

The correlation of climate parameters, climate change risks, and the related effects on the physical, social and cultural aspects of heritage constitute the most significant of these gaps. A detailed listing of these links, adjusted for the EMME region, can be drawn from international and European initiatives and proposals – notably from UNESCO, ICOMOS, ICCROM, Europa Nostra, and, closer to home, the Hellenic Initiative for the Protection of Cultural and Natural Heritage.<sup>3</sup> Such a list will make it possible to begin assessing where we are, coordinating knowledge on these issues and, finally, prioritising our needs and related responses. As such, this correlation of climate parameters, risks and effects can be organised in the following categories: cultural landscapes, associated and traditional communities, intangible heritage, moveable heritage, archaeological resources, and buildings and structures.

These broad categories are linked to a range of climate changes, among them higher temperatures; altered freeze/thaw cycles; permafrost thaw; increased water vapor in the air; more forceful winds; climate-influenced wildfires; changes in seasonality and phenology; spread of invasive species and pests; changes in range, distribution and population of species; less precipitation and more drought (desertification); increased precipitation and more intense rainfall; intermittent and chronic coastal, estuarine and freshwater flooding and inundation; intensified storms; increased coastal erosion; rising water tables; saltwater intrusion; acidification of the sea; pollution; climate-driven development; and risks from climate-mitigation actions.

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3. ICOMOS (International Council on Monuments and Sites) focuses on the conservation and protection of cultural heritage sites. It is dedicated to the application of theory, methodology, and scientific techniques to the conservation of architectural and archaeological heritage. Its member architects, historians, archaeologists, art historians, geographers, anthropologists, engineers and town planners benefit from interdisciplinary exchange. ICCROM (International Centre for the Study of the Preservation and Restoration of Cultural Property) serves its member states by promoting the conservation of cultural heritage throughout the world. It operates in the spirit of the 2001 UNESCO Universal Declaration on Cultural Diversity, which states that “Respect for the diversity of cultures, tolerance, dialogue and cooperation, in a climate of mutual trust and understanding, are among the best guarantees of international peace and security”, UNESCO (United Nations Educational, Scientific and Cultural Organization) is a specialized UN agency that promotes international cooperation in education, arts, sciences and culture. Europa Nostra represents citizens’ organisations that work to safeguard Europe’s cultural and natural heritage. It speaks for the heritage movement before relevant international bodies, in particular the European Union, the Council of Europe and UNESCO.

Advances in science and technology and the fast-growing development of related tools can greatly aid efforts to document, monitor, predict, assess risks, and to craft policies and strategies to meet them. The humanities and social sciences can be critical catalysts in framing the broader challenge as the EMME region learns from the past and redefines the meaning, value and role of cultural heritage in a changing world. A vital priority is the systematic mapping of at-risk heritage and the prioritisation of measures and actions in the short, medium and long term. In the meantime, however, the low priority the region has placed on cultural heritage in risk-management plans, and the lack of integrated approaches for the protection of cultural heritage, aggravate the current predicament.

Another key research gap in the region is how cultural heritage and its preservation can best be integrated into green-economy policies, programs and measures. While tourism is vital for economic growth in stakeholder countries, the role that cultural heritage plays in sustainability planning (including responses to the effects of climate change) remains quite limited; in several cases it is non-existent. International and European efforts can provide valuable guidance and input, but they are not adequate to address the complex realities of the region, which include challenges like acute economic instability, political fragmentation, war and migration. Moreover, without focused data or studies, there can be no comprehensive understanding of the region's broader needs and challenges. This is an area in urgent need of input and initiative.

## **Policy recommendations**

While the regional nature of climate change is evident, cultural heritage sites and landscapes are profoundly localised. Each has a specific context, microclimate, hydrology and relief, among other considerations. And while there may be characteristics common to some sites and monuments (for example, in coastal or mountainous areas), the differences may outnumber the similarities. That said, regional coordination remains important for the purposes of exchanging experiences, insights and good practices and developing flexible yet nuanced responses to the effects of climate change on cultural heritage. The policy areas described below correspond to the gaps described above and encapsulate a range of actions and strategies.

### **Mapping, risk assessment, monitoring and mitigation at both local and regional levels**

Mapping, risk assessment and monitoring of cultural and natural heritage are extremely important for mitigation and adaptation plans. In this context, the use of advanced science and technology is a priority to support the identification, prioritisation and dissemination

of the threats of climate change to cultural heritage. The region's stakeholders must move towards a more collective and better coordinated response to the challenge of climate change by developing a systematic mapping and risk assessment of threatened heritage and matching that assessment with targeted policies, mitigation and adaptation strategies, and best practices. In this context, it is important that policies focus on the societal dimension of the effects of climate change and the way heritage relates to communities and humans. Cultural heritage, both tangible and intangible, can guide choices that promote action and thus strengthen the resolve and social cohesion of communities as they take the difficult steps that will be necessary to mitigate and adapt to climate change. Heritage can help stress the urgency of climate change; it can demonstrate and model adaptation and mitigation strategies (learning from the past, community experience); and it can nurture social resilience.

### **Correlating climate change impacts and threats to cultural heritage**

Establishing the links between climate change phenomena and threats that directly affect the protection and well-being of heritage assets is a precondition for appropriate mitigation actions supported by policy changes.

### **Linking cultural heritage to the green economy**

Cultural heritage must be integrated into green economy planning and development. Cultural heritage can be a change agent for adaptation and mitigation plans within broader green-growth strategies. Sustainable cultural heritage strategies can promote the valorisation of heritage assets (tourism, community engagement, local industries) and thus promote their direct association with key social and economic sustainability goals. While learning from international initiatives, such as Europa Nostra and ICOMOS, to promote cultural heritage in the context of the European Green Deal framework, the EMME region can retain its valuable focus on sustainable solutions adjusted to regional needs and socio-economic realities. Transitioning to green development will require societal and community support, which must be carefully cultivated.

### **Raising awareness**

Cultural heritage must become a vehicle for climate action and an agent of societal change and adaptation. Communication, outreach and education can help the region prepare for and ameliorate climate change impacts so that a more resilient cultural heritage can survive in the region. Again, an acute regional focus holds great potential for success, as it will maximise relevance for regional societies and local communities. Cultural heritage contains and reflects the historic experience of people and their natural environment; as such, it is uniquely suited to promote the urgency of climate change action across the

region. The memory and experience of the past can help connect people to places, identify patterns of response to change and loss, and communicate the need for adaptation and mitigation strategies as the region adjusts to a rapidly changing natural environment.

Communication policies and outreach strategies integrating the collective experience represented by cultural heritage can be particularly effective in projecting the immediacy of the threat. Iconic monuments, sites and landscapes can serve as instructive examples of the impact of climate change. For example, the potential loss of an ancient site like Olympia in Greece to wildfires, Petra to flooding and parts of the city of Alexandria to coastal erosion (examples discussed later in the report) can move public opinion to act on climate change.

In this context, the importance of heritage education cannot be overstressed as a powerful driver for broader climate change action in societies across the region. The development of focused curricula and training programs that address climate change and its regional impacts on cultural heritage must become a priority across the EMME region. Educating younger generations on climate change and cultural heritage is an indispensable investment, as it opens access to young people's families and thus helps prepares communities and societies for the great challenges to come.

### **Opportunity for regional collaboration and coordination**

Cultural heritage lends itself as a priority area for immediate regional collaboration. The cultural wealth of our shared past must become a beacon for collective action and mobilisation. It is therefore recommended as a policy area which can be exploited for the benefit of the region. Plans and policy actions that promote collaborative and coordinating steps towards a regional understanding of the threat of climate change on cultural heritage hold great potential.

# 1. Scope of the EMME Climate Change Initiative

In March 2019, the Council of Ministers of the Republic of Cyprus approved the Eastern Mediterranean and Middle East (EMME) Climate Change Initiative to coordinate regional actions to mitigate the impact of global warming across the Mediterranean and to develop a comprehensive plan to reduce greenhouse gas emissions in line with the 2015 Paris climate accord. The Initiative has been widely communicated to the countries and leadership of the EMME region, to European Union member states, and to the United Nations and other international organisations.

Led by the government of the Republic of Cyprus, the initiative is a response to the growing scientific evidence that climate change and the severity of its consequences in the EMME region significantly exceed the global average. Recent studies from prominent institutions have classified the region as a global hot-spot for climate change, one particularly vulnerable to its effects. Research, including from the Cyprus Institute and its partners, has provided important insights into the effects of climate change on water availability and agriculture, weather extremes, public health, ecosystems, tourism, and humanitarian and security issues, including mass migration of environmental refugees. These effects concern not only the EMME countries, but also the international community, especially Europe, because a climate-induced humanitarian crisis would likely exacerbate geopolitical instabilities in the region, which is home to nearly 500 million people.

The initiative aims to induce EMME countries to take the following actions:

- To build a shared understanding of the magnitude of the challenge, set reliable projections of the regional climate change processes and effects, identify gaps in knowledge, and propose ways to address them
- To identify pathways for the most effective, rapid and economical way to implement the targets of the Paris agreement at the national level
- To develop a policy toolkit for the amelioration of climate change effects in various sectors
- To enhance regional cooperation and capacity building by promoting international mobility, sharing good practices, developing joint educational programmes, advancing research and innovation, and participating in joint ventures/projects to achieve the aforementioned goals.

In the framework of the EMME Climate Change Initiative, the Cyprus Institute has been given the responsibility of pursuing the first phase of the project – namely, to establish comprehensive scientific foundations and develop a set of policy actions to be made available to policy-makers to achieve the goals of the Initiative. The Cyprus Institute and its partners are pursuing this task in part through the work of task forces on the following themes:

- The Physical Basis of Climate Change
- Energy Systems
- The Built Environment
- Health
- Water Resources
- Agriculture and the Food Chain
- Marine Environment/Resources
- Education and Outreach
- Migration
- Tourism
- Enabling Technologies
- The Green Economy and Innovation
- Cultural Heritage

Each task force, consisting of experts from the region, is pulling together existing knowledge on the climatic conditions and socio-economic and socio-political realities in the EMME countries so as to identify gaps in research and policy needs and provide a toolkit of possible actions to address the challenges identified.

The reports of the task forces will be combined into a comprehensive scientific report that will contain an overarching conclusion, accompanied by technologically mature and economically affordable solutions for addressing the impacts of climate change in various socio-economic sectors.



## 1.1. Task force scope and priorities: The challenge is regional

- What will be the direct and indirect impacts of climate change on cultural heritage (both tangible and intangible) and on natural heritage?
- How does the impact of climate change on heritage affect social and economic life?
- What will be the role of cultural heritage in the EMME region's climate change transition?

These are the key questions for the region. To answer them, the proposed strategy is to harvest local knowledge and expertise at the country level while providing a regional framework for collaboration that will make it possible to identify synergies and to offer mutual support, services, good practices and solutions.

The EMME region is considered one of the epicentres of world cultural heritage. It is the cradle of several world civilisations—the Old World—with the rich archaeology of the region tracing the formation of prehistoric and ancient cultures, civilisations and empires through time. These include the southwest Asian Neolithic and first sedentary villages, as well as the Babylonian, Egyptian, Assyrian, Hittite, Levantine, Cycladic, Minoan, Cypriot, Phoenician, Persian, Greco-Roman, Parthian, Sasanian, Byzantine and Umayyad, and Abbasid and Seljuq civilisations, among others. All flourished in the region, which also gave birth to the three great monotheistic religions of Christianity, Judaism and Islam. As a result, the EMME region is home to an extremely rich and diverse body of cultural properties and traditions, amplifying the challenge to protect them through measures to mitigate and adapt to climate change. A collaborative and well-coordinated approach is the only way forward.

While the regional nature of climate change is evident, cultural heritage sites and landscapes are profoundly localised. Each has a specific context, microclimate, hydrology and relief, among other considerations. And while there may be characteristics common to some sites and monuments (for example, in coastal or mountainous areas), the differences may outnumber the similarities. That said, regional coordination remains important for the purposes of exchanging experiences, insights and good practices and developing flexible yet nuanced responses to the effects of climate change on cultural heritage.

As such, the scope of the cultural heritage task force is defined by a series of priorities that correspond to its mandate to serve as a regional framework of expertise and collaboration able to:

- Identify, prioritise and assess the threats of climate change on cultural heritage in the EMME region.

- Propose new policies, strategies and best practices to prepare for and ameliorate climate change impacts so as to make the region's cultural heritage more resilient.
- Promote cultural heritage as a change agent for adaptation and mitigation plans within broader green growth developments. Arts, culture and heritage can offer solutions that are publicly recognisable and appealing focal points to engender change; they can also promote changes at the level of policy and systems.
- Improve communication strategies regarding the importance of the challenge.

In this framework it is important to identify areas of research that can strengthen mitigation, adaptation and preservation efforts to respond to the threats of climate change.

- Science and technology advances and tools (documenting, monitoring, predicting, assessing, policy-making)
- Sustainable cultural heritage strategies for the valorisation of heritage assets and their direct association with key social and economic sustainability goals
- Use of the humanities and social sciences as catalysts in framing the challenge, learning from the past, and re-defining the meaning, value and role of cultural heritage in a changing world.

**Figure 1. Countries included in the Climate Change Initiative**



## 2. Geographical setting

This report focuses on the region of the Eastern Mediterranean and the Middle East (EMME), as illustrated by Figure 1. The national socio-economic, cultural and political context varies considerably across the countries of the region: Bahrain, Cyprus, Egypt, Greece, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Palestine, Qatar, Saudi Arabia, Syria, Turkey, and United Arab Emirates.

An important aspect of the EMME region that is directly related to cultural heritage is its diverse geography and range of environmental conditions, which historically have shaped the rich heritage of the region and now constitute a great challenge to efforts to mitigate the impact of climate change on tangible and intangible heritage.

The region has been the hub of human movement, settlement and conflict since the last Ice Age. Thus, its heritage encompasses a vast span of time, cultures, uses and states of conservation. Moreover, the region, while relatively small, features diverse topographic settings, landforms and microclimates that have resulted in diverse subsistence strategies and settlement patterns. All of these factors necessitate proper stewardship through a challenging period in human and global history.

Within this context, responses to the challenges climate change poses to the region's cultural heritage are and will continue to be affected by an array of socio-economic stresses such as those posed by tourism, economic crises, such the devastating impact of the current COVID-19 pandemic, political volatility, war and the related migration pressures.

These stresses will be amplified by the direct impacts of climate change. The region's extensive coastal areas will be endangered by rising sea levels. Near-coastal interiors will be subject to droughts, flash floods, landslides and deforestation. Heritage sites in such areas will become increasingly vulnerable to these phenomena. Issues such as rock deterioration and erosion will affect both buildings and sites. Coastal and near-coastal areas of the region are heavily populated, and social instability will increase the rates of treasure-hunting and vandalism across the region. The deeper interior, while less vulnerable by virtue of the lower population and lower density of heritage sites, will nonetheless become increasingly endangered, as it will lack proper oversight. The horrific reign of ISIS in western Iraq and eastern Syria is potentially an early glimpse at the destruction that can be wrought on the cultural heritage of the area. The destruction of the temple of

Dushara in Palmyra cannot be easily forgotten. Thus, the linkages between politics, climate and heritage are clear.

Although the task force focuses on climate change and cultural heritage, demographic and economic conditions directly affect the capacity of stakeholder states to respond to the challenges that climate change poses to cultural and natural heritage.

The EMME region has experienced **rapid population growth** in recent decades (Table 1). The population of the region grew from 243 million in 1990 to 360 million in 2010 and 409 million in 2017. The greatest growth has occurred on the Arabian Peninsula. During this timeframe, the population of Saudi Arabia has more than doubled. That of the United Arab Emirates has quintupled and that of Qatar sextupled. At the other extreme, the Greek population has been the most stagnant in the region. In the next decade, the median projection of the United Nations for the region is additional population growth of 20% (80 million people) from 2017 to 2030. The challenge of meeting demand for energy while achieving a reduction in greenhouse gas emissions, as envisioned by the Paris Agreement, is clear.

**TABLE 1. Population (medium variant) and GDP trends in each of the countries in the EMME region**

Country	Population (thousands) [1]				GDP per capita (current US\$) [4], [5]		
	1990	2010	2017	2030**	1990	2010	2017
Bahrain	496	1,241	1,494	2,013	8,529	20,722	23,715
Cyprus*	767	840	864	934	9,642	31,024	26,339
Egypt	56,134	82,761	96,443	120,832	766	2,645	2,441
Greece	10,226	10,888	10,569	9,917	9,600	26,918	18,883
Iran	56,366	73,763	80,674	92,664	2,214	6,603	5,628
Iraq	17,419	29,742	37,553	50,194	10,327	4,657	5,205
Israel	4,448	7,346	8,244	9,980	12,663	30,694	40,542
Jordan	3,566	7,262	9,786	10,655	1,167	3,690	4,163
Kuwait	2,095	2,992	4,056	4,747	8,795	38,577	29,760
Lebanon	2,803	4,953	6,819	6,195	1,013	7,757	7,838
Oman	1,812	3,041	4,666	5,936	6,448	19,281	15,130
Palestine	2,101	4,056	4,747	6,342	921	2,387	3,397
Qatar	476	1,856	2,725	3,327	15,454	67,403	61,264
Saudi Arabia	16,234	27,421	33,101	39,322	7,246	19,263	20,804
Syria	12,446	21,363	17,096	26,677	897	2,830	771
Turkey	53,922	72,327	81,116	89,158	2,794	10,672	10,514
United Arab Emirates	1,828	8,550	9,487	10,661	27,729	33,893	39,812
Total	242,961	360,401	409,441	489,553			

\* Population refers to the areas under the control of the Republic of Cyprus.

\*\* In order to keep the underlying assumptions constant across all countries, population projections for 2030 assume the medium variant scenario from the UN's latest World Population Prospects report [1], instead of using individual national projections.

**Per capita income** has grown significantly in most countries since 1990. However, the economic output of some countries in the region has improved only marginally or remained relatively constant in recent years. A few countries have experienced negative growth. Cyprus and Greece were affected by financial crises between 2008 and 2016, while Qatar has been affected by the diplomatic dispute with its neighbours. In June 2017, Bahrain, Egypt, the Maldives, Saudi Arabia, the United Arab Emirates and Yemen severed diplomatic ties with Qatar and implemented a variety of sanctions, such as refusing port access to Qatari ships, restricting airspace and expelling Qatari visitors. Syria's economic output has been drastically reduced due to the civil war in the country since 2011. Jordan has witnessed a large influx of immigrants as a result of regional instability, stressing its financial, water and infrastructural resources.

Because many of the region's countries are major oil exporters, their economic output has been shaped by fluctuations in international oil prices. As GDP growth is expected to continue in the region over the long term, it is imperative to achieve a reduction in the energy and carbon intensities of GDP so as to fall into line with global climate targets.

# 3. Climate change and cultural heritage in the EMME region

## 3.1. Expected regional impact

As most countries in the Eastern Mediterranean and Middle East (EMME) are moving in a direction opposite from that recommended by the Intergovernmental Panel on Climate Change, it is expected that the region will be seriously affected by climate change in the coming decades.

As a result, climate change phenomena and their socio-economic implications will fundamentally challenge the protection of the region's cultural and natural heritage, which is among the richest and most diverse globally. More specifically, climate change will affect both tangible and intangible heritage, posing challenges to the management and preservation of actual monuments and sites but also to cultural landscapes more generally. In essence, climate change threatens communities on multiple levels, affecting their socio-economic fabric as well as their natural environment. For example, food traditions are being eradicated by disasters that destroy the unique ecosystems throughout the region. Rising waters are eroding landscapes which sustained communities for centuries. The loss of these landscapes means the loss of heritage which is part of residents' collective memory and the cultural tissue that provides social cohesion and a sense of identity.

Indicatively, cultural and natural heritage in the region will be directly or indirectly affected by:

- Rising temperatures as well as increased solar radiative effects
- Rising sea level and coastal erosion (adding to major anthropogenic challenges, especially from plastic and other pollution discarded into the sea)
- Rainfall and extreme weather (droughts, fires, floods, etc.)
- Soil erosion, desertification and dwindling water resources
- Environmental and atmospheric pollution
- Results of socio-economic challenges (funding shortages, tourism, security, migration, etc.)
- Wildfires and deforestation.

Climate change is already causing tensions to flare within the region. The refugee crisis and mass migration, two of the most prominent examples, have been associated with increased looting of heritage and archaeological sites. As our climate warms and the sea levels rise, people will move, lose water and food sources. In the process, they will be cut off from their social and cultural networks and brought into contact with similarly stressed people who do not want them there. All of this will raise tensions and possibly lead to conflict. Owing to ongoing conflict or desertification, many individuals have become displaced, lost their livelihoods, and find themselves desperate for alternative sources of income and shelter. Members of these vulnerable populations are “subsistence looters” who traffic out of necessity rather than criminal intent.

Even sustainable infrastructure and economic interventions can exacerbate tensions. Some of the climate change interventions that may lead to conflict include building renewable energy infrastructure in sensitive or cultural landscapes, raising the density of already crowded historic districts, placing solar panels on historically or culturally significant buildings, renovating districts or buildings with cultural or community significance, and limiting tourism for ecological reasons in places that rely on its revenue.

## **3.2. Knowledge and research gaps**

Although there is no specific effort presently to address the impact of climate change on cultural heritage in the EMME region, the broad scope of international initiatives, reports and projects offers a valuable framework that can facilitate our attempt to provide a preliminary regional overview.

Indicatively, over the past decade the European Commission has founded several interdisciplinary multi-regional projects on cultural heritage and climate change. For example, projects like ARCH, HERACLES, PROCULTER STORM, IRESIST+ and SHELTER have approached the issue by marshalling multi-disciplinary expertise and public involvement to mitigate the effects of climate change on cultural heritage. Other efforts – such as projects like HYPERION, PROTHEGO, RESCULT – have identified existing climate risks and their effects on monuments and sites. Scientific teams from three EMME region countries, namely Cyprus, Turkey and Greece, participated in these projects, thus contributing a regional perspective. Nonetheless, even though these projects were successful in providing preliminary data on the issue of climate change and cultural heritage, there is still a need for detailed, recommendation-based approaches, as suggested, for example, in the Urban Agenda for the EU Partnership on Culture / Cultural Heritage Final Action Plan:

However, these activities do not resolve the challenges outlined... As the study *Safeguarding Cultural Heritage from Natural and Man-Made Disasters*, conducted by the European Commission in 2018, highlights, there is a low priority of cultural heritage in risk management planning and a lack of integrated approaches for protecting cultural heritage against risks. Establishing some recommendations or guiding principles for European cities could help to raise awareness and to promote the development as well as implementation of integrated approaches and plans in the field of risk and heritage management at the regional and local level.

A significant gap in research is the correlation of climate parameters, climate change risks, and the related effects on the physical, social and cultural importance of cultural heritage. A basic listing of these relations in the EMME region is necessary in order to begin assessing where we are, coordinating knowledge on these issues and finally prioritising the region's gaps in knowledge and research. The following section provides an overview of these challenges. It is expected that the list will grow in size and refinement.

A related gap in knowledge and research is the strategic prioritisation of immediate, short- and long-term measures and actions. The need is urgent for immediate mitigation measures focused on the EMME region, which will draw on the aforementioned correlation between climate parameters, climate change risks and expected effects on cultural heritage.

### 3.3. Correlation of cultural heritage and climate change

According to the International Council on Monuments and Sites (ICOMOS), “cultural heritage can guide choices that promote human action in ways that support resilience and sustainability and by extension climate-resilient development pathways.” In its 2019 publication *The Future of Our Pasts: Engaging Cultural Heritage in Climate Action*, ICOMOS made a powerful argument and provided an effective outline for the intersection of cultural heritage and climate change. Approaching the problem from a global perspective grounded in a deep knowledge of heritage tools and methodologies, ICOMOS prepared an exhaustive table correlating climate change to cultural heritage. It is organised around the six categories of cultural heritage:

- Cultural landscapes
- Associated and traditional communities
- Intangible heritage
- Moveable heritage



- Archaeological resources
- Buildings and structures.

The outline that follows of the damages caused and anticipated by climate change considers a range of key changes in climate: higher temperatures; altered freeze/thaw cycles; permafrost thaw; increased water vapor in the air; more forceful winds; climate-influenced wildfires; changes in seasonality and phenology; spread of invasive species and pests; changes in range, distribution and population of species; less precipitation and more drought (desertification); increased precipitation and more intense rainfall; intermittent and chronic coastal, estuarine and freshwater flooding and inundation; intensified storms; increased coastal erosion; rising water tables; saltwater intrusion; acidification of the sea; pollution; climate-driven development; and risks from climate-mitigation actions.

The outline organises the effects of climate change according to the ICOMOS typology and applies it to the EMME Region.

1. Cultural landscapes include historic urban landscapes, parks, gardens, spaces of ritual or religious significance.

### ***Impacts of climate change***

- Changes of behaviour in the use of ritual spaces
- Changes to hours and seasons of visitation
- Inappropriate changes to historic building and sites
- Increased expenses
- Increased pace of deterioration
- Increases of pests and animals
- Loss of communities associated with cultural landscapes
- Loss or alteration of designed landscapes, parks and gardens
- Loss of rituals associated with cultural landscapes
- Loss of communities, towns and neighbourhoods
- Loss of traditional grazing areas, structures and practices
- Stress on culturally significant plant species
- Need for protective structures
- Reduced access to open space
- Shifts in migratory patterns

2. Associated and traditional communities are groups of people who work and live together with a shared culture.

***Impacts of climate change***

- Abandonment, loss or death of communities
- Changes in grazing patterns
- Loss of traditional activities
- Decreased economic activity
- Destabilisation of societies
- Health risks
- Increased crop failures, disease risk and migration
- Increased stress on fewer resources
- Increased tension and conflict
- Loss of access roads
- Food insecurity
- Loss of homes, villages and communities
- Loss of language groups
- Loss of patterns of movement
- Relocation of communities
- Stress on local agencies
- Trauma and psychological damage

3. Intangible cultural heritage comprises those elements of heritage that cannot be collected and placed in a museum, among them rituals, patterns, foods, language and oral traditions.

***Impacts of climate change***

- Altered place attachment
- Breaks in memory and context
- Broken sense of place
- Cancellation of cultural activities

- Changes in ceremonial cycles, religious practices and seasonal activities
- Impact on participative activities
- Increased tension and conflict
- Loss of connection to homeland, ecosystems, local knowledge and rituals
- Destruction of culturally relevant species
- Deterioration of local language/words
- Disconnection with oral tradition and economic practices
- Loss of sacred spaces and locales
- Loss of traditional food systems

4. Moveable heritage is composed of the contents, interiors and documentary archival evidence relating to heritage places, monuments and sites.

***Impacts of climate change***

- Accelerated deterioration and damage
- Complete loss of artifacts, storage and display space
- Changes in use of structures
- Changes in access paths and roads
- Damage to utilities, generators and electrical systems
- Disassociation of collections
- Increased cost of supplies and materials
- Increased mould and pests
- Increased rate of chemical decay
- Increased use of energy, notably for heating, ventilation and air conditioning
- Increased stress on objects, artifacts and archives
- Increase in size of collections to manage
- Planning and preparation for extreme events
- Renovations to strengthen structures
- Risks to health of staff

5. Archaeological resources include archaeological and rock art sites as well as the surrounding landscape and terrain.

***Impacts of climate change***

- Accelerated deterioration
- Alterations to field seasons
- Data loss
- Decreased accuracy of carbon-14 dating
- Destruction of archaeological deposits and stratification
- Disruption of landscape and fields
- Disturbances due to increased tourism, recreation and traffic
- Looting and dispersal of artifacts
- Loss of artifacts, structures and sites
- Loss of spatial coherence
- Movement of sites and shipwrecks
- Reduction or alteration to visitation patterns
- Risk to safety of staff
- Soil toxicity
- Structural damage

6. Buildings and structures are historically significant elements of the built environment that can also include ephemeral structures.

***Impacts of climate change***

- Abrasion and erosion
- Breakage of exterior ornament and decoration
- Changes to structure
- Loss of traditional dwellings
- Changes in cyclical traditions of building maintenance
- Change in use or abandonment
- Changes to access roads and historical topography
- Changes to surrounding landforms
- Changing patterns of visitation and footfall
- Collapse or destabilisation

- Cracking and deterioration
- Damage to fenestration, foundations and roofs
- Complete destruction or loss
- Health risks to visitors and staff
- Increased decay
- Increased regional conflict
- Inadequacy restoration guidelines
- Loss of access to sites

# 4. Policy landscape

## 4.1. International framework

International bodies like UNESCO, the International Council on Monuments and Sites (ICOMOS) and the International Centre for the Study of the Preservation and Restoration of Cultural Property have developed actions and initiatives to build capacity for resilient world heritage. They have identified the following priorities: 1) that world heritage properties should continue to convey their outstanding universal value; 2) that stakeholder states should manage the effects of climate change effectively and sustainably; and 3) that adaptation measures, disaster risk management actions, climate change mitigation measures and sustainable development should be designed and implemented.

To these ends, the following policies and declarations are in place:

- Convention on the Protection of the World Cultural and Natural Heritage by the General Conference of UNESCO at its 17th session Paris, 16 November 1972.
- UNESCO “Policy on the Impacts of Climate Change on World Heritage Properties”, 2007
- UNESCO “Climate Change and World Heritage: Report on Predicting and Managing the Effects of Climate Change on World Heritage, and, Strategy to Assist State Parties to Implement Appropriate Management Responses”, 2007

**TABLE 2. The United Nations Sustainable Development Goals**

GOAL 1: No Poverty	GOAL 10: Reduced Inequality
GOAL 2: Zero Hunger	GOAL 11: Sustainable Cities and Communities
GOAL 3: Good Health and Well-being	GOAL 12: Responsible Consumption and Production
GOAL 4: Quality Education	GOAL 13: Climate Action
GOAL 5: Gender Equality	GOAL 14: Life Below Water
GOAL 6: Clean Water and Sanitation	GOAL 15: Life on Land
GOAL 7: Affordable and Clean Energy	GOAL 16: Peace and Justice Strong Institutions
GOAL 8: Decent Work and Economic Growth	GOAL 17: Partnerships to Achieve the Goals
GOAL 9: Industry, Innovation and Infrastructure	

Source: United Nations Department of Economic and Social Affairs, <https://sdgs.un.org/goals>.

- ICOMOS report on “Future of Our Pasts: Engaging Cultural Heritage in Climate Action”, 2019
- European Cultural Heritage Green Paper (2021): Developed by Europa Nostra in partnership with ICOMOS and the EMME Climate Change Initiative in an effort to promote cultural heritage within the framework of the European Green Deal.
- UN Habitat New Urban Agenda

UNESCO’s 1972 World Heritage Convention is the principal instrument for identifying and protecting the world’s natural and cultural heritage. It is a focal point of international cooperation for heritage conservation. The World Heritage Committee was formed under the Convention in 2005.

The broader cultural heritage community is building its capacity to contribute to climate change policies. The launch of the Climate Heritage Network in 2019 aims to increase the involvement of the heritage community in achieving the goals of the Paris Agreement. At COP26 in Glasgow in November 2021, the Network emphasised cultural heritage and helped to put it on the international agenda. More specifically, it released “Accelerating Climate Action through the Power of Arts, Culture and Heritage: A Manifesto on Keeping 1.5° Alive”. The manifesto seeks to activate those involved in arts, culture and heritage to take climate action through communication and engagement, and by inspiring their constituents, members and audiences to increase their ambition, to change their own behaviours, and to engage with climate change policy development at the local, national and international levels.

The Sustainable Development Goals (SDGs) were adopted by the United Nations in 2015 in the framework of the 2030 Agenda for Sustainable Development to cope with challenges the planet is facing. The seventeen SDGs were set aiming at framing a broad collective effort towards a sustainable and peaceful future.

Cultural heritage does not appear directly in the SDGs, but in 2021 ICOMOS published policy guidance highlighting the interconnection of cultural heritage and the SDGs with case studies and suggestions. In addition to the fact that Goal 13 is specifically devoted to climate change, there are valuable contextual links to climate change and cultural heritage in Goals 1, 3, 4, 8, 9, 11 and 16. Implementation of these SDGs in the EMME region is relatively poor. Because the region is one of the hot spots of climate change and its effects on heritage, the region must do more to implement SDGs that have a direct or indirect connection to climate change.

The decision of the Eastern Mediterranean and Middle East (EMME) Climate Change Initiative to form a task force on cultural heritage is consistent with international best practices. As detailed in the previous section, various international efforts include cultural heritage in planning and policies. International organisations have identified cultural heritage as a critical piece of any approach to climate change abatement. Examples include the Sendai Framework for Disaster Risk Reduction, the 2019 ICOMOS publication “the Future of our Past”, the 2021 European Cultural Heritage Green Paper, the New European Bauhaus, the 2018 decision of the European Parliament on the European Year of Cultural Heritage and, of course, the Paris Agreement on Climate Change. These policies and decisions emphasise the significance of cultural heritage and its capacity to connect people, foster belonging and cultivate social inclusion.

The European Green Deal, launched by the European Commission to make Europe the first carbon-free continent by 2050, does not mention cultural heritage. However, Europa Nostra partnered with ICOMOS and the Climate Heritage Network to produce and publish the European Cultural Heritage Green Paper, which demonstrates the relevance of cultural heritage for achieving the ambitious goals of the European Green Deal. In effect, the document correlates the contribution of cultural heritage to all key areas of the European Green Deal, including clean energy, circular economy, renovation, smart mobility, farm to fork, green finance and a just transition, research and innovation, education and training, and green deal diplomacy. Moreover, it proposes a series of concrete recommendations for policy-makers and cultural heritage stakeholders. Potential conflicts, real or perceived, between heritage preservation and action under the European Green Deal are also identified, as well as win-win strategies for overcoming conflicts.

## **4.2. Regional and local framework**

Initiatives and efforts at the local and regional levels are making preliminary contributions to what is expected will expand into an inclusive, integrated framework of strategies and actions against climate threats to cultural heritage. For example, the Greek Initiative for the Protection of Cultural and Natural Heritage from Climate Change Impact is an international initiative led by the Hellenic Ministry of Culture. The Task Force on Cultural Heritage of the EMME Climate Change Initiative serves as a regional node in the initiative.

As its name implies, the initiative focuses on the impact of climate change on cultural heritage, the protection of cultural and natural heritage, and synergistic cooperation in pursuit of those goals. The initiative’s priorities are:



- Prevention and monitoring
- Documentation and mapping
- Holistic and interdisciplinary approaches
- Local focus, action and management
- Education and outreach
- Social participation for a sustainable future and the preservation of cultural heritage.

## 5. Proposed policy and research initiatives

Cultural heritage must become a policy and planning priority in the Eastern Mediterranean and Middle East (EMME). The region is composed of a rich and diverse socio-economic landscape that is dependent on cultural heritage. Moreover, there is a strong interdependence between the people of the region and their natural environment. The region holds a variety of landscapes –urban, rural, inland, coastal, desert, mountains – as well as a diversity of living and working environments. Every one of these landscapes, as well as every economic sector, is affected by climate change. As such, the region's leaders, policy-makers and stakeholders must recognise the immense value of tangible and intangible culture in the implementation of measures to address climate change.

In order to implement changes that can benefit communities in the region, shifts in attitudes will be required. A good example is to practice multiple uses of natural and man-made resources. Some of the necessary attitudes are already embodied in the regional community of heritage workers. The collections maintained by heritage institutions – ranging from archaeological sites, libraries, museums, and digital collections – document the ravages of climate change. Heritage scholars are experts at speaking with diverse communities across the region in sensitive ways that can maximise the likelihood of adoption of new policies and technology. Most importantly, heritage experts are able to prevent maladapted activities and technologies from damaging the environment and people's rights. Furthermore, preservationists and conservationists are trained to find simple, light interventions to maintain the local culture – these interventions are the most sustainable solutions. Some of these interventions are inspired by the heritage itself, which often suggests green solutions for soil management, water collection and conservation, and flood management, among other concerns.

Maintaining the region's cultural heritage and the fabric of its societies will depend on people working together. And cultural heritage is a vehicle for collaboration across the diverse EMME region. Projects and initiatives must capture the hearts of the region's people, and cultural heritage experts can lead the way, integrating cultural heritage into environmental, architectural and planning policies. The New European Bauhaus initiative promoted by the European Commission offers an instructive model of a holistic approach to the challenge.

The effects of climate change on sensitive cultural heritage are likely to be among the key issues that attract and engage real public interest and concern. Cultural heritage can thus offer a focus that crystallises attention and offers an important lever for public policies that will be supported and welcomed by the public.

In this context, key priority policy actions for the EMME region are described below.

## 5.1. Mapping, risk assessment, monitoring and mitigation

The utmost priority for the region is to provide a thorough mapping of cultural heritage in the region. That mapping will support an assessment of the risks posed by climate change to tangible and intangible heritage. Estimating the threat will provide the basis for the implementation of monitoring mechanisms and related measures to protect monuments, sites, traditions and landscapes. The region shares an array of common characteristics which can support a framework of collaborative and collective approaches to the climate change challenge.

Indicatively the following proposed projects and actions can significantly contribute to the aforementioned needs.

- *Prepare detailed digital maps of cultural assets drawing from diverse sources and stakeholders at the local, national and regional levels.* Those sources include archaeological authorities, heritage organisations and institutions, and local communities. This is an urgent priority for the region as it will help capture the full scale of the challenge while providing a context in which to identify and describe relevant threats.
- *Propose predictive models of 1) the scale and likely frequency of extreme weather events (winds, precipitations, floods, frost cycles) and 2) new and unfamiliar risks.* More regional climate modelling is particularly needed. Some areas will have to deal with unprecedented hazards that may endanger cultural heritage (e.g. wildfires).
- *Provide heritage data to enrich climate models.* History, archaeology and heritage science involve a broad range of stakeholders, from physical to social scientists. One aspect that must be further explored by research is how qualitative and observational data, as well as insights from traditional and indigenous knowledge, could be used to enrich hard scientific data on climate change. The related data must be reliable and interoperable: different data sets can lead to different assumptions on climate scenarios. In this context, it is important to gain better access to existing infrastructures that provide data for climate studies, such as COPERNICUS and INSPIRE<sup>4</sup>. Providing heritage science with better access to spatial services would

help to address the lack of relevant data. It would be particularly interesting to monitor sea level rise and coastline change. Examples from Cyprus indicate very significant changes in the recent era. The process of integrating climate science with heritage science could facilitate promising exchanges between the two scientific communities.

- *Feed research results into various disaster risk management models.* Site managers and heritage professionals who work with cultural assets vulnerable to extreme events need good data to develop plans of all sorts (preparatory, emergency and recovery). Research must not assume or overstate adaptive capacity: Some heritage sites may be susceptible to irreversible loss or damage, and the 'build back better' manifesto may not be valid in the framework of cultural heritage because of its specific characteristics. It would be interesting to reflect on how to integrate and deal with uncertainty in adaptation strategies.
- *Ensure that research provides specific resources to policy-makers at various levels.* Research results could focus on what is needed to inform decision-making and thereby redress the lack of policy on adaptation. It could investigate efficient methods and measures for adaptation, provide guidelines on what is technically feasible (or not), and collect and document case studies in a way that makes them easier to be shared with policy-makers. Local communities often lack resources to assess the effects of climate change and adopt good practices. Providing policy-makers with data and resources to acknowledge the needs of the heritage community would be of great help.
- *Develop workshops, training materials and tools that promote better integration of cultural heritage into wider disaster risk policies and programmes at the regional, national and local levels.* These will help those who manage cultural and natural heritage properties in various ways: 1) to reduce the risks to these properties from natural and human-made disasters; 2) to identify the main principles of a disaster risk management plan for heritage; 3) to explain how to prepare such a plan; 4) to demonstrate that heritage can play a positive role in reducing risks from disasters and so help to justify the conservation of heritage properties; and 5) to suggest how disaster risk management plans for heritage properties can be integrated into national and regional disaster management strategies and plans. The most important outcome will be to enable actors from the fields of disaster risk management and cultural heritage to strengthen policies, institutions and local communities in risk-prone regions.

## 5.2. Linking cultural heritage with sustainable development

Both the United Nations' Sustainable Development Goals and the European Green Deal failed to directly address the importance of cultural heritage. Efforts to correct this omission (as described in section 5) provide an invaluable opportunity to revisit, reframe and refine the ways we understand and experience the central role of cultural heritage. To put it bluntly, the world in general and the EMME region in particular are caught in a vicious cycle: Climate change is eroding our cultural heritage; that erosion is weakening the socio-economic fabric of our communities. This is certainly true in the EMME region.

A green and sustainable future is the only way forward. The sooner governments and societies commit to that proposition, the better off our planet will be. It is true that the green transition will be disruptive. But an effort must be made to make the transition fair and inclusive, putting people and their communities first. Certain regions, industries and workers will require special attention.

Links between cultural heritage and sustainable development need to be articulated and fleshed out. The region thrived for thousands of years on the resources provided by climate and geology. In recent decades, population growth in the region has outstripped the environment's ability to provide. Transfers of food, water and energy are now needed to sustain the population and its standard of living. And while it is impossible to reverse population growth that has already occurred and difficult to revert to traditional modes and standards of living, there still is much that can and should be learned from our ancestors. Thus, any attempt at achieving sustainable development will be severely handicapped if the lessons learned from our past and engrained in our heritage are ignored.

Tourism can monetise cultural heritage in a sustainable manner. Until the appearance of COVID-19, the region relied heavily on revenues from tourism. And while some aspects of tourism have had detrimental effects on heritage assets, the potential for rethinking it as a tool for sustainable development should not be ignored.

## 5.3. Cultural heritage education, community engagement and public awareness

Cultural heritage can be a key catalyst in raising public attention to the challenges and threats of climate change. For one thing, it embodies centuries of human-environment interaction, which can be instructive, inspiring, and cautionary. For another, heritage engages people, because it epitomizes their community. For example, monuments and archaeological sites are not just individual physical features but also integral elements

of broader cultural networks and systems, which can be summed up as the cultural landscape.

To date, however, cultural heritage has not been used efficiently for to combat climate change. This must change, because the mobilising power of heritage is too valuable to leave unexploited. Sorely needed are education, community engagement and public awareness of the threats posed to cultural and natural heritage; these can shape how societies adapt to the realities of a quickly changing environment. Reciprocally, the climate change challenge provides opportunities to redefine and reframe the ways we perceive and communicate the role of cultural heritage and its vital importance in all aspects of our lives.

Viewed from either perspective, holistic, inclusive and hands-on approaches to cultural heritage hold great potential in becoming the thematic vehicles driving efforts to confront climate change. The culture, values and heritage of the EMME region must be at the heart of the seismic shifts in its economy, industry, production, and consumption, landscape, infrastructure, transport, food and agriculture, construction, taxation and social benefits.

In this context, the engagement of local communities is key in our efforts to address and meet the climate change challenge. There is little doubt that in the absence of systematic efforts to communicate with local communities, the changes needed to mitigate climate change will be faced with opposition and hostility. Cultural heritage experts are well equipped to advise on how best to turn potential opposition into constructive engagement.

To lead this effort, the Task Force on Cultural Heritage recommends the formation of a Regional Technical Committee to advise on the goals, priorities and proposed actions emerging from this report.

## **5.4. Case studies**

Case studies from the region can serve as instructive examples of both the challenges and the range of threats directly and indirectly linked to climate change. They can also point to good practices in planning mitigation and adaptation measures.

### **5.4.1. Alexandria, Egypt**

Rising sea levels and the related erosion of coastal areas in the Mediterranean are nowhere clearer than in the ancient and historic city of Alexandria. The threat to Alexandria's heritage is further exacerbated by humidity, subsoil water, historically eroding geomorphology, the impact of climate change on the Nile Delta and uncontrolled urban development combined with neglect and poor management of its tourist capacity. Some of these factors are described below.

- The heritage city of Alexandria gradually disappeared from Egyptian tourist maps and planning, leading to the suspension of Mediterranean cruise tours and the sharp weakening of touristic activity and interest beginning in the first decade of the current century.
- The city's climate is very humid. Humidity becomes even higher in summer and has been aggravated by climate change.
- For many decades, subsoil water has affected Alexandria's archaeological sites. The construction of high-rise apartment buildings to house the city's growing population pushed drainage up sharply, causing a dramatic increase in subsoil water and raising the underground water table to an unprecedented degree. These changes inundated some sites, such as the Shatby, Anfoushy, Wardian, and Kom El-Shokafa cemeteries. With inundation came crystallised salts, chlorides and fungi. This situation threatens irreversible damage to these and other monuments.

Other economic and urban challenges have marginalised heritage in Alexandria, as in Egypt as a whole, such that it is still far from the interest of decision-makers. The city, like the country, lacks personnel qualified to tackle the problems of heritage sites scientifically. Except for efforts to protect the city's coastline and the famous Corniche with breakwaters and wave barriers, there is limited capacity to undertake large-scale planning, mitigation and adaptation. In this context, interventions and initiatives focused on specific sites and monuments could raise awareness and offer examples of good practice for the city as a whole. Examples include the project of the American Research Center in Cairo to restore and protect the Kom El-Shokafa cemetery; the Archaeological Society of Alexandria's project to safeguard and develop the Shatby necropolis with support from the A.G. Leventis Foundation; and the project to protect the Abu Mina site from groundwater erosion.

A regional capacity building initiative could train a generation of well-educated young people to assume responsibility for future projects to publicise and combat the encroaching effects of climate change on Alexandria's heritage sites. Meanwhile, urgent action is needed to salvage, restore and conserve the city's sites.

#### **5.4.2. Petra, Jordan**

Flash floods in the World Heritage site of Petra have been a problem since the Nabateans built the city over two thousand years ago. The Nabateans altered the surrounding landscape, building terraces, gabions, and dams to slow floods and reduce the amount of water flowing into the city.

In recent years, flash floods have been exacerbated by climate change, posing greater risks to the site, residents and tourists. Efforts to reduce the flood risk, however, must be

compatible with the site's integrity. Fortunately, the solution lies in learning from the original Nabatean engineers. Research conducted by the German Jordanian University for the Petra Development Tourism Regional Authority demonstrates that the rehabilitation and reuse of ancient flood control systems can sustainably protect the unique site.

#### **5.4.3. Olympia, Greece, and the Troodos region, Cyprus**

Wildfires have been devastating the forested areas of Greece, Cyprus and Turkey.

These forests are integral components of broader cultural landscapes; their loss has shattering impacts on the well-being of local communities. Furthermore, World Heritage monuments and sites, like Olympia in Greece and the Painted Churches of the Troodos region in Cyprus, lie within forests and are threatened with complete destruction. Although the increasingly dry and hot summers of the region cannot be averted, holistic documentation, sophisticated monitoring, fire-prevention, and fire-suppression systems can help.

The Hellenic Ministry of Culture and Sports and the Cyprus Department of Antiquities have been integrating climate change measures in the management plans for these sites, thus connecting their protection and well-being with sustainable growth. The engagement of local communities in this scheme is an absolute priority.

#### **5.4.4. Ephesus, Turkey**

As one of Turkey's UNESCO World Heritage archaeological sites, Ephesus provides an instructive example of the benefits of studies to understand and respond to the impacts of climate change over time. The site of the ancient city of Ephesus faces environmental threats from sea-level changes and increased movement of alluvial soil by streams, which for centuries contributed to the silting of its harbour. Its ancient port long ago lost its connection with the sea, a development that led to the decline and abandonment of the city at the end of antiquity.

While the city provides an excellent example of the effects of sea-level changes on the landscape, multidisciplinary research can identify and therefore model what can be expected in the future. Scientists used climate estimation models to reconstruct the changing heat model and rainfall level between 2016 and 2035. The experts then evaluated the weather models to offer suggestions for managing the site. Results from the Ephesus case study may be summarised as follows:

- From 2016 to 2035, the average temperature will increase by at least 2.5°C. This increase will affect the humidity and evaporation level around the site, which can cause erosion, heavy rainfall and fires.



- The study found no significant change in the average daily rainfall level between 2016 to 2035. On the other hand, the *frequency* of rain must be considered a real treat. Frequent rains can cause water to accumulate at specific points of the archaeological site, damaging stone structures. A mitigation plan and protection strategies are needed.
- With changing weather, the vegetation should also be carefully controlled. The necessary clearing effort could also be applied to the settlements surrounding Ephesus and bring social benefits to their citizens.
- The analyses and mitigation plans can underpin community solidarity and promote the fight against climate change at the national level.

The study may be considered an example of good practice in demonstrating the direct connection between climate change and cultural heritage. As change in sea level is one of the most widespread effects of climate change, sites like Ephesus can help illustrate the effects of sea-level changes. Being a UNESCO site, Ephesus can help disseminate the urgency of the threat and thus promote the importance of preservation and mitigation efforts at the national level. The role of interdisciplinary work and collaboration is key here. Only a cooperative approach among scientists and other stakeholders can yield effective and sustainable solutions.

## 6. Summary and recommendations

Drawing from the above-mentioned challenges and related needs, the following related actions centre on the preparation of a comprehensive regional list of endangered heritage; the goal is to generate immediate and short-term results. Regional coordination on the impact of climate change on cultural heritage is considered a theme, which all stakeholder states can get behind.

### 6.1. EMME index of cultural heritage vulnerable to climate threats

The creation of a regional index of cultural heritage exposed to climate-related threats – including cultural and natural heritage sites, monuments, landscapes and traditions – will provide the basis for gauging the magnitude and urgency of the challenge. It is important to map the vulnerability of cultural heritage in the region and thus correlate climate change parameters with impacts. The documentation and mapping of endangered cultural heritage will be supported by advanced science and technology towards the proper assessment of risk and related monitoring. In addition, the establishment of the index is expected to facilitate useful comparisons and groupings across countries and throughout the region. The design and maintenance of the index will be supported beyond 2022 by the Cyprus Climate Change Initiative and its Task Force on Cultural Heritage.

The development of the EMME index will unfold in two phases.

The first phase can take place in the very near term. It will require the direct engagement of state and governmental heritage authorities (ministries of culture, departments of antiquities, heritage preservation authorities, etc.), which will be expected to commit to active participation in the proposed regional scheme. Drawing on local resources and experience, country stakeholders will be asked to select and provide preliminary lists of threatened heritage (cultural and natural, tangible and intangible) at the country level. Instructions for the preparation of these lists will be provided by the task force. List entries will include descriptions, links to specific climate change parameters and pertinent documentation. These lists will find their place in the EMME index, which will be organised by country. Of course, it is expected that the preliminary lists will be uneven, as they will depend on input provided by national heritage authorities with different organisational structures and capacities.

The second phase – to be accomplished in the short- to medium term – concerns the creation of a preliminary regional index from the country-level lists. A comprehensive digital platform, able to manage a range of relevant data within the broader framework of the Cyprus Climate Change Initiative's infrastructure, will offer the necessary support to create the regional list. The gradual population of the regional index with local and country-level data will facilitate the identification of common threats as well as patterns of protective measures and mitigation practices. Moreover, the development of the regional index will provide a common organisational scheme for heritage under threat from climate change. As the index grows, it will clarify regional dangers and threats, thus providing an invaluable regional outlook for future action. While country lists will retain their integrity, the regional index is expected to provide enormous opportunities for collaboration, exchange of knowledge and the development of good practices.

In sum, the proposed EMME index of cultural heritage vulnerable to climate change aims to foster community resilience and adaptation to climate change, support evidence-based policy making and interventions, and forecast climate-driven damage to cultural heritage.

## **6.2. Regional cultural and natural heritage monitoring mechanism**

This intermediate action is predicated on the creation of the EMME regional index described above, which will provide the necessary framework to support and develop a rigorous monitoring mechanism for collaborative regional responses to the challenges and threats of climate change. Although the mechanism will have to make use of the uneven capacities of each country, the existence of the regional index will offer much-needed expert support and know-how.

Building on the regional index, the proposed monitoring mechanism will rely on country nodes, managed by the local authorities, to collect data and information. The information they collect will be fed into the regional mechanism, thus offering the capacity for coordination, optimisation and data processing. The objectives of the proposed action centre on the creation of a robust collaborative system able to closely monitor climate change threats and impacts. The system will also facilitate much-needed regional coordination, collaboration and communication, as well as the sharing of expertise, knowledge and tools.

### 6.3. Risk planning for cultural heritage

This intermediate action promises significant long-term impact and benefit. It expands on the two actions just described. The risk planning action will be organised in two distinct stages. The first will address the country aspect of the challenge; it will be pursued and managed by the appropriate local authorities. Building on local results, the second stage will focus on the regional dimension of risk planning for cultural heritage. The proposed action will benefit from the regional framework of the Cyprus Climate Change Initiative to set up a comprehensive planning system to facilitate the design, costing and prioritisation of mitigation and adaptation measures intended to preserve and protect cultural heritage from heat waves, fires, floods, sea-level rise and other climate-related risk.

### 6.4. Greener cultural heritage

A short- to medium-term action of both practical and symbolic significance is to make cultural heritage greener. More specifically, sites, monuments and museums need to move towards decarbonisation and reduction in water consumption to contribute to the broader greening of social and economic life. The robust framework of the Cyprus Climate Change Initiative can aid in this effort.

A set of coordinated measures and best practices can help EMME states and local institutions to address the urgent need for greener tourism, which remains a key priority for the sustainable management of cultural heritage against climate change threats. Responding to this challenge, the development and application of comprehensive systems and mechanisms to assess and monitor the carbon emissions and water consumption of cultural heritage infrastructure and related tourist activities is a top priority. Armed with that information, stakeholders can take steps to reduce emissions and water consumption and to support green and sustainable tourism (including transport and travel). The steps required to achieve these objectives include improving the energy efficiency of heritage site infrastructure and the related introduction of renewable energy in the management and protection of sites, and in tourism. Achieving these goals will depend on investment in technologies to reduce emissions and water consumption, supported by the development of eco-labels and eco-stars to identify cultural heritage sites and monuments that have reduced their carbon and water footprint.

## **6.5. Climate cultural heritage education and outreach**

A short to intermediate action with critical long-term social impact is the effective use of cultural heritage to educate and inform societies about the grave threat of climate change. In essence, cultural heritage must become a vehicle for climate action and thus be an agent of societal change and adaptation. For the EMME region, this is also an opportunity for immediate regional cooperation to develop a common understanding of the common threat – and thus a shared response to the challenge. A necessary first step is to systematically harvest local knowledge, experience and expertise.

State authorities and local groups alike stand to benefit from regional cooperation, which will make it possible to identify synergies and offer support and expertise. The necessary regional approach could be led by a dedicated office within the framework of the Cyprus Climate Change Initiative to coordinate education and outreach on the nexus of climate and cultural heritage. This office would form a network of local nodes that would not only provide input, but would also benefit from the experience and practices of partners. Moving from the local to the regional level on education and outreach at the intersection of climate and cultural heritage would directly contribute to the social resilience of the EMME region.

## **6.6. Regional toolkit of best practices, services, communication, and social and economic responses**

Building on the above actions, a new regional toolkit of best practices, services, communication, and social and economic responses will organise the tools developed within the framework of the Cyprus Climate Change Initiative to address the challenges to cultural and natural heritage imposed by climate change. The compilation of the regional index described in section 7.1 will support the development of the capacity needed to assemble a toolkit capable of meeting the varying needs of country stakeholders and properly attuned to the socio-economic needs and the political realities of the EMME region.

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## Executive Summaries

- 1 The Physical Basis of Climate Change
- 2 Energy Systems
- 3 The Built Environment
- 4 Health
- 5 Water Resources
- 6 Agriculture and the Food Chain
- 7 Marine Environment/Resources (web version only)
- 8 Education and Outreach
- 9 Migration
- 10 Tourism (web version only)
- 11 Enabling Technologies
- 12 The Green Economy and Innovation
- 13 Cultural Heritage