



# Workshop on Cultural & Natural Heritage & Climate Challenges

## *Concept Note*

Cultural and Natural Heritage  
and **CLIMATE  
CHALLENGES**

1-2 July 9.30 – 13.00 CEST

  IMPLEMENTED BY  



*Bringing together Cultural and Natural Heritage stakeholders to discuss key challenges related to climate change and work towards solutions*

*This document has been produced in the context of the Copernicus Climate Change Service (C3S). The activities leading to these results have been contracted by the European Centre for Medium-Range Weather Forecasts, operator of C3S on behalf of the European Union (Delegation Agreement signed on 11/11/2014). All information in this document is provided "as is" and no guarantee or warranty is given that the information is fit for any particular purpose. The user thereof uses the information at its sole risk and liability. For the avoidance of all doubts, the European Commission and the European Centre for Medium-Range Weather Forecasts has no liability in respect of this document, which is merely representing the authors view.*



## Contributors

### **RAMBOLL**

Gwendoline Lacressonniere

### **ECMWF**

Chris Stewart



## Table of Contents

|                                                                               |           |
|-------------------------------------------------------------------------------|-----------|
| <b>1. Background and Context</b>                                              | <b>5</b>  |
| <b>2. Cultural and Natural Heritage and climate change</b>                    | <b>6</b>  |
| 2.1 Context: what is Cultural and Natural Heritage?                           | 6         |
| 2.2 Vulnerability of Cultural and Natural Heritage to Climate Change          | 6         |
| <b>3. Cultural and Natural Heritage and Copernicus Climate Change Service</b> | <b>7</b>  |
| 3.1 The role of the Copernicus Climate Change Service                         | 7         |
| 3.2 Cultural and Natural Heritage User needs and Copernicus products          | 9         |
| <b>4. Workshop on Cultural and Natural Heritage and Climate change</b>        | <b>11</b> |



## 1. Background and Context

On 1-2 July 2021, the Copernicus Climate Change Service (C3S) <https://climate.copernicus.eu/> will host a workshop with key sectoral stakeholders to discuss climate challenges for Cultural and Natural Heritage, data needs and potential solutions offered by C3S. This workshop serves the following objectives:

- To understand the climate change-related challenges of the Cultural and Natural Heritage community
- To identify specific needs for climate data, tools and services in order to meet these challenges
- To present the C3S service offering, demonstrate where it fits in the climate service value chain, and determine ways in which it could support the Cultural and Natural Heritage community.

In this document, we expand further on the relevance of climate change data for the Cultural and Natural Heritage sector on one hand, and the workshop programme on the other hand.



## 2. Cultural and Natural Heritage and climate change

### 2.1 Context: what is Cultural and Natural Heritage?

The 1972 UNESCO World Heritage Convention is the principal instrument to identify and protect the world's Natural and Cultural Heritage for the benefit of current and future generations. Around 1120 natural, cultural and mixed places are inscribed on the World Heritage List. Cultural Heritage (CH) includes artefacts, monuments, group of buildings and sites, museums that have a diversity of values including symbolic, historic, artistic, aesthetic, ethnological or anthropological, scientific and social significance (*UNESCO Institute for Statistics, 2009 UNESCO Framework for Cultural Statistics*). About 870 Cultural Heritage sites are registered in the world, with the most important number of sites in Europe. Natural Heritage refers to natural features, geological and physiographical formations and delineated areas that constitute the habitat of threatened species of animals and plants and natural sites of value from the point of view of science, conservation or natural beauty (*UNESCO Institute for Statistics, 2009 UNESCO Framework for Cultural Statistics*). About 210 Natural Heritage sites are listed worldwide. Mixed Heritage sites contain elements of both natural and cultural significance; around 40 sites exist worldwide. Cultural Heritage generates about EUR 300 Billion of yearly Gross Value Added (GVA) in Europe<sup>1</sup>. When it comes to Natural Heritage, taking the example of the Natura 2000 network, which regroups European protected areas whose biodiversity should be preserved<sup>2</sup>, the direct yearly benefits generated amount to between EUR 200 Billion and EUR 300 Billion<sup>3</sup>. The GVA includes goods and services (e.g. the revenues from the exploitation of touristic sites...).

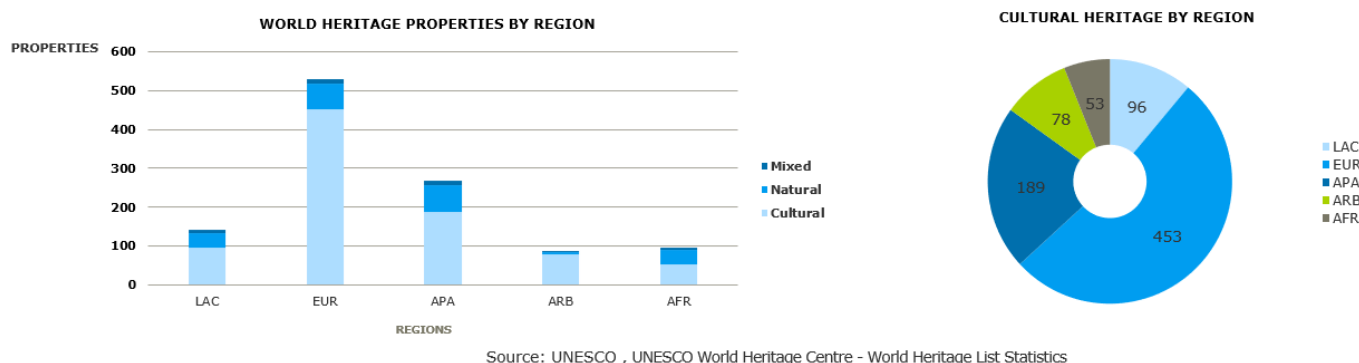


Figure 1 : World Heritage (left) and Cultural Heritage (right) by region (LAC: Latin America and the Caribbean, EUR: North America and Europe; APA: Asia and Pacific; ARB: Arab States; AFR: Africa). Source: UNESCO

### 2.2 Vulnerability of Cultural and Natural Heritage to Climate Change

Cultural and Natural Heritage is threatened by numerous climate change impacts, namely flooding, heat waves, sea level rise, and storms. The issue of climate change impacts on World Natural and Cultural Heritage sites was brought to wider attention during the World Heritage Committee of 2005,

<sup>1</sup> Nypan, T., A proposal for a design to develop European statistics on the socio-economic contributions of the physical cultural heritage (Online). Available at: [http://ehhf.eu/sites/default/files/DESIGN%20FOR%20DEVELOPING\\_FINAL\\_june.pdf](http://ehhf.eu/sites/default/files/DESIGN%20FOR%20DEVELOPING_FINAL_june.pdf)

<sup>2</sup> European Commission website. Available at: [http://ec.europa.eu/environment/nature/natura2000/index\\_en.htm](http://ec.europa.eu/environment/nature/natura2000/index_en.htm)

<sup>3</sup> European Commission, 2013, The economic benefits of the Natura 2000 Network (Online). Available at: [http://ec.europa.eu/environment/nature/natura2000/financing/docs/ENV-12-018\\_LR\\_Final1.pdf](http://ec.europa.eu/environment/nature/natura2000/financing/docs/ENV-12-018_LR_Final1.pdf)



and it has been assessed that “the impacts of climate change are affecting and will affect many properties in years to come” (World Heritage Committee). Therefore, it is crucial to evaluate the vulnerability of Cultural and Natural Heritage over European regions. The vulnerability is defined as the degree to which an identified cultural heritage value is or will be affected by the effects of climate change, such as climate variability and extremes.

| Climate hazard - Chronic                                               | Climate hazard - extreme                                                                                                                                                                                                                                                                                     | Physical impacts                                                                                                                                               | Biophysical impacts                                             |
|------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------|
| Temperature<br>Water derived<br>Wind derived                           | Intense rainfall<br>Diurnal, seasonal extreme events (heat waves)<br>Changes in freeze-thaws<br>Drought<br>Changes in humidity cycles<br>Increasing in time of wetness<br>Storms                                                                                                                             | Flooding (sea, river, coastal)<br>Landslide and changes in appearance of landscapes<br>Sea level rise<br>Coastal erosion<br>Change in deposition of pollutants | Biodiversity loss<br>Hydrology, Water availability<br>Land loss |
| Consequences for Cultural and Natural Heritage                         |                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                |                                                                 |
| <b>Economic loss</b><br>Loss of cultural memory<br>Decrease of tourism | <b>Physical loss</b><br>Deterioration of facades due to thermal stress<br>Freeze-thaw/frost damage<br>Structural damages<br>Penetration moisture into porous CH materials<br>Blackening of materials<br>Salt crystallisation/weathering<br>Biomass accumulation on monuments<br>Effects on Land Biodiversity | <b>Human loss</b><br>Population migration                                                                                                                      |                                                                 |

Figure 2 : Vulnerability of Cultural and Natural Heritage to climate changes. Source: Authors.

### 3. Cultural and Natural Heritage and Copernicus Climate Change Service

#### 3.1 The role of the Copernicus Climate Change Service

The Copernicus Climate Change Service (C3S) provides authoritative information about the past, present and future climate, as well as tools to enable climate change mitigation and adaptation strategies by policy makers and businesses. C3S is entrusted to the European Centre for Medium-range Weather Forecasts (ECMWF) by the European Commission (EC). The core services of C3S include provision of free data (mainly observations, reanalysis, seasonal forecasts and climate projections) accessible via the Climate Data Store (CDS). C3S also provides sector specific support (SIS) and products tailored to the user needs as well as high level analysis reports (monthly bulletins, European State of the Climate (ESOTC)). As an operational service, the datasets offered by C3S come

with comprehensive quality control information. Moreover, tools such as the CDS toolbox are provided to facilitate data processing. To help users make the most of the C3S service offering, user support and training are other essential components of C3S.

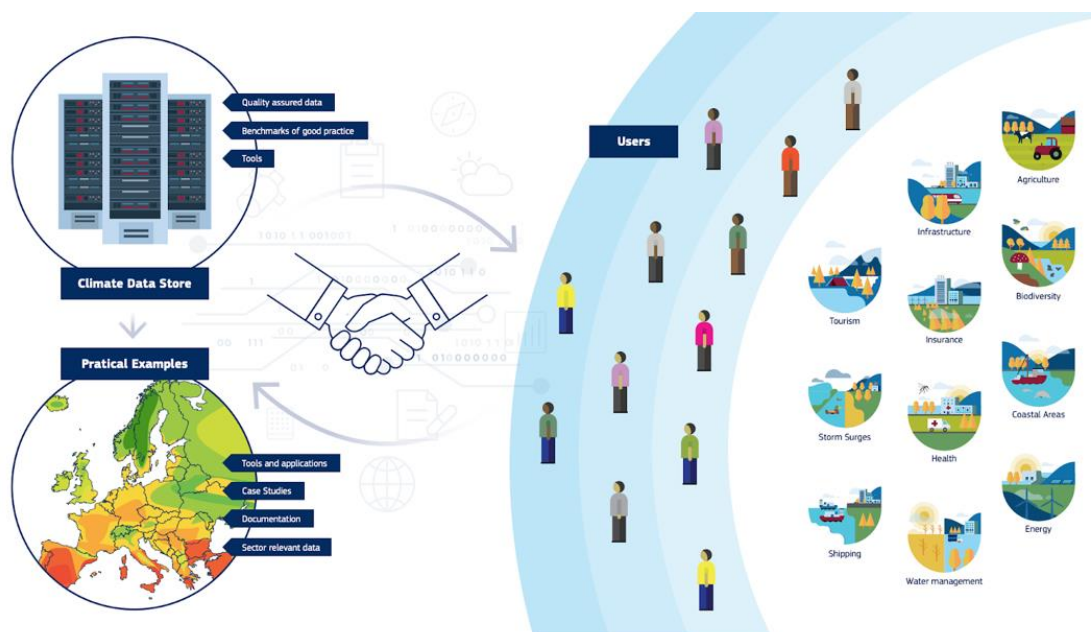


Figure 3 : C3S supports downstream service development. Source: C3S

Copernicus is constantly evolving. Copernicus 2.0 will launch in July 2021 and span the next seven years, with the aim to engage more users and sectoral communities and make the existing services evolve. The C3S programme is committed to being a user-oriented and user-driven data provider, at this juncture more than ever.

### 3.2 Cultural and Natural Heritage User needs and Copernicus products

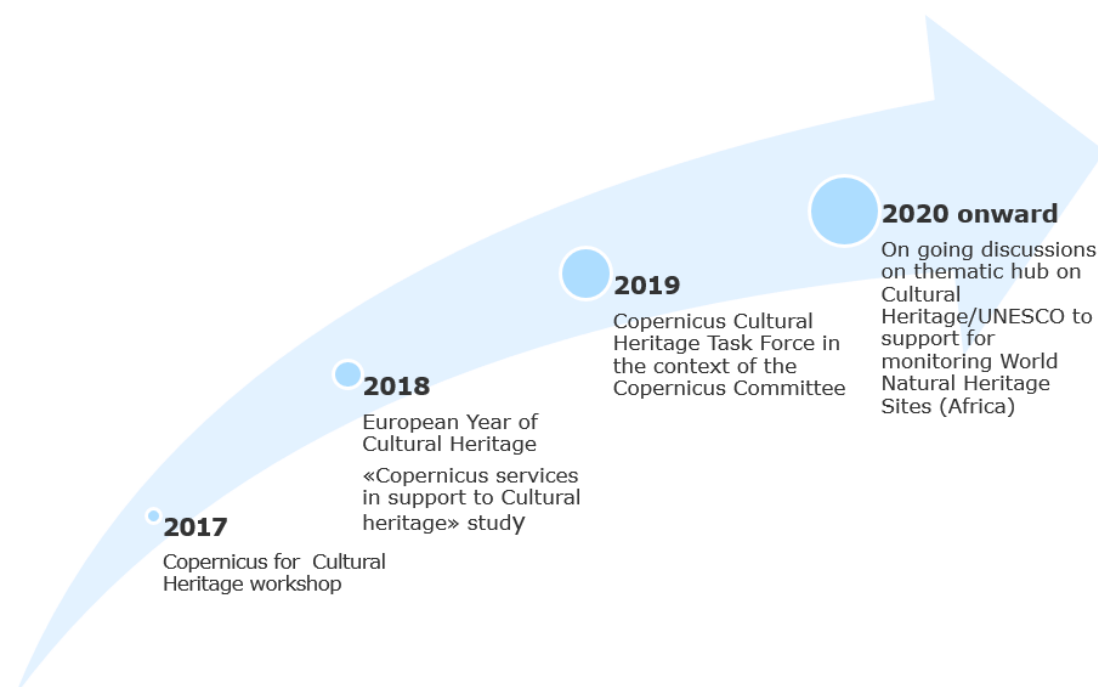


Figure 4 : Copernicus and Cultural Heritage. Source: C3S

The European 2018 Year of Cultural Heritage celebrated the diversity of Cultural Heritage across Europe and stressed the urgency of protection and preservation for the next generations. In this context and following the workshop organized by Copernicus in 2017 (“Copernicus for Cultural Heritage”), a “Copernicus services in support to Cultural Heritage” study<sup>4</sup> was conducted to support the European Commission in promoting the use of Copernicus data for Cultural Heritage preservation, monitoring and management. A first phase was to survey Cultural Heritage user community needs and requirements for the three segments that represent its value chain (creation, production, transmission).

| Creation segment                                                                                                                                                                                                                                                                                                                                                                                         | Production segment                                                                                                                                                                                                                                                                                                                           | Transmission segment                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|
| <p>Study of the natural environment of the site for the detection of underground archaeological features</p> <p>Non-destructive analysis of the underground / underwater positioning of the CH features</p> <p>Non-destructive analysis of the surface positioning of the CH features</p> <p>Mapping of the cultural landscape of the site and identification of the specific risks it is exposed to</p> | <p>Monitoring of the evolution of the natural environment of the Tangible Heritage site</p> <p>Monitoring of the evolution of the natural environment of the Natural Heritage site</p> <p>Observation of damage on the built structure of a Cultural Heritage site</p> <p>Drawing of conclusions to facilitate an emergency intervention</p> | <p>Enable public access to the site</p> |

Figure 5 : High level user needs, source: Copernicus study

<sup>4</sup> Copernicus services in support to Cultural Heritage, 2018



A correspondence analysis matching up needs based on this survey with Copernicus capabilities was carried out and reported in the study. The results of the match analysis suggest that the Copernicus program could cover a large part of the CH user requirements. Following this study, the Copernicus Cultural Heritage Task Force<sup>5</sup>, mainly composed of Member State National experts from both Cultural Heritage and Earth observation domains, assessed in greater detail the current and future potential of Copernicus data, services and products in support of monitoring and protection of Cultural Heritage. The Task Force activities concluded that C3S could support the CH community with relevant information about the past, present and future climate (e.g., temperature increase, sea level rise) and support the development of climate indices (e.g., based on records of temperature, precipitation, drought events) matching the requirements of the sector. Although a plethora of relevant indicators and applications are available already, or can be derived from the core C3S datasets, user awareness of Copernicus datasets may be holding back uptake. Additionally, the launch of Copernicus 2.0 is an opportunity to prioritize the development of new datasets or variables according to feedback from target user communities. The workshop on Cultural and Natural Heritage and climate change aims to enhance user interaction in this sector, as a concrete step to supporting climate adaptation potential in the Cultural and Natural Heritage community.

---

<sup>5</sup> Report on the user requirements in the Copernicus domain to support Cultural Heritage management, conservation and protection, 2019



## 4. Workshop on Cultural and Natural Heritage and Climate change

Following the activities conducted by Copernicus on Cultural and Natural Heritage, the workshop aims to collect the Cultural and Natural Heritage community needs and requirements that are specifically related to C3S. It will aim to pinpoint the data and type of information that are required to tackle the challenges of climate change to Natural and Cultural Heritage. The workshop that will take place the **1<sup>st</sup> and 2<sup>nd</sup> of July 2021**, will give visibility on how C3S products and services may contribute to providing accurate and timely climate change data and information for the Cultural and Natural Heritage stakeholders, and will demonstrate where C3S fits in the “data value chain” of climate services, supporting the downstream sector with data and analysis tools to assist end users. A survey ([https://ec.europa.eu/eusurvey/runner/C3S\\_CulturalHeritage](https://ec.europa.eu/eusurvey/runner/C3S_CulturalHeritage)) will be disseminated through the key stakeholders to collect user needs and requirements and evaluate the gaps with the existing products and services available for Europe’s Cultural and Natural Heritage challenges.

| <b>Proposed Agenda:</b>                                    |                                                                                                         |
|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| <b>Day 1 : 1<sup>st</sup> July (Morning) times in CEST</b> |                                                                                                         |
| 09:30                                                      | <b>Opening session</b>                                                                                  |
| 09:40                                                      | <b>Session 1: Policy perspectives and challenges of climate change on natural and cultural heritage</b> |
| 10:40                                                      | <i>Coffee break</i>                                                                                     |
| 10:50                                                      | <b>Session 2: Cultural and Natural Heritage requirements for climate change adaptation</b>              |
| 11:50                                                      | <b>Session 3: Copernicus Climate Change and Atmosphere Monitoring Services</b>                          |
| 13:00                                                      | <b>Concluding remarks, end of day 1</b>                                                                 |

| <b>Proposed Agenda:</b>                                    |                                                                                        |
|------------------------------------------------------------|----------------------------------------------------------------------------------------|
| <b>Day 2 : 2<sup>nd</sup> July (Morning) times in CEST</b> |                                                                                        |
| 09:30                                                      | <b>Welcome back</b>                                                                    |
| 09:40                                                      | <b>Session 4: User requirements analysis</b>                                           |
| 10:40                                                      | <i>Coffee break</i>                                                                    |
| 11:00                                                      | <b>Session 5 : Breakout rooms</b><br>Participants to split up based on specific topics |
| 12:50                                                      | <b>Concluding remarks, end of day 2</b>                                                |

Table 1 : Workshop agenda



ECMWF - Shinfield Park, Reading RG2 9AX, UK

Contact: [info@copernicus-climate.eu](mailto:info@copernicus-climate.eu)