

COPERNICUS & ME

Copernicus data and services to SHELTER cultural heritage

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THERE IS AN INCREASING NEED FOR ACCURATE AND HARMONISED DATA ON LAND COVER IN MULTI-NATIONAL PROJECTS AIMED AT SAFEGUARDING CULTURAL HERITAGE.



EKODENCE, A TURKISH SME, USES DATA ON LAND COVER FROM SENTINEL-1 AND SENTINEL-2 TO MAP RISKS AROUND CULTURAL HERITAGE SITES.



THE SENTINEL DATA WILL BE USED TO PROPOSE MEASURES TO INCREASE THE RESILIENCE OF CULTURAL HERITAGE SITES AND MAKE RECOMMENDATIONS ON “BUILDING BACK BETTER” TECHNIQUES.



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COPERNICUS



ESA/ATG medialab

COPERNICUS, EUROPE'S EYES ON EARTH

Copernicus is the Earth Observation Programme of the European Union, looking at our planet and its environment for the benefit of global citizens.

Five Copernicus missions are currently in orbit. The data they provide is coupled with ground-based, airborne, and seaborne measurements to make six information services focused on monitoring: Atmosphere, Marine environment, Land, Climate change, Security, and Emergency.

Such services are free and openly accessible and can be used by private, public and international organisations to improve life on Earth.

For more information about Copernicus, visit www.copernicus.eu

THERE IS AN INCREASING NEED FOR ACCURATE AND HARMONISED DATA ON LAND COVER IN MULTI-NATIONAL PROJECTS AIMED AT SAFEGUARDING CULTURAL HERITAGE.

Climate change is exposing historical and cultural sites to threats such as floods, wildfires and heatwaves, among others.

Data on land cover is critical to understand these hazards, as well as to monitor changes around cultural heritage sites [1].

Recent developments in space technology have made spatial information data on land cover more available at local, regional and global scales [2].

Even though spatial information becomes more and more abundant thanks to global Earth Observation (EO) systems, spatial data collected by different entities for different regions of the world still lack standardisation and harmonisation.

Cultural heritage is one of the areas that particularly suffer from the lack of harmonised and standardised data on land cover.

Indeed, in several projects aimed at safeguarding cultural heritage against natural and geological hazards, stakeholders from different countries need data that can be compared (i.e. harmonised and standardised data) to test methodologies and managing tools.





EKODENGE

Type of organisation: SME

Country: Turkey

Annual budget in 2020: € 2m - € 5m

Previous experience with Earth

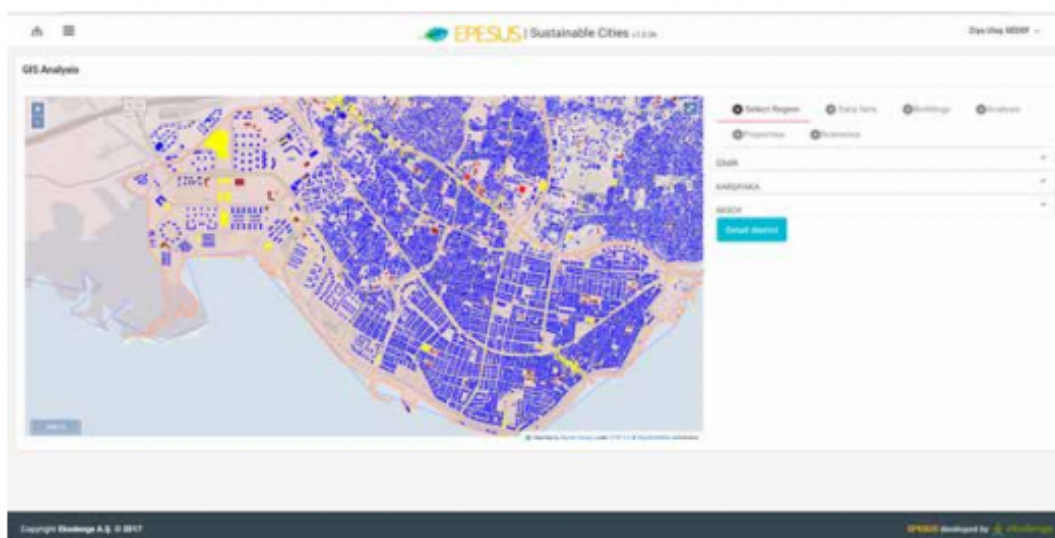
Observation data: Yes

EKODENGE IS A TURKISH SME WITH A TEAM OF SUSTAINABILITY EXPERTS, PROVIDING CONSULTANCY, ENGINEERING, ARCHITECTURE, AND SOFTWARE SOLUTION SERVICES.

Created in 1996, Ekodenge is headquartered in Ankara, at the Hacettepe Technopark research and business centre. The company can count on a multi-disciplinary team of 40 people, including architects, chemical, environmental and mechanical engineers.

Ekodenge works on projects related to sustainability for a variety of private and public clients, including private sector organisations, organised industrial districts, chambers of industry and trade, development agencies, sectoral unions/ associations, and municipalities.

As an example of one of the products created by Ekodenge, EPESUS City is a GIS platform developed in house that calculates the urban carbon footprint for cities needing to develop sustainable climate and energy action plans.



EPESUS for Cities. Source: www.ekodenge.com

TODAY, EKODENGE AIMS TO EXPAND ITS WORK IN THE CULTURAL HERITAGE DOMAIN BY LEVERAGING ON ITS EXPERIENCES IN OTHER SECTORS.

Indeed, since 2019 Ekodenge is part of the Consortium implementing the SHELTER project (Sustainable Historic Environments holistic reconstruction through Technological Enhancement and community-based Resilience).

Funded by the Horizon 2020 programme of the European Commission under grant agreement No 821282 for a duration of four years, the project is coordinated by the Fundación Tecnalia Research & Innovation and involves 23 partners from 10 countries.

THE SHELTER PROJECT AIMS AT DEVELOPING A DATA-DRIVEN AND COMMUNITY-BASED KNOWLEDGE FRAMEWORK THAT WILL BRING TOGETHER THE SCIENTIFIC COMMUNITY AND HERITAGE MANAGERS, WITH THE OBJECTIVE OF INCREASING RESILIENCE, REDUCING VULNERABILITY, AND PROMOTING BETTER AND SAFER RECONSTRUCTION IN HISTORICAL AREAS.

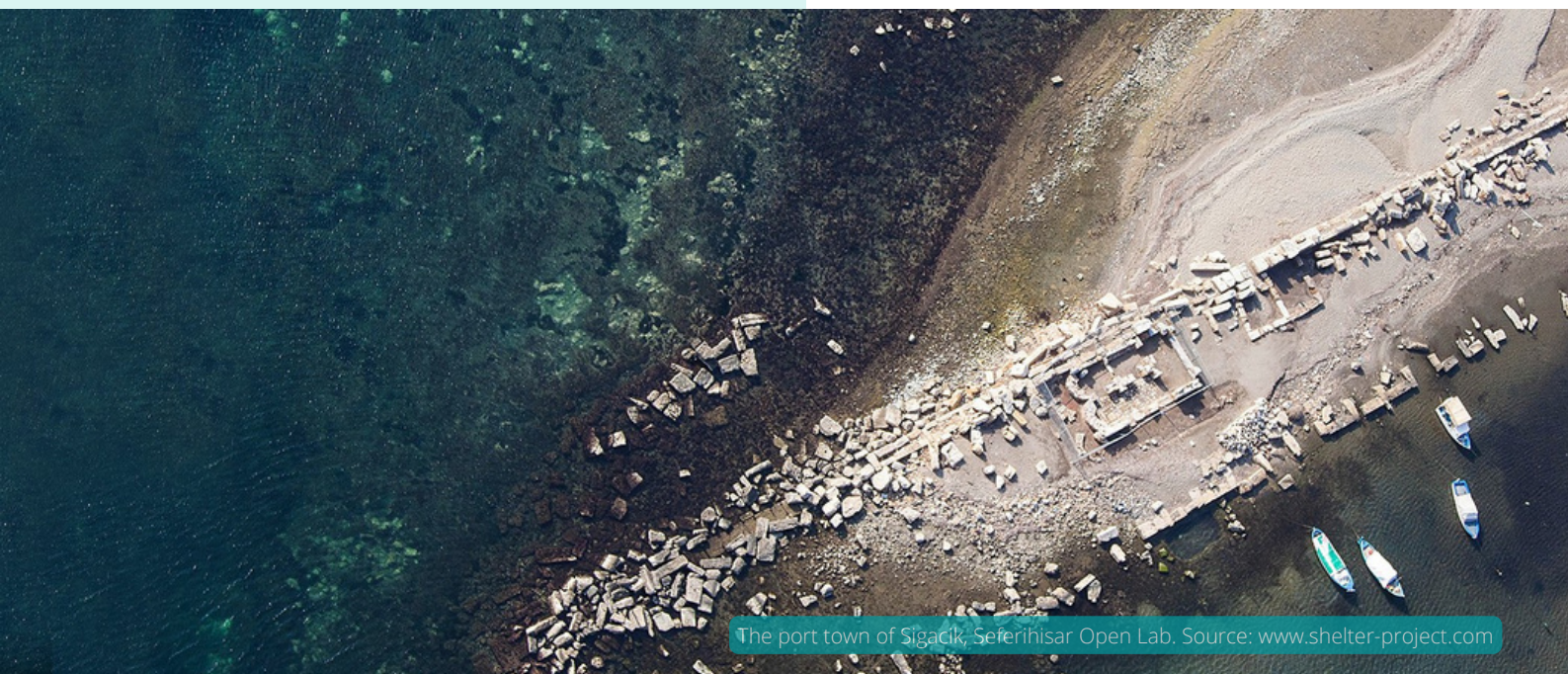


The countries of the 23 partners of the SHELTER project. Source: www.shelter-project.com/partners/

All the developments of the project will be validated in five open-labs, representing the main climatic and environmental challenges in Europe and different heritage's typologies [3]:

- The Santa Croce church and archaeological area in Ravenna, Italy. Characterised by the presence of floor mosaics, the church is exposed to outdoor climatic threats, while the archaeological site is subject to soil subsidence.
- The coastal district of Seferihisar, in the province of Izmir, Turkey. The district is located in a very seismic area. Successive earthquakes have deteriorated the walls of the old Fortress of Sigacik, while the whole area is also subject to extreme heatwaves and storms, which severely affect agriculture and fishery activities.
- The Island of Dordrecht in the Netherlands. The island is part of the historic city centre and includes almost 800 historical buildings, which are threatened by increasing water levels.
- The Serra Do Xurés Natural Park in Galicia, Spain. The area is particularly threatened by wildfires.
- The Sava River Basin flows through Slovenia, Croatia and along its border with Bosnia and Herzegovina, and finally through Serbia, feeding into the Danube in its capital, Belgrade. The area is particularly subject to floods, which endanger the several historical, religious, natural and prehistoric sites on the Danube's rivers.

THE SHELTER PROJECT AIMS AT MAPPING THE RISKS IN THESE SITES, WHILE CREATING EASILY ACCESSIBLE TOOLS TO VISUALISE THEM.



The port town of Sigacik, Seferihisar Open Lab. Source: www.shelter-project.com

**WITHIN THE PROJECT
EKODENGE IS RESPONSIBLE
FOR CREATING A RISK
ASSESSMENT TOOL
VISUALISED ON A GIS.**

**THE GIS HAS TO CONTAIN
INFORMATION ON LAND
USE, USEFUL TO FORESEE
RESILIENCE AND THREATS
TO THE HERITAGE AND TO
PLAN RECOVERY
MEASURES.**

The project aims to develop a set of tools that utilise a common database, and this database needs to have standardised spatial data.

Hence, the GIS platform needs to rely on accurate and sharable information that can be compared over time and allow partners of the project to add their own data in a harmonised fashion.

To do this, Ekodenge needs accurate information on land cover in the sites targeted by the project.



The SHELTER's data-driven platform explained. Source: www.shelter-project.com

IN ORDER TO BUILD THE PLATFORM FOR DISASTER RISK MANAGEMENT IN THE AREAS INCLUDED IN THE PROJECT, THE SHELTER PARTNERS USE DATA ON LAND COVER AND CLIMATE AND HISTORICAL DATA FROM THE SENTINEL-1 AND SENTINEL-2 SATELLITES OF THE COPERNICUS PROGRAMME.

The Copernicus images provide data on vegetation cover, which are useful to foresee fires and to assess resilience metrics related to heatwaves, floods and built areas around the cultural heritage sites.

Moreover, the historical data allow to retrace soil movements, changes in landcover, and weather events, such as heatwaves and floods, that damaged the cultural heritage sites in the past.

These data are integrated in the data-driven platform for disasters risk management produced within the project.

The Copernicus data is particularly useful for this kind of assessments, since the data are freely available across Europe and accessible in the same format.

This means that the data acquired through Copernicus allow Ekodenge to calibrate all different and site-specific data to be used into the same platform. Moreover, the information contained in the platform for each site can be easily compared and updated.



Sava River Basin Open Lab. Source: www.shelter-project.com

COPERNICUS DATA AND SERVICES PROVIDE ACCESSIBLE, HARMONISED, RELIABLE, AND ACCURATE DATA ON LAND COVER AROUND CULTURAL HERITAGE SITES.

Thanks to Copernicus data, Ekodenge can acquire data on land cover for the five different areas targeted in the open labs in a harmonised and standardised format.

The GIS platform developed by the partners of the SHELTER project will contribute to building a model to improve the resilience of cultural heritage sites through better decision-making processes and policies applicable at local and regional levels.

All data will be used on an IT platform after the project ends in 2023. The platform is intended to be used by all the stakeholders operating in the sites targeted by the SHELTER project.

Indeed, it includes tools useful in all phases of risk management, from preparedness measures to increased sites' resilience and stability, to response and recovery measures. This means that the information contained in the platform can be useful for a number of public and private stakeholders, ranging from policymakers to fire brigades, and from construction companies to research institutes.



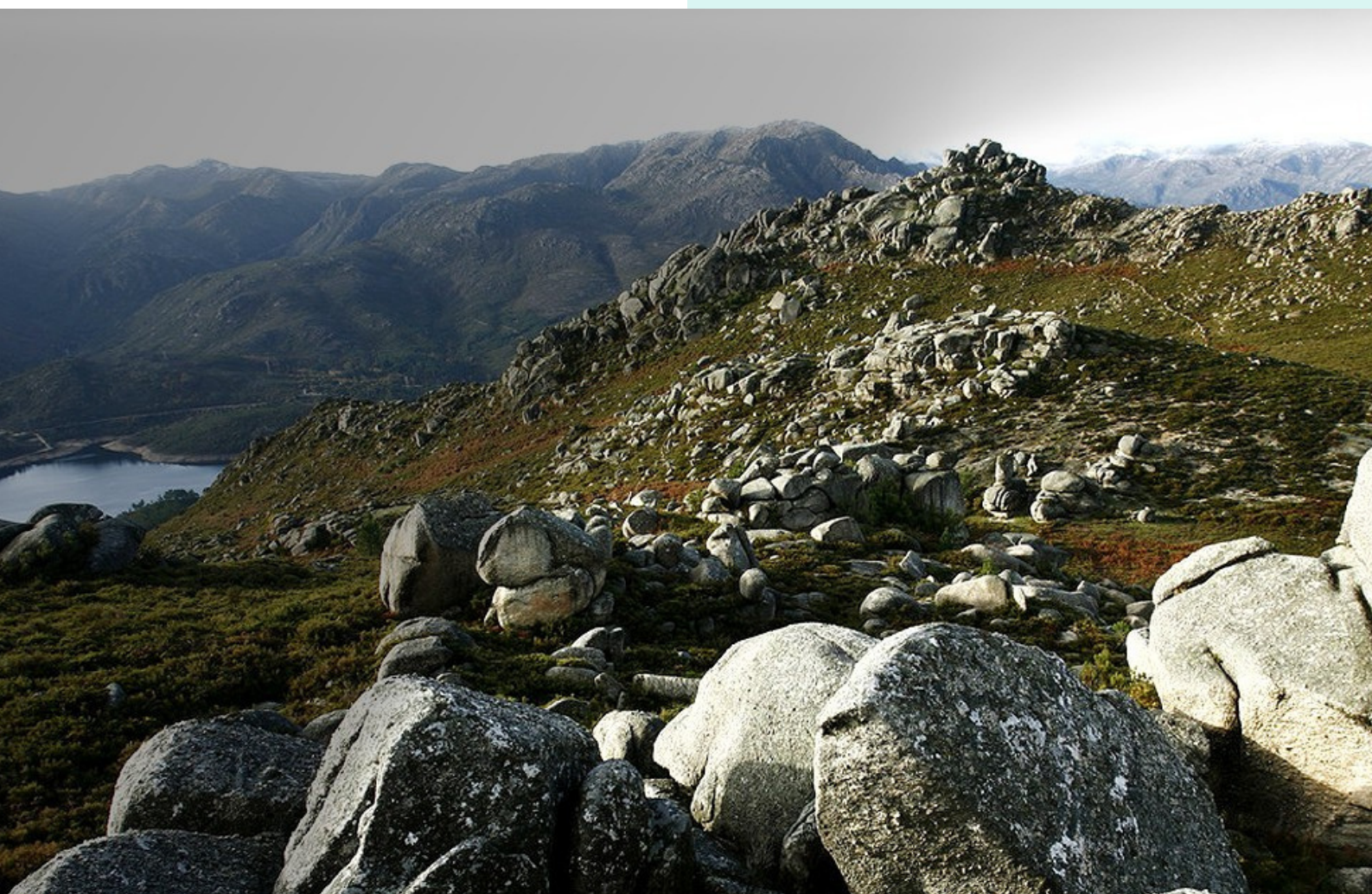
Dordrecht Open Lab, the Netherlands. Source: www.shelter-project.com

Based on the information regrouped in the platform, the project partners will propose measures to increase the resilience of cultural heritage sites and make recommendations on “building back better” techniques.

The platform not only includes information relevant for safeguarding cultural heritage, but also for protecting natural heritage and human settlements from natural disasters and climate change at the regional level.

After this experience, Ekodenge is eager to use Copernicus data to provide similar services to municipalities that often lack the specific spatial information needed to better manage risks.

**THE EKODENGE TEAM HAS
LEARNED HOW TO USE
COPERNICUS DATA TO
ACQUIRE INFORMATION
ON LAND COVER THAT
CAN BE INTEGRATED INTO
GIS AIMED AT DIFFERENT
SCOPES.**



Serra Do Xurés Natural Park Open Lab in Galicia, Spain. Source: www.shelter-project.com

LINKS

Ekodenge website:
www.ekodenge.com
SHELTER project website:
www.shelter-project.com/
HORIZON Europe website:
www.horizon-eu.eu/
Hacettepe Technopark website:
www.hacettepeteknokent.com.tr/
INSPIRE Directive website:
www.inspire.ec.europa.eu/
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website:
[www.copernicus.eu/en/aboutcopernicus/i
nfrastructure/discover-our-satellites](http://www.copernicus.eu/en/aboutcopernicus/infrastructure/discover-our-satellites)

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- [2] Standardization of geographic data: The European Inspire directive, European Journal of Geography, June 2018. Consulted on 10 December 2021.
- [3] Shelter project website:
<https://shelter-project.com/>



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