



Interreg
CENTRAL EUROPE



STRENCH

European Union
European Regional
Development Fund

STRENGTHening resilience of Cultural Heritage at risk
in a changing environment through proactive
transnational cooperation



NEWSLETTER #1
APRIL-DECEMBER 2020





Dear Reader,

we are pleased to provide you with the 1st STRENCH newsletter covering the project duration April-December 2020 presenting the following topics to you:

- 🌱 **Project Description, “STRENCH What is Planned” & Capitalized Projects**
Visit our Webpage: <https://www.interreg-central.eu/Content.Node/STRENCH.html>

- 🌱 **Project Partners & Central-European pilot sites**
Introducing **9 Partners** from **7 Central European Countries**, each presenting their own unique pilot sites ranging from historic parks, ruined hamlets, palaces threatened by flooding and fire to cultural landscapes adversely affected by climate change.

- 🌱 **STRENCH Kick-Off meeting (April 2020)**

- 🌱 **Spotlight: Web GIS Tool**
State of the art Risk-Mapping: <https://www.protecht2save-wgt.eu/>

- 🌱 **STRENCH Summer School 2020 (September/October 2020)**
Fully online held course attracting a global audience and consisting of 15 theoretical as well as practical sessions presented by 12 renowned lecturers.

- 🌱 **Facebook Series on CLIMATE CHANGE IN FORCHHEIM (Franconian Switzerland, Germany)**
Observing changes in temperature, sunshine duration, phenology and occurring drought in the District of Forchheim “Fränkische Schweiz”

- 🌱 **Local Working Table Krems, Austria (November 2020)**





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Natural and man-made hazards, anthropogenic effects and extreme climate change events, are persistently putting natural and cultural heritage under pressure, with an increasing frequency over time. In addition, such disasters and catastrophes impose new and continuously changing conservation challenges, create urgent needs for innovative preservation and safeguarding approaches, particularly during extreme climate conditions.

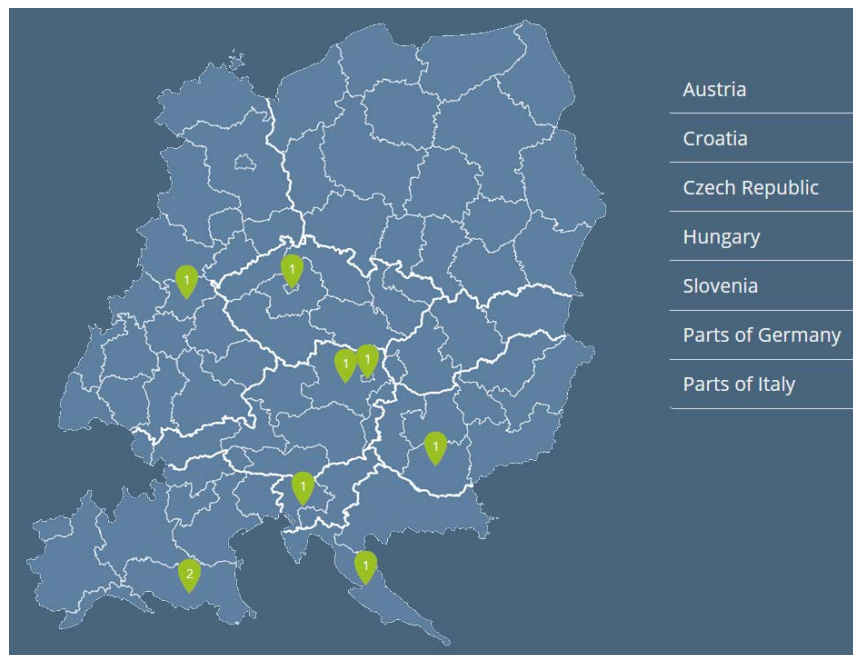
The EU Interreg Central Europe project **STRENCH** – *Strengthening resilience of cultural heritage at risk in a changing environment through proactive transnational cooperation*, develops ready to use solutions for assessing climate change effects and protecting cultural heritage & cultural landscapes. **Web:** <https://www.interreg-central.eu/Content.Node/STRENCH.html>

STRENCH what is planned

The main priorities of **STRENCH** focus on natural and cultural resources aiming to improve capacities for the sustainable use and preservation of cultural heritage in Central Europe. Composed of 9 central European project partners STRENCH’s lead organisation is the venerable Institute of Atmospheric Sciences and Climate of the National Research Council of Italy (ISAC-CNR). With its commencement on March 1st 2020 the **STRENCH** is scheduled to run until February 28th 2022.

STRENCH outcomes strongly contribute to and capitalise from EU funded project results to improve capacities of the public and private sectors to mitigate the impacts of climate change and natural hazards on cultural heritage sites, structures and buildings at risk.

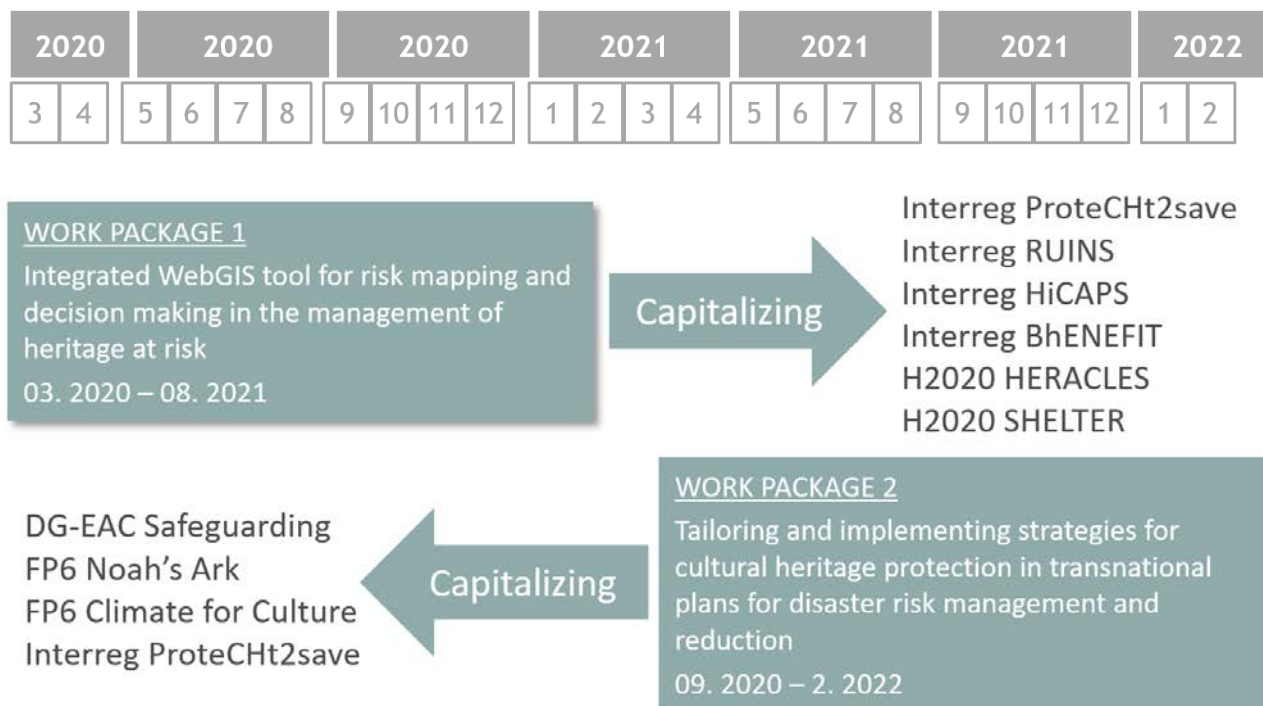
It is specifically tailored and robustly implemented to propose ready-to-use solutions (WebGIS tool,



hazard maps, methodology for vulnerability ranking, strategies for disaster risk reduction) for the assessment of climate change effects in order to define strategies for the protection of



cultural heritage at risk. **STRENCH** further seeks to assist local stakeholders and policymakers responsible for disaster mitigation and safeguarding of cultural heritage assets by improving their know-how on CH protection strategies (preparedness/emergency/recovery). In addition **STRENCH** fosters the active involvement of citizens and local communities in cultural heritage protection.



STRENCH Capitalized Projects



Risk Assessment and Sustainable Protection of Cultural Heritage in Changing Environment. ProteCHt2save contributed towards an improvement of capacities of the public and private sectors to mitigate the impacts of climate change and natural

hazards on cultural heritage sites, structures and artefacts. The project focused primarily on the development of feasible and tailored solutions for building resilience of cultural heritage towards floods and events of heavy rain. ProteCHt2save was composed of 10 project partners from 7 Central European countries.

Web: <https://www.interreg-central.eu/Content.Node/ProteCHt2save.html>



Giving a "second life" to the medieval ruins through modern management and attributing contemporary, socially useful functions, while preserving the historical value of these sites by developing and disseminating transnational guidelines and integrated models of contemporary use, modern management and protection of medieval ruins in Central Europe. **RUINS** was composed of 10 project partners from 6 Central European countries.



Web: <https://www.interreg-central.eu/Content.Node/RUINS.html>

The **HICAPS** project created 8 revitalization concepts for 8 different castle parks in Central Europe aiming to counter deterioration and neglect by improving environmental management in urban areas and successfully using cultural heritage as a resource for local and regional development. HICAPS was of 10 project partners in 4 Central European countries.

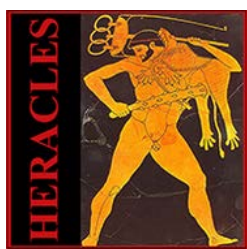


Web: <https://www.interreg-central.eu/Content.Node/HICAPS.html>

BUILT HERITAGE, ENERGY AND ENVIRONMENTAL FRIENDLY INTEGRATED TOOLS for the sustainable management of historic built areas. The **BhENEFIT** project focused on improving the sustainable management of historic built areas, combining the daily maintenance of historic heritage with its preservation and valorization. The project found innovative solutions on how to evaluate the use and historical value of built areas and on how to optimize building performances regarding energy efficiency and structural behavioral increase.



Web: <https://www.interreg-central.eu/Content.Node/BhENEFIT.html>



Heritage Resilience Against Climate Events on Site. HERACLES main objective surrounds the validation and promotion of responsive systems for effective resilience of cultural heritage against climate change effects by taking a holistic, multidisciplinary approach through the involvement of end-users, industry/SMEs, scientists, conservators/restorators, social experts, decision and policy makers.

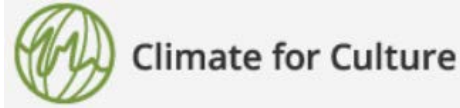
Web: <http://www.heracles-project.eu>

Sustainable Historic Environments holistic reconstruction through Technological Enhancement and community-based Resilience.
The overall objective of **SHELTER** is to establish a cross-scale,



multidimensional, data-driven and community based operational knowledge framework for heritage-led and conservation-friendly resilience enhancement and sustainable reconstruction of historic areas to better cope with climate change and natural hazards.

Web: <https://shelter-project.com/>



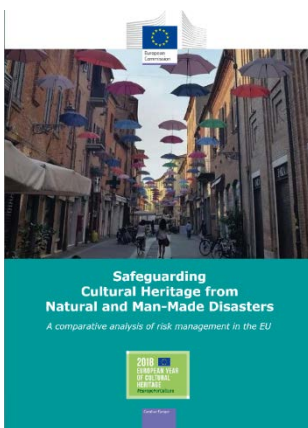
CLIMATE FOR CULTURE investigated the potential impact of climate change on Europe's cultural heritage assets – particularly on historic buildings and their interiors.

Web: <https://www.climateforculture.eu/index.php?inhalt=home>

The **NOAH'S ARK** Project determined meteorological parameters and changes most critical to the built cultural heritage. The project further aimed to research, predict and describe the effects of climate change on Europe's built cultural heritage over the next 100 years and to develop mitigation and adaptation strategies. The dissemination of information on climate change effects, advising of policy-makers and legislators was performed through the project's policy advisory panel.



Web: <https://cordis.europa.eu/project/id/501837>
https://www.coe.int/t/dg4/majorhazards/activites/2009/Ravello15-16may09/Ravello_APCAT2008_44_Sabbioni-Jan09_EN.pdf



Safeguarding Cultural Heritage from Natural and Man-Made Disasters, a comparative analysis of risk management in the EU. This Study presents a comprehensive overview of the existing knowledge, at European and international level, on safeguarding cultural heritage from the effects of natural disasters and threats caused by human action. Furthermore, it maps existing strategies and tools for disaster risk management in the 28 Member States, and provides evidence-based recommendations with the purpose of supporting European cooperation and improving the integration of cultural heritage in national platforms for disaster risk reduction.

Study available on EU Publications: https://europa.eu/cultural-heritage/toolkits/safeguarding-cultural-heritage-natural-and-man-made-disasters_en.html

Web: <https://www.isac.cnr.it/projects/study-safeguarding-cultural-heritage-natural-and-man-made-disasters>



STRENCH Project Partners & Pilot Sites

Austria

University for Continuing Education - **Danube University Krems (DUK) Centre for Cultural Property Protection**. DUK is a state university exclusively oriented towards continuing education, encompassing the needs of working professionals. Located in the UNESCO World Heritage Cultural Landscape of Wachau, it lays great value on respect and sustainable exploitation of cultural heritage. www.donau-uni.ac.at



SISTEMA GmbH offers its customers a wide range of products and services based on remote sensing analysis techniques and IT applications. Thematic services include meteorological, environmental, and dedicated applications/general services and research projects. www.sistema.at



Wachau Cultural Landscape (UNESCO World Heritage Site)

Location: Austria, Lower Austria, Danube stretch between the towns Melk and Krems (approx 36 km).



<https://whc.unesco.org/en/emblem/> (accessed Nov 26th 2020)

“Criterion (ii): The Wachau is an outstanding example of a riverine landscape bordered by mountains in which material evidence of its long historical evolution has survived to a remarkable degree. Criterion (iv): The architecture, the human settlements, and the agricultural use of the land in the Wachau vividly illustrate a basically medieval landscape which has evolved organically and harmoniously over time.”

(<https://whc.unesco.org/en/list/970>>, accessed on Nov 20th 2020)



© Donau Niederösterreich

Traditional agricultural cultivation particularly of viticulture (terraced vineyards, historic dry stone wall terraces) and apricots. Exceptionally high density of historic architecture along the banks of the Danube River as well as in the hills surrounding the river and its hinterland.

Immediate Hazards: Floods (particularly Danube floods), flash floods (particularly tributaries of river Danube), landslides, fires (historic towns of Wachau)



Vulnerability: Climate change and increased tendency to extreme weather events such as sudden frost after long warm springlike periods, hail, early spring storms etc. pose a significant risk to the famous blossoming of the Wachau apricot trees and cause significant crop failure.



©Stefan Rotter

The location of several historic towns (Melk, Duernstein, Spitz, Stein, Krems, Weissenkirchen etc.) directly on the banks of river Danube and at the foot of the descending hills of the valley, makes them vulnerable to Danube floods, landslides from the steeply ascending walls of the Danubian water gap and flash floods from tributary creeks.

The old towns of Melk, Duernstein, Krems and Stein are medieval in their structures. Bricks, stones and wood are the main building materials, wood especially in the roof constructions and first floors. This fact makes them very vulnerable to fire.

Croatia

Municipality of Dugopolje is a local public authority in Split-Dalmatia county, Croatia. The vision of the Municipality of Dugopolje is to synthesize their own geo-traffic, natural, spatial, and cultural resources, to become an example of successful local development based on the preservation of valuable cultural and natural heritage, tourism and innovation entrepreneurship. www.dugopolje.hr



©Marija Čipčić

Kolići Hamlet

Location: Croatia, Split-Dalmatia County, Dugopolje. Hamlet in mountain areas. Hamlet Kolići is an example of a traditional Dalmatian village mostly made of stone material.

Immediate Hazards: Fire (due to drought), landslides.

Vulnerability: Due to its position in the Mediterranean area, Kolići hamlet is threatened by a high risk of drought and forest fires that can damage the local cultural heritage including prehistoric mounds along the ancient road as well as a ruined medieval settlement. These hazards pose an increasing threat to this area, especially due to climate change. Since the hamlet is located on the slopes, it is also endangered by the slope processes, including landslides.



Czech-Republic

The Institute of Theoretical and Applied Mechanics (ITAM), located in Prague, the ITAM is part of The Czech Academy of Sciences. ITAM works on scientific research in the field of solid-phase mechanics, in recent years broader interdisciplinary research of historic materials, structures and sites have been developed for safeguarding architectural and built heritage. It includes the development of relevant methods for diagnostics, monitoring and failure analysis of mainly timber and masonry structures as well as methods of their surveying, investigation, documentation, consolidation and conservation.



www.itam.cas.cz

Troja Palace/Hamlet

Location: Czech Republic, Prague, Troja, hamlet, palace and gardens. Troja hamlet lies in the proximity of the Vltava River.



© P. Diem

Immediate Hazards: Flooding (Vltava River), windstorm, fire.

Vulnerability: Historical constructions and their contents are mostly made of porous material which is highly susceptible to floods; in particular building components as well as natural heritage is vulnerable to dynamic and static forces, flowing objects, moisture degradation of materials and biological colonization etc. The vulnerability profile of the site is also characterized by the lack of maintenance plans specifically dedicated to cultural heritage assets. Finally, structural and architectonic elements typical of the Baroque period, in particular roofs and spires, are highly prone to vibration induced by strong winds.



©ITAM



Vltava River Flooding (2002)



©ITAM



©ITAM

Germany

The District of Forchheim (DoF) is located at the northern part of Bavaria, Germany. The District Council Forchheim is a local government authority and is part of the Nuremberg metropolitan region. So far, the impacts of climate change on the cultural and natural heritages of the DoF have not been assessed in detail. Thus, the DoF is pleased to be part of STRENCH project and aims to elaborate a climate adaption strategy in collaboration with the project partners of STRENCH and regional stakeholders. . www.lra-fo.de



© TZ Fränkische Schweiz/Trykowski

Franconian Switzerland

Location: Germany, Bavaria, District/local government Landkreis Forchheim, around 20 municipalities with several hamlets and touristic scenes of cultural and economic value. The DoF comprises parts of the nature park “Fränkische Schweiz” (Franconian Switzerland), which



is part of the low mountain range “Fränkische Alp” (Franconian Alp) and has a long settlement history. Consequently, the *Franconian Switzerland* covers cultural heritage and natural heritages such as a characteristic mountain and hilly cultural landscape with a high density of castles and ruins, striking rock formations and caves, deep valleys formed by rivers and old architecture. These include cultural heritage assets such as hamlets e.g. half-timbered houses,



© TZ Fränkische Schweiz/Trykowski



mills and rural areas with natural, typical landscapes including fruit growing areas and cherry plants. Relevant to the STRENCH project is the typical cultural landscape of fruit production (especially cherries) and timbered houses in the valleys. This cultural landscape must be protected by the challenges of climate change.

Immediate Hazards: Flooding, drought, late frost events

Vulnerability: The cultural landscapes are facing more frequent and increasingly unpredictable water floods especially in the mountain areas and valleys. The current climate change puts increasing pressure on the traditional agriculture and landscape typical for the area. Traditional agricultural fruit growing (especially cherries) face increasing water drought damage and temperature extremes such as late frost resulting in severe crop failure. New invasive pests contribute to growing list of problems faced due to climate change.



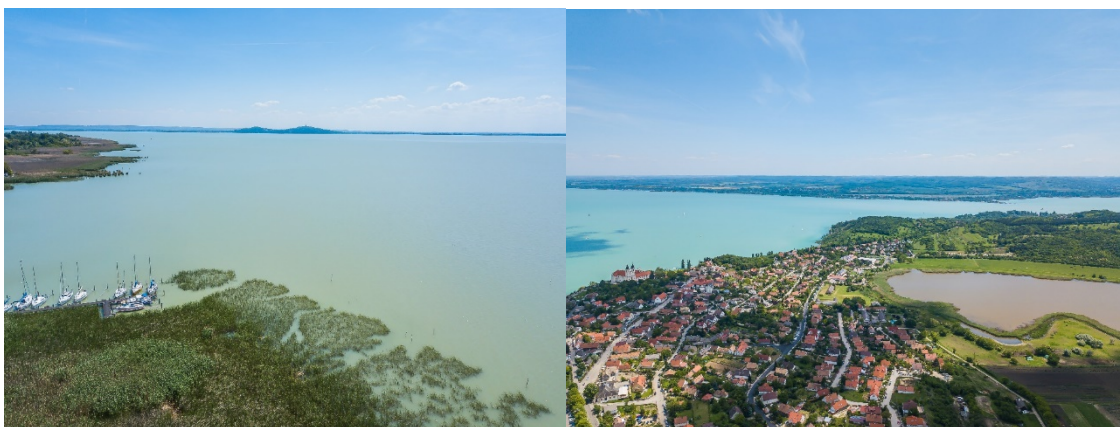
Hungary

Lake Balaton Development Coordination Agency, (LBDCA) is a non-profit organization established by the Lake Balaton Development Council. The LBDCA aims to protect natural values of Lake Balaton and to increase the competitiveness of the region at international level through learning about and adopting foreign best practices. www.balatonregion.hu



Lake Balaton Region

Location: Hungary / Lake Balaton Region / 180 settlements belong to the region (4480 km²). The largest lake in Central Europe is Lake Balaton.



© Tamás Helényi



The Lake Balaton region offers a landscape characterized by a natural spectacle of volcanic and erosion phenomena creating a hot water karst lake - the world's largest hot water spa. An Endemic habitat of relics and rarities and a viticulture with a history of more than 2000 years. Besides the cultural landscape the region hosts thousands of years old landscape structures, settlements and road networks with a living architectural tradition focusing on the given landscape and geographical conditions.

Immediate Hazards: Flash floods, landslides, peat fires, invasive species, drought, low/high groundwater level, high lake water level, insects, i.e. wooly butterfly gradation

Vulnerability

The shorezone of Lake Balaton is mainly artificially built environment (the total length of the shoreline of Lake Balaton is 235 km, of which 107.5 km long shoreline is artificially built and regulated). Installations, unauthorized embankments, the creation of unlicensed boat and sailing exits, and tourism developments have contributed to the extinction of a significant portion of waterfront reeds, sedges, and grasslands that are important for both water quality and nature conservation.



© Local Government of Balatonfüred 2015

Climate change: droughts and decline in groundwater level, resulted by climate change, have a direct or indirect effect on different forest types. Significant conversion of wetlands: regulation, riverbed management, intensification affect many wetlands. The rapid growth of invasive species, lack of official action (no enforcement) and aging population unable to continue traditional forms of cultivation pose additional threats.



© kapos.hu 2011

Below left: Algae blooming (water quality deterioration) at low water level due to climate change:



© Lake Balaton Development Coordination



© Lake Balaton Development Coordination

Above right: Destroyed shoreline by a towering ice block, 2006 Siófok



Italy

Institute of Atmospheric Sciences and Climate (ISAC) - National Research Council (CNR) of Italy is the largest CNR Institute on atmospheric sciences and one of the top-level Institutes of the Department of Earth System Science and Environmental Technologies. The ISAC research team involved in STRENCH aims at assessing, predicting and managing the effects of natural, environmental and anthropogenic hazards on built heritage and cultural landscapes, including the impact of extreme events. www.isac.cnr.it

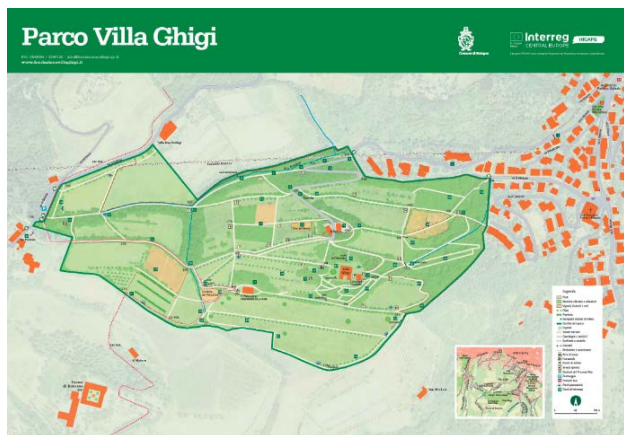


Villa Ghigi Foundation “Fondazione Villa Ghigi” (FVG) mission pertains the preservation and management of the Villa Ghigi public park (30 hectares) and the management of other public parks near Bologna. FVG focuses primarily on the careful planning and administration of public green areas combining a sustainable management with the preservation of ecological and historical aspects of the territory. www.fondazionevillaghigi.it

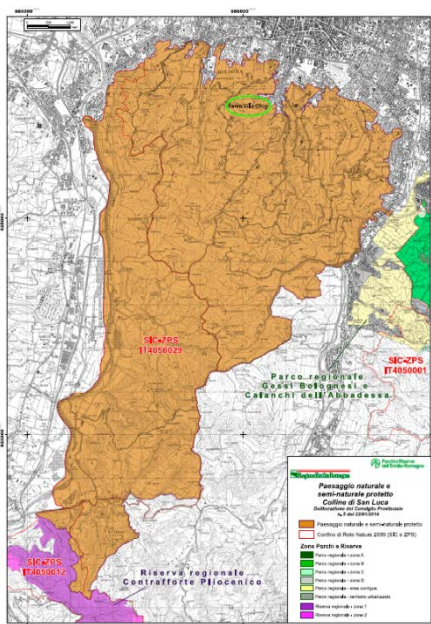


Parco Villa Ghigi

Location: Italy, Emilia-Romagna, Bologna. Located only 2 km from the heart of Bologna the Piazza Maggiore the Villa Ghigi park extends over an area of 29 hectares encompassing several historic buildings and gardens such as the Convent of the Observance, the neoclassical Villa Aldini (built in the early nineteenth century in place of the ancient sanctuary of the Madonna del Monte), the Eremo di Ronzano and the former monastery of San Michele in Bosco (today Rizzoli Orthopedic Institute).



© Fondazione Villa Ghigi



The park itself offers an exemplary synthesis of the Bolognese hilly landscape (and also of its dynamics and problems). Next to the great naturalistic value associated with meadows, hedges, shrubs and strips of forest, there is the remarkable heritage of rural biodiversity linked to the numerous species of fruit trees of ancient cultivars typical of the Bolognese hills.

Immediate Hazards: Torrent rainfalls, periodic floods, drought, (out of season) weather events

© Fondazione Villa Ghigi



Vulnerability:

Increasingly frequent episodes of intense rainfall coinciding with a poor drainage network cause problems in regulating the parks surface waters leading to hydrogeological instability (landslides) and flooding. The current state of the drainage network is a result a simplification process initiated during the public opening of the park resulting in a reduction of the ancient agricultural arrangements with expansion of the plots and closure of ditches and drains. These floods have a severe effect on the parks infrastructure leading to the collapse of road surfaces severely damaging the infrastructure of the park.

Other hazards include out of season snowfall and strong windstorms causing damage to the prized trees in the park. Further changing climatic conditions leading to drought decrease the vegetative phytosanitary state of the arboreal specimens of the park further increasing concerns on the geological, geomorphological and hydrogeological nature of the slope where the park is located.



Among the dangers identified, sporadic episodes of strong wind and abundant or "out of season" snowfall caused the nipping of branches or subsidence of entire trees. The changed climatic conditions of recent years (and the consequent problems of water crisis and drought) are compromising the vegetative and phytosanitary state of some arboreal specimens of the park.

© Fondiazone Villa Ghigi

Slovenia:

Urban Planning Institute of the Republic of Slovenia (UIRS) is the main national urban research institute in Slovenia in the field of spatial, regional and urban planning and related disciplines researching also architectural and cultural heritage sites, developing innovative methods and tools. The Urban Planning institute has been involved in several EU and national projects dealing with the issue of the sustainable management of historical urban areas regarding cultural heritage preservation, climate change issues and developing and implementing ICT tools. www.uirsi.si



Vipava Valley

Location: Slovenia, south-eastern part of Slovenia. For millennia, the Vipava Valley area has been a passage way between Italy and the Danube region which has enriched the valley with various cultural heritage sites.



©Frank J. Zakrajsek

A special cultural landscape suitable for fruit and wine production dominates the area. Sacred monuments, mostly churches from the Gothic period, and castles constitute cultural landscape of national importance ranging from the Roman period to the 19th century. Roman fortification and baths (Ajdovščina) 17th century hunting manor (Zemono) and monuments from the 19th century as the Coronini manor are but just a few sites to be found in the valley.

Immediate Hazards: Flooding, Bora wind

Vulnerability: Due to geographical, hydrological and climatic characteristics the Vipava valley is affected by natural disasters, including floods caused by Vipava river flowing through the valley and the bora wind a northeasterly wind, which comes down to the valley with high speed from the mountain peaks causing destruction. The Vipava River Basin is part of the Soča River Basin.

The Vipava River is 45 km long with an average annual flow of 17.3m³/s. The water level of the Vipava River is subject to high oscillations inflow due to surface tributaries. Regulation and canalization in the eighties in the previous century profoundly changed the water regime in the whole valley. Although these interventions successfully transformed a large area for agriculture purposes several catastrophic floods occurred in the past years which resulted from changes in the precipitation regime in the lower part of the valley.



©Frank J. Zakrajsek



STRENCH Kick Off Meeting

Held on April 16th 2020 during the mid of the 1st wave of Covid-Lockdowns the STRENCH Project Partners nonetheless moved forward and utilizing an online alternative to host their Kick-Off-Meeting (KoM).

We would have liked to have hosted the project partners in our CNR-ISAC institute and in our beautiful city of Bologna. To meet in person to celebrate the start of this new project, and to agree on the activities to be carried out, especially in this first semester. However, the serious health situation didn't allow us.



Despite the fear of this COVID-19 pandemic, the research does not stop! With this positive spirit the KoM online meeting of the STRENCH project took place online with the participation of 24 people. After the official welcome of the Lead Partner and a brief presentation of the consortium, each partner presented the project(s) to be capitalized:

Interreg CE ProteCHt2save, 7FP Noah's Ark, Climate For Culture DG-EAC Safeguarding – presented by ISAC-CNR (LP)

Interreg CE RUIINS – presented by ITAM

Interreg CE HiCAPS – presented by FVG

H2020 HERACLES, H2020 SHELTER – presented by SISTEMA

Interreg CE BhENEFIT – presented by UIRS

The Work Package (WPTs) coordinators (CNR-ISAC vs WPT1, ITAM vs WPT2) presented all the activities to be carried out, focusing particularly on those with an impending deadline. DUK as WPC (communication) coordinator presented the planned activities and the proposal for the implementation of each product.

In addition to the project partners, the representatives of the programme's Joint Secretariat (project manager and financial manager) attended the meeting, clarifying the legal and economic point of view. The Lead Partners CNR ISAC has also provided specific details in relation to the establishment of the management committee, the financial management, the six-monthly progress reports and use of the eMS platform for the insertion of all data.

We hope to be able to carry out the next face-to-face meeting to also get to know the territories of the pilot sites better, but in the meantime, there is no shortage of work to be done.



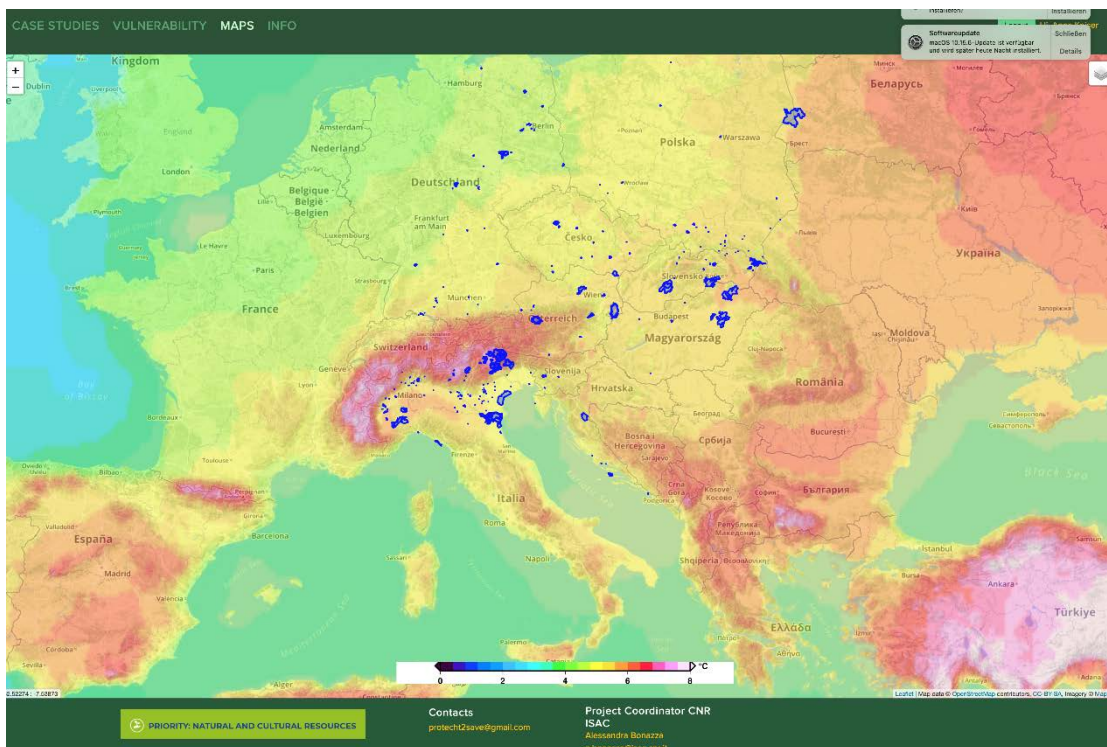
Spotlight: STRENCH Work Package (WPT1) Web GIS

WPT1 - *Integrated WebGIS tool for decision making in the management of heritage at risk* (ISAC-CNR). **WEB-GIS Tool:** <https://www.protecht2save-wgt.eu/>

As part of the Interreg STRENCH project an online WebGIS tool for the production of risk maps to support public authorities and private organizations in the decision-making process for the protection of CH at risk in climate change, will be implemented. The Web GIS tool was developed in the ProteCHT2save project including risk assessment due to heavy rains, flooding of large basins and drought-related fires. The tool will also be integrated with the results of the capitalized projects and with the risk of floods, wind storms and landslides on further culture categories (cultural landscapes, historical parks, archaeological sites and small ruined villages in mountain and coastal areas). The activities surrounding the WPT1 focused, in this first period, on two main topics:

- In May, an Excel file was sent to the consortium, prepared by CNR-ISAC with ITAM support, in order to find the correct way to better capitalize on the results of our project. The file consists of 5 sheets for the collection of information relating to: Projects outputs capitalised, Existing National and Regional Plans and Strategies for Risk Management, Existing Vulnerability / Risk Maps, Existing GIS Platforms, Record of Past Catastrophes. The purpose of this collection was to obtain preliminary information to prepare an inventory of outputs and approaches from EU Projects for managing cultural heritage at risk (D.T1.2.1).

- In June to the partners of the capitalized projects and the local stakeholders involved, were asked to complete a questionnaire specifically created by the CNR-ISAC. The result of this survey are included in the deliverable stakeholder consultation and user requirement identification (D.T1.1.1) and will be the first step for the development of hazard maps linked to extreme climates for short and long term risk assessment (A.T1.1).



STRENCH Summer School 2020

Joint ENVIMAT and Cultural Property Protection Summer School 2020

28th September to 9th October 2020 | online
Tools and Strategies for Strengthening Resilience of Cultural Heritage in Climate Change

Danube University Krems. Department for Building and Environment.
www.donau-uni.ac.at/dbu/summerschool

Hosted by the Danube University Krems, and organized jointly with ISAC-CNR between September 28th and October 9th 2020 the **STRENCH Summer School** offered its participants a fully online held course consisting of 15 theoretical as well as practical sessions presented by 12 renowned lecturers.

Cultural Heritage Protection from a military and law enforcement perspective:

Cultural Property Protection in the 21st Century: A View from the Most Deployed Division & The Italian Model for Cultural Property Protection in Case of Natural Disasters

Cultural Heritage Protection from a civilian perspective:

- 🕒 Cultural Heritage Protection Design: Identification of Threats and Vulnerability Assessment
- 🕒 Vulnerability of Cultural Heritage: Challenges and Opportunities of Resilience Building
- 🕒 Building Materials for Cultural Heritage: Characterization, Damage and Protection

Cultural Heritage Protection in the face of climate change:

- 🕒 Cultural Heritage at Risk due to Impact of Extreme Climate: the Role of the Satellite Observations & Climate Extremes in a Changing Climate
- 🕒 Managing Cultural Heritage at Risk in a Changing Environment

State of the Art Satellite based Tools for Cultural Heritage Protection:

- 🕒 Copernicus in Support of the Safeguarding of Cultural and Natural Heritage at Risk
- 🕒 Risk Mapping for Protection of Cultural Heritage exposed to Climate Extremes
- 🕒 Practical Training WebGIS Tool for Risk Mapping

With approx. 70 registrations the Danube University Krems would like to convey its sincerest gratitude to the lecturers and participants of this successful Summer School!



FACEBOOK SERIES ON CLIMATE CHANGE IN FORCHHEIM

Project Partner: District Council Forchheim, **Author:** Sebastian Maier

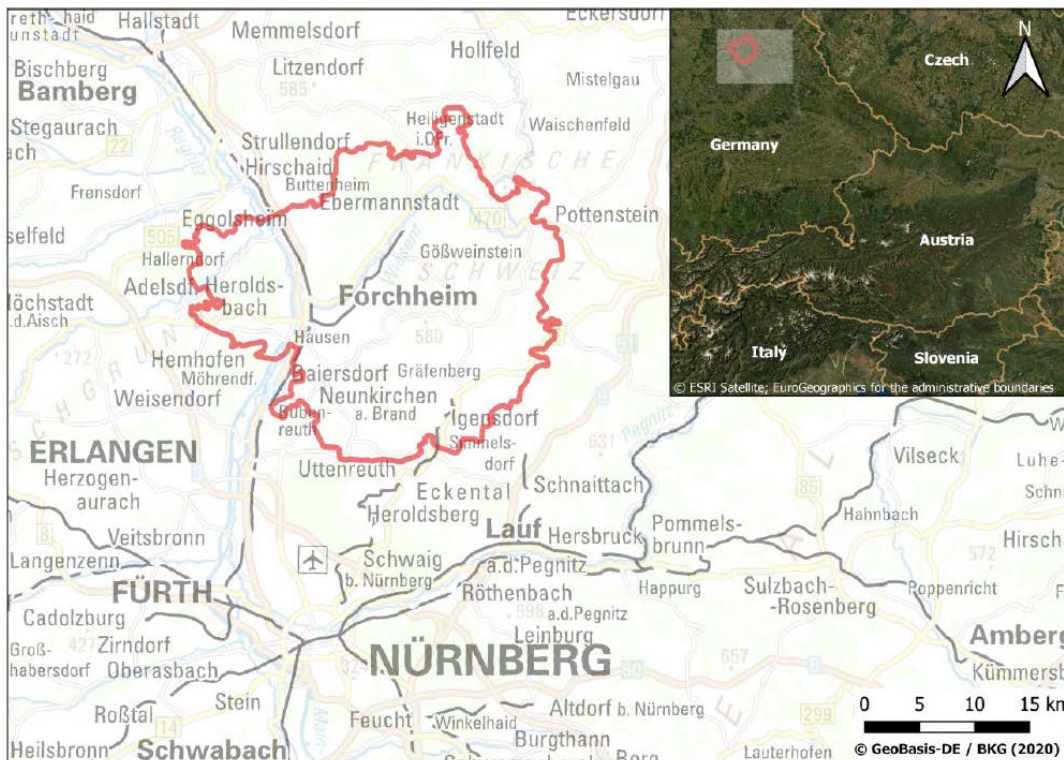
Published by Sebastian Maier as a 6 part Facebook Series on the STRENCH Facebook Page between the 26th and 28th of October the article gives valuable insights in the effects of climate change on the district's cultural landscape. STRENCH Facebook Page: <https://www.facebook.com/Strench-Interreg-Central-Europe-Project-101358324888295/>

Part 1: Introduction of the District of Forchheim

The District of Forchheim (DoF) is located at the northern part of Bavaria, Germany, and is part of the Nuremberg metropolitan region. The DoF comprises parts of the nature park "Fränkische Schweiz" (Franconian Switzerland) which has a long settlement history. Consequently, the Franconian Switzerland covers cultural (CH) and natural heritages (NH) such as a characteristic mountain and hilly cultural landscape with a high density of castles and ruins, striking rock formations and caves, deep valleys formed by rivers, but also meadow orchards and fruit tree plantations.

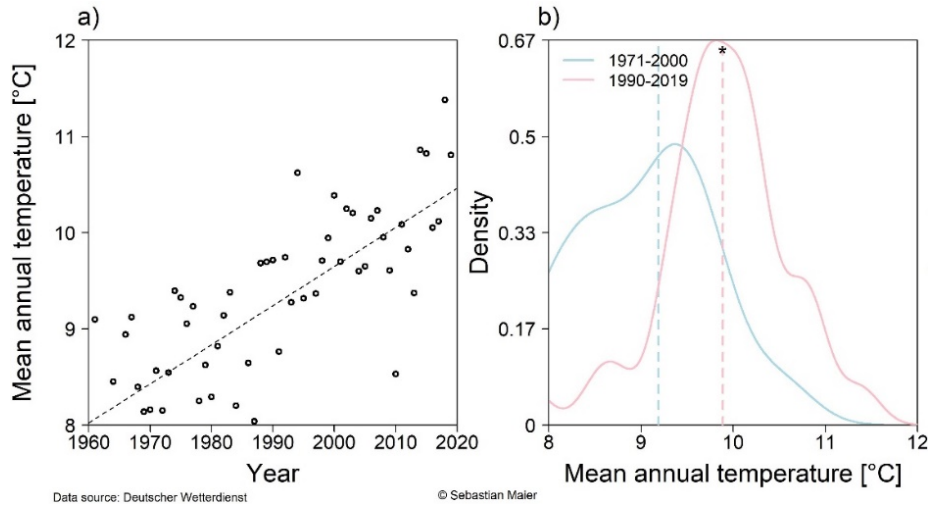
However, due to its site conditions, the DoF with its CH and NH is particularly susceptible to natural and climatic hazards. Thus, it is of great importance to gain basic knowledge on how the District of Forchheim will be affected by climate change. Therefore, the District Council Forchheim is pleased to be part of the Interreg Central Europe project STRENCH.

Given the support of the project partners, the DoF aims to elaborate a climate adaption and mitigation strategy which is intended to be fact-based. Consequently, climatic trends and changes have been assessed for the District of Forchheim on the basis of climate observations.

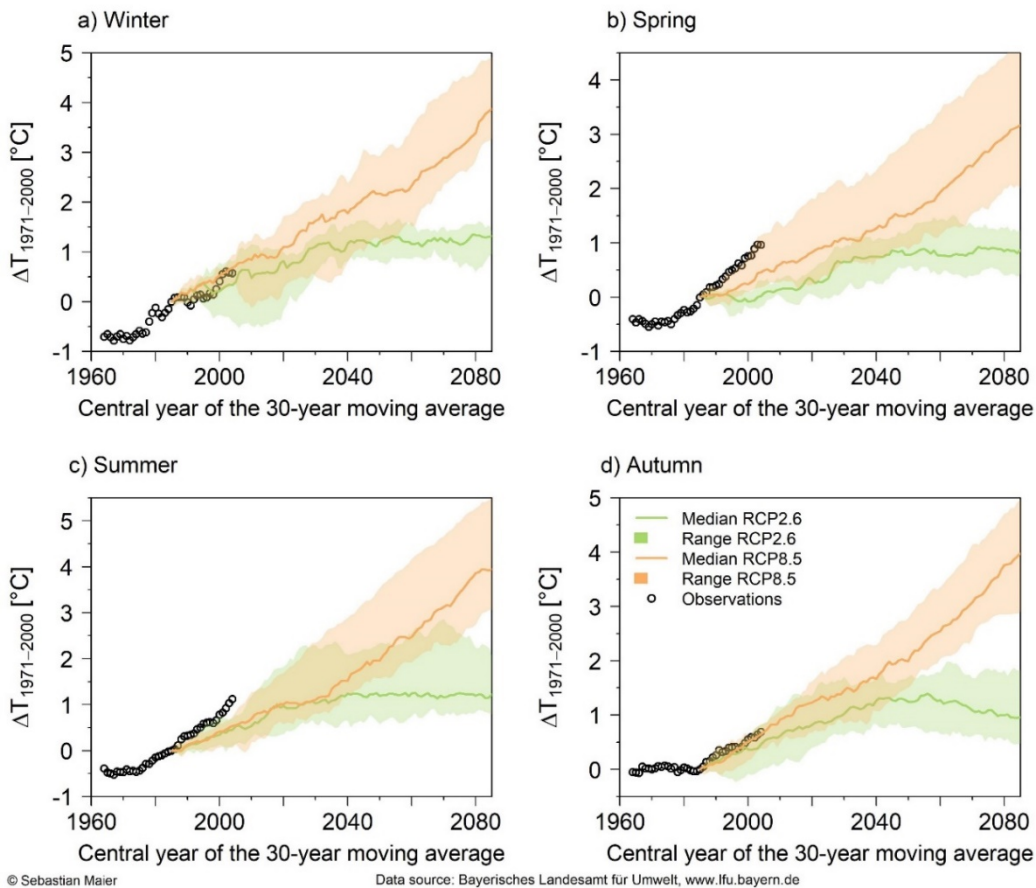


Part 2: Temperature

Time-series analysis indicated a clear trend of increasing temperatures in the District of Forchheim (DoF). Considering the two climate periods 1971-2000 and 1990-2019, the mean annual temperature increased from 9.2°C to 9.9°C. The frequency distributions of the mean annual temperatures of the two climate periods revealed less frequent “cold years” and more frequent “hot years” in the climate period 1990-2019 compared to the period 1971-2000. Additionally, the annual number of heat days (days with maximum temperatures of $\geq 30^{\circ}\text{C}$) almost doubled from 1971-2000 (6 heat days) to 1990-2019 (11 heat days) for the climatic region to which the DoF belongs.



Moreover, interestingly, the observed 30-year running mean of annual temperatures in spring and summer already reached the predicted median of the climatic period 2071-2100 following RCP2.6 at the climatic region “Forchheim-Fuerth-Erlangen-Hoechstadt-Nuernberg”.



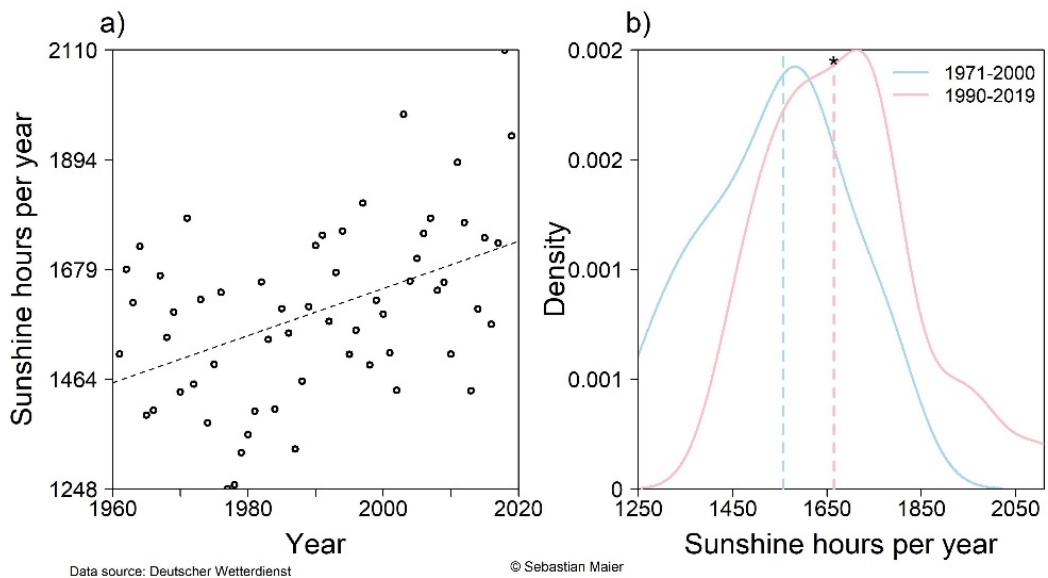
© Sebastian Maier

Data source: Bayerisches Landesamt für Umwelt, www.lfu.bayern.de



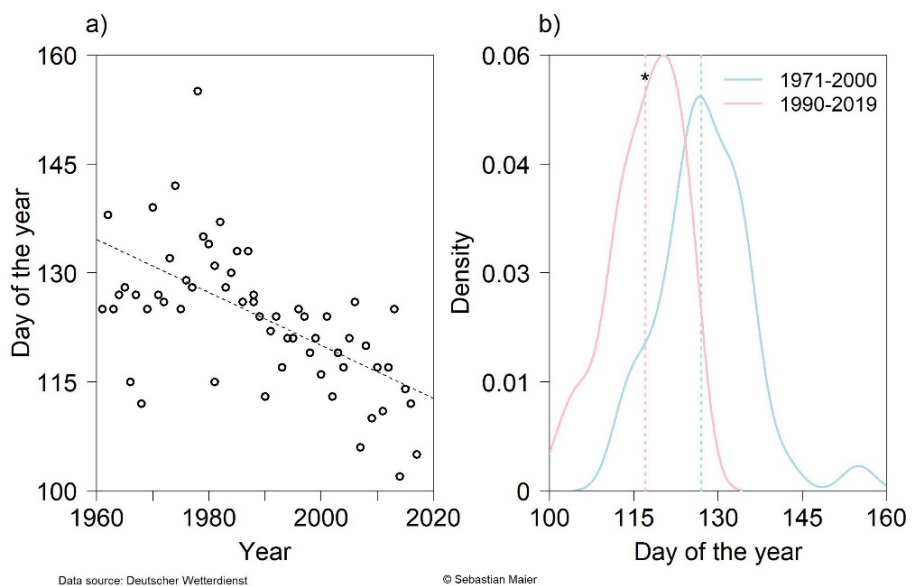
Part 3: Sunshine Duration

A significant increase in sunshine duration was found for the District of Forchheim (DoF) based on data derived from the DWD (Deutscher Wetterdienst). Considering the two climate periods 1971-2000 and 1990-2019, the mean annual sunshine duration significantly increased from 1557 hours (1971-2000) to 1664 hours (1990-2019). Considering the frequency distributions of annual sunshine duration of the two climate periods a significant shift towards less frequent years with “low” sunshine duration and more frequent years with a “high” sunshine duration was identified. Also, new extremes occurred in the climate period 1990-2019, such as the exceeding of 1900 sunshine hours in 2018 and 2019. Changes in sunshine duration of course affect the local energy balance and they are assumed to reinforce the greenhouse gas effect particularly in summer.



Part 4: Phenology

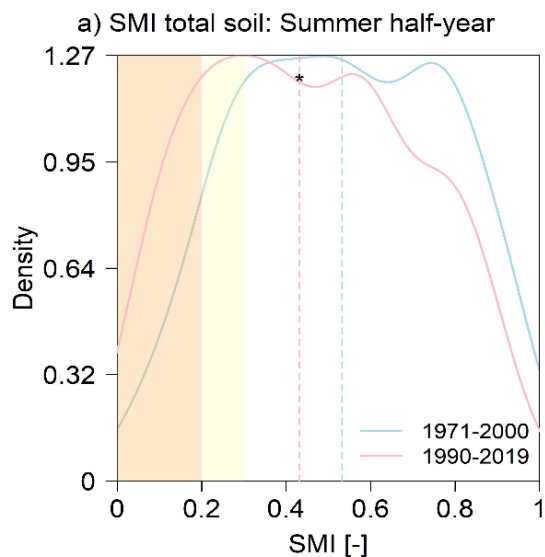
The District of Forchheim (DoF) is a well-known cherry- and apple-growing area. Thus the phenology of cherry and apple tree was of special interest of this analysis. In particular, the beginning of flowering was investigated for cherry and apple tree, respectively. Time-series analysis indicated a significant earlier beginning of flowering for both apple (displayed in the graph) and cherry tree in the DoF. Considering the two



climate periods 1971-2000 and 1990-2019, the mean beginning of flowering decreased from day 127 to day 117 for apple trees and from day 115 to day 109 for cherry trees. Notably, the mean beginning of flowering in the climatic period 1971-2000 corresponds to an extremely late beginning of flowering in the climatic period 1990-2019 for the cherry tree and the apple tree in the DoF, respectively. Unfortunately, frost events do not occur earlier why there is a higher risk of frost damages.

Part 5: Drought

The soil moisture index (SMI) provided by the Helmholtz-Zentrum für Umweltforschung is determined by estimating the percentile of the monthly soil moisture value with respect to its site specific climatology. The SMI can be classified into two major classes, i) abnormally dry ($0.3 \leq \text{SMI} < 0.2$; yellow area in plot) and ii) drought ($0.2 \leq \text{SMI}$; orange area in plot). Considering the meteorological half-years, the summer half-year showed significant lower top-soil SMI and total-soil SMI in the District of Forchheim (DoF) for the climatic period 1990-2019 compared to the period 1971-2000. Thus, the DoF had to face more frequent and more extreme drought and abnormally dry conditions in 1990-2019, exacerbating the “normal” dry soil conditions especially in summer.



Data source: UFZ-Dürremonitor / Helmholtz-Zentrum für Umweltforschung © Sebastian Maier

Part 6: Next Steps

In the next step the District of Forchheim (DoF) will analyze the potential impacts of future climate extreme events. Therefore we will use the Web-GIS tool developed in the previous Interreg-CE project ProteCHt2save which provides climate model ensemble statistics for several climate risk indices with a spatial resolution of 12 x 12 km. The very promising Web-GIS tool is accessible under <https://www.protecht2save-wgt.eu/>

The obtained results then will be used for assessing the vulnerability of the DoF to climate change and to elaborate a climate adaption and mitigation strategy.



Local Working Table held in Krems, Austria

On November 2nd 2020 the Danube University Krems hosted a hybrid Local Working Table for the STRENCH project in Krems with several experts and partners joining the presentations and discussion online.

Participants / target groups

- 1) **Danube University Krems** (Host)
- 2) **Sistema GmbH** (Project Partner STRENCH), **IIT Centre for Cultural Heritage Technology, UPC Barcelona** (International Experts Affiliated With Sistema)
- 3) The Wachau World Heritage Association, Austrian Armed Forces, Abby Melk, (Local Stakeholders)

Local Working Table Conclusion:

Effective CH protection and climate change observation for building resilience require modern technology as a basis for effective decision making and awareness raising. The Web-Gis Tool and other remote data analysis tools as presented by guest speakers and participants Ms Arianna Traviglila PhD (Director of the IIT Centre for Cultural Heritage Technology) and Associate Professor Ramiro Marco Figuera (UPC Barcelona specialist for remote data analysis and GIS) have the potential to fulfil this requirement. Further



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simplification in the usage and additional tailoring to the specific needs of decision makers and other stakeholders (especially youth) has been identified as a key need. External funding such as EU-funds would be of great benefit for creating a sustainable tool for tackling the current and future challenges arising in the face of drastic climate change.

The further introduction of citizens based science and gamified apps have the potential in bringing communities together enabling the local population to become involved in tackling climate change and to assist in CH protection. Additional funding for the creating of such apps



and the subsequent data-management are a pre-requisite with great potential for constructive data output, citizen involvement and climate change induced disaster preparedness.

Special attention must be given towards the involvement of local schools and other youth organizations in order to achieve sustainability. Attractive easy to use state of the art technology is a requirement to ignite interest and subsequent participation for this specific target groups.



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The Local Working Table aims to further Capitalize on the Web-GIS Tool for heritage protectors, emergency response organizations, local decision makers, youth and other stakeholders in the Wachau area. The Local Working Table enables further networking options for the participants with the aim to create sustainable risk management strategies for CH protection.



Upcoming Events

DECEMBER 2020

District Council Forchheim, Germany: Stakeholder interviews (online) with the aim to assess how sensitive defined fields of actions (e.g. orcharding, agriculture, cultural property, ...) react to climate change.

Contact: sebastian.maier@lra-fo.de

JANUARY 2021

Local Working Table in Bologna, Italy. The meeting will be organized by FVG (Fondazione Villa Ghigi) and CNR-ISAC (Institute of Atmospheric Sciences and Climate) in the presence, if health conditions allow it, with the local stakeholders of the Città Metropolitana di Bologna, Consorzio di Bonifica Renana, Arpae, IBC - Istituto per i beni artistici, culturali e naturali, Regione Emilia Romagna, Protezione Civile, GEV - Guardie Ecologiche Volontarie. The meeting will be held at the end of January in the Parco Villa Ghigi to discover, through a walk, the vulnerability of the site, characterized by historic buildings and gardens. Stakeholders will then attend at the presentation of the project STRENCH and the exercise with the Web GIS tool for risk mapping.

Contact: p.denuntiis@isac.cnr.it

Local Working Table in Dugopolje, Croatia. This upcoming meeting will be organized by the Municipality of Dugopolje at the end of January 2021. Representatives from public bodies that own or manage cultural assets, development agencies and representatives from universities dealing with the topic of natural and cultural heritage under pressure will be invited to the workshop. Stakeholders will attend at the presentation of the project STRENCH and a visit to the Kolići pilot site will be organized.

Contact: petra.furcic@urbanex.hr

FEBRUARY 2021

District Council Forchheim, Germany: Local working table with regional stakeholders.

Contact: sebastian.maier@lra-fo.de

MARCH 2021

District Council Forchheim, Germany: Discussing possible contributions of the STRENCH project team to the "Climate Action Week" in Forchheim.

Contact: sebastian.maier@lra-fo.de





STRENCH

STRENGTHENING Resilience of Cultural Heritage at Risk



READY-TO-USE SOLUTIONS

- » WebGIS tool for multi-risk assessment on cultural heritage in Central Europe
- » hazard maps of extreme events in Central Europe for decision making in disaster risk reduction
- » methodology for vulnerability assessment of cultural heritage at risk
- » sustainable risk management strategies for cultural heritage

CULTURAL HERITAGE CATEGORIES

- » cultural landscapes
- » ruined villages
- » historic parks
- » archaeological sites in mountain and coastal areas

HAZARDS

- » heavy rain
- » (large basin) floods
- » flash floods
- » landslides
- » fire due to drought
- » windstorm



PROJECTS CAPITALISED

- » Interreg Central Europe – BhENEFIT
- » Interreg Central Europe – RUINS
- » Interreg Central Europe – ProteCHt2save
- » Interreg Central Europe- HICAPS
- » H2020 – HERACLES
- » H2020 – SHELTER
- » FP6 – Noah’s Ark
- » FP7 – Climate for Culture
- » DG-EAC – Safeguarding Cultural Heritage from Natural and Man-Made Disasters

PROJECT DURATION

01.03.2020 – 28.02.2022

€ ERDF co-financing
1.064.956,62 €

total eligible budget
1.301.712,50 €

CONTACT US:

STRENCH Lead Partner
National Research Council Italy
Institute of Atmospheric Sciences and Climate
Alessandra Bonazza
A.Bonazza@isac.cnr.it
strench.ice@gmail.com



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