

DELIVERABLE D.1.1.2

Analysis of the adoption of Strategies/Plans of
Adaptation to Climate Change for the CHN
protection

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A. Introduction

This deliverable is part of the project activity A1.1, which aims at investigating the policies and strategies taken by Central European authorities to mitigate the impact of climate change. More specifically, the report analyses the adoption of the EU Water Directive at national/regional level among the partner countries involved in the project, outlining the strengths and weaknesses and the existing gaps for the protection of cultural and natural heritage (CNH) assets sensitive to climate change risk.

The methodology employed is based on the active engagement of project partners in data research and collection, including local site managers of selected project case studies. The research focuses particularly on the following points:

1. The current state of strategies/plans of adaptation to the climate change adoption process in each country/region/site.
2. If adopted, strengths and weaknesses of the strategies/plans applied to each local context. If not adopted, challenges and barriers that prevent adoption.
3. Regardless of the adoption of the strategies/plans, existing gaps for the protection of CNH assets sensitive to climate change risk.

The deliverable is structured as follows: section B outlines the current state of the adoption of strategies/plans of adaptation to the climate change for each partner's country/region/site; section C details major challenges and barriers as well as existing gaps preventing its adoption and adequate protection of CNH. Finally, part D summarises the main findings at the research and possible future work useful for the development of appropriate tools in the following phases of the project.

B. Current state of Strategies/Plans of Adaptation to Climate Change in partner countries

In Central Europe, climate change adaptation strategies focus on addressing the region's growing vulnerabilities to extreme weather events, such as heatwaves, floods, and droughts. Key strategies include enhancing water management to improve flood protection and drought resilience, promoting sustainable agriculture to reduce the impact of changing precipitation patterns, and investing in green infrastructure like urban green spaces to mitigate heat islands. Additionally, Central European countries are working on strengthening disaster preparedness and fostering climate-resilient urban planning, while also implementing policies to reduce greenhouse gas emissions and transition to renewable energy. Collaboration across borders is crucial, as many environmental challenges are transnational in nature.

The following paragraphs highlight the current situation concerning the climate change mitigation strategies and plans in the Central European countries represented in INACO, namely: Italy, Austria, Czech Republic, Hungary, Germany, Poland, Slovakia and Croatia.

Italy

National

Italy is located in the so-called “Mediterranean hot spot”, an area identified as particularly vulnerable to climate change. Moreover, the national territory is notoriously prone to natural hazards (landslides, floods, coastal erosion, water shortages), and it is already evident how rising temperatures and the intensification of extreme events related to climate change (droughts, heat waves, winds, intense rainfall, etc.) amplify these risks whose economic, social and environmental impacts are bound to increase in the coming decades.

The Minister of the Environment and Energy Security, by Decree No. 434 of Dec. 21, 2023, approved the National Climate Change Adaptation Plan¹ as an implementation of the EU Green Deal, which was approved at the European Council on Dec. 12, 2019, the European Guidelines (EC 2013c) and the Long-Term Strategy for 2050 to the United Nations Framework Convention on Climate Change (UNFCCC), as stipulated in Article 4.19 of the Paris Agreement. Knowledge of the impact of climate change on cultural heritage in Italy is based, first of all, on the identification of the priority climate parameters that determine its degradation both in the outdoor environment (mainly architectural heritage, archaeological heritage, etc.) and in the indoor environment (museums, churches, hypogea, etc.). In fact, the National Climate Change Adaptation Plan includes several short- and long-term actions:

- Mixed non-structural and infrastructural and technological actions- Adaptation actions for materials
- Adaptation actions for built heritage and buildings
- Adaptation actions for materials exhibited in museum settings
- Adaptation actions and conservation measures for landscapes and constrained landscape assets.

As reported in Annex III of the National Climate Change Adaptation Plan, research on the impact that climate change will have on cultural heritage has so far been very limited. It should be pointed out that the available scenarios refer mainly to building materials, while impact assessments related to complex systems, such as historic centres and archaeological sites, which are also subjected to intense anthropogenic action brought about by tourist flows, are lacking. It is therefore urgent to include cultural heritage in the value chain of sustainable development, the number one issue facing the world today.

Regional

Since November 2015, the Emilia-Romagna Region has taken part in the Under2 Coalition following the signing of the Subnational Global Climate Leadership Memorandum of Understanding, Under2MoU. Local governments that are members of the Under2MoU are committed to reducing, by 2050, greenhouse gas emissions by between 80% and 95% compared to 1990 levels, or to a quota of 2 tonnes of CO₂ equivalent per capita. The goals for the

¹ (<https://www.mase.gov.it/notizie/clima-approvato-il-piano-nazionale-di-adattamento-ai-cambiamenti-climatici>)

Emilia-Romagna Region identified in the Memorandum of Understanding call for a 20% reduction in emissions by 2020 compared to 1990 levels, and a target of -80% by 2050. It is in this context of national and international policies and commitments that the Emilia-Romagna Region has defined its Climate change mitigation and adaptation strategy for the change mitigation and adaptation strategy, with the aim of “holding together” these two aspects in the fight against climate change which are seemingly disconnected, but in fact strongly interconnected in natural and man-made, as well as complex and varied environments. The regional joint mitigation and adaptation strategy is above all the result of a process that has actively involved many representatives, sectors affected by regional policies and regional system agencies through the establishment of an intersectoral working group with Council Resolution no. 570/2016. The regional strategy goals can therefore be summarised as follows²:

- to enhance the actions, plans and programmes of the Emilia-Romagna Region in terms of mitigation and adaptation to climate change by mapping the actions already in place at regional level to reduce greenhouse gas emissions and adapt to climate change;
- to define monitoring indicators (among those already in use by the various plans for both the SEA (Strategic Environmental Assessment) and VALSAT (Environmental and Territorial Sustainability Assessment) and for the operational programmes of the 2014-2020 Structural Funds);
- to design and implement a regional and local policy implementation observatory;
- to identify further measures and actions that should be implemented for the various sectors, in relation to existing sector plans, helping to coordinate regional planning with reference to the mitigation and adaptation goals;
- to identify and promote a participatory process involving local stakeholders in order to integrate the issue of adaptation and mitigation into all regional and local sectoral policies;
- to coordinate with local mitigation and adaptation initiatives.

Site

The pilot site is located in the Parco regionale del Delta del Po dell'Emilia-Romagna, a natural park that is also a Wetland of International Importance under Ramsar Convention, a Special Conservation Area and Special Protection Area under the EU directives 92/43/EEC „Habitat“ and 2009/147/EC „Birds,“ and it is also included in the UNESCO Biosphere Reserve “Po Delta” under the program Man and Biosphere and in the UNESCO World Heritage “Ferrara city of the Renaissance and its Po Delta”. For all these protection categories, it is mandatory to develop and implement Management Plans or Action Plans.

The Regional Park, for better conservation of ecosystems, habitats and biodiversity, is divided into six stations, each of whom having its own territorial plan, which identifies areas with different levels of protection, indicating the allowed activities and interventions, in order to preserve the natural and cultural heritage and indicating the managing activities for nature conservation and also to keep it up with climate change trends. In addition, every Natura 2000 site has Specific Conservation Measures and Management Plans for habitats and species

² <http://demetra.regione.emilia-romagna.it/al/articolo?urn=er:assemblealegislativa:delibera:2018;187>

<https://ambiente.regione.emilia-romagna.it/it/cambiamenti-climatici/strategia-mitigazione-adattamento/quader-no-camb-climatici-27-11-19-en-web.pdf/@download/file>

conservation including the activities to face the climate change threats. The Municipality of Ravenna, in which part of the pilot site falls, has its own Sustainable Energy and Climate Action Plan (PAESC) that reaffirms the key role acknowledged to cities in the fight against climate change through the implementation of local policies that have as their reference climate and energy.

Being inside a UNESCO Biosphere Reserve, the site is included in its Action Plan. Moreover, the site is included in the Management Plan of the UNESCO World Heritage site “Ferrara, City of the Renaissance, and its Po Delta“, made by the Municipality of Ferrara, manager of the UNESCO site, that develops the climate changes topic on a landscape point of view, which will be further emphasised with the next update of the plan.

In addition, the Park is actively involved in other climate change mitigation projects financed by the European Union (ITHR0200390 - ACTION, HORIZON-MISS-2022-CLIMA-01 Land4Climate, LIFE22/NAT/IT/LIFE NatuReef) in some areas bordering the pilot site concerned with the same theme as the the INACO project, with the aim of improving the water, seashore, rivers and wetlands management. In particular, the Interreg Croatia-Italy ACTION is dealing with the same issues of INACO, in the wetland system south of the INACO’s pilot site. All these projects are linked with INACO and the results of them and of INACO itself will be put together, to better define the strategies and actions to be developed in the future, even on a larger scale.

Austria

National

The Austrian Strategy for Climate Change Adaptation was developed in accordance with the UN Framework Convention on Climate Change (UNFCCC), the Sendai Framework, the UN Sustainable Development Goals, and the European Climate Law. The goal is to prevent negative consequences, but also to use arising chances. The first Strategy was issued in 2012, with updates in 2017 and 2024. It informs about already occurring and future consequences of climate change for Austria and provides options for action for 14 sectors, from agriculture, to catastrophe management, biodiversity, or economy. The strategy is supported by the federal and state governments.

The respective ministries have issued various guidelines addressing topics that may concern CNH protection. Examples include the guidelines ‘Risk management in disaster management’ , ‘River engineering and ecology’ and ‘Water management concepts’ . In addition, strategy papers and studies have been published on topics such as ‘Climate change and water management’ , ‘Municipalities in a changing climate’ and ‘Climate adaptation and biodiversity’ .

Austria has ratified the UNESCO Convention On the Protection of the World Cultural and Natural Heritage . Twelve Austrian cultural and natural heritage sites have been inscribed on the World Heritage List. For these, comprehensive management plans must be drawn up, some of these, though not all, have dedicated chapters on climate change, its consequences for the World Heritage region, and options for actions.

Austria is participating in the Sendai Framework for Disaster Risk Reduction and has developed an Austrian Strategy on Disaster Risk Reduction (ASDR). The Austrian Strategy relies primarily on investment in protective measures and the extensive voluntary structures of emergency services, although lately, a paradigm shift can be observed, from mere protection of people and goods to strengthening resilience. Part of the strategy is the establishment of relevant networks, programmes, and initiatives. For instance, the Federal Ministry of the Interior has brought together various bodies involved in disaster relief under the name 'National Crisis and Disaster Management'. This was established to create a new informal cooperation and coordination instrument between federal and state agencies, emergency organisations, and other agencies involved in crises or disasters with an impact on Austria. Noteworthy are also the Disaster Competence Network Austria (DCNA), the KIRAS Security Research Programme, or the National Damage and Event Database (CESARE).

Regional

Europe-wide unique, is the funding programme 'KLAR! - Climate Change Adaptation Model Regions'. The KLAR! programme, is currently supporting 89 Austrian regions in minimising the damage caused by climate change and utilising the opportunities that arise. Measures primarily include public information, awareness raising, and local adaptation projects.

In Austria the federal states ('Bundesländer') are responsible for several aspects that concern climate change and/or the protection of CNH. For example, building law, regional planning, disaster control, and nature conservation are anchored in law at federal state level.

Site

The pilot site Lake Neusiedl is a nature park, a national park, and a European nature reserve. For all these protection categories, it is mandatory to develop and implement Management Plans. These are anchored in the nature conservation laws of the federal states. Furthermore, the pilot site is a UNESCO World heritage site, for which a management plan has been developed. Lake Neusiedl is also a Ramsar area, for which a Wetland Strategy was deployed. All plans and strategies aim at conserving the protected area (according to their respective focus and management goals), but not all of them explicitly consider climate change.

In a Strategy study of 2014, issued on behalf of the Austro-Hungarian Water Commission, all relevant stakeholders in the region from the fields of water management, limnology, nature conservation, and regional planning described the status quo and formulated goals for their respective sector. The overarching goal is the protection and preservation of the natural and cultural landscape of the Lake Neusiedl region and thus of the World Heritage Site. The stakeholders have, however, partially diverging, or even contrasting opinions on how this should be achieved.

A Water Management Plan for Lake Neusiedl was developed within the REBEN project in 2020, commissioned by the Burgenland Provincial Government, with a focus on reducing pollution from the catchment area, sediment and reed management, and monitoring.

The Burgenland Provincial Government also commissioned a Feasibility Study for the creation of a water management plan which is intended to show how the region's water bodies can be managed while at the same time taking into account all existing interests. This study also considers the (quite controversial) possibility of a dotation of Lake Neusiedl with additional water, e.g., from the Danube catchment.

As part of the EU project EuLakes, a Guideline for sustainable lake management in climate change was developed. This guideline includes the lake itself, and the natural and cultural landscape of the pilot region and provides a comprehensive list of measures and options for actions in response to all relevant threats from climate change. Another product of the EuLakes project is the Nature Conservation Management Concept, with a focus on terrestrial habitats within the lake area, including the reed belt and the foreshore. These are integral parts of the natural and cultural heritage, due to their relevance as natural habitats, landscape aesthetics, and traditional land use techniques, such as pasturing or reed harvesting.

In addition to specific recommendations for action, the above-mentioned studies also provided important basic data on various physical, chemical, biological, socio-cultural, or political aspects. These are supplemented by further studies, for example on the effects of climate change, water availability and demand, or the geodetic remapping of the Lake Neusiedl - Hanság Canal system. The pilot site is therefore probably one of the best-studied regions in Austria.

Czech Republic

National

The Czech Republic's Climate Protection Policy, along with the Strategy for Adaptation to Climate Change, outlines the country's approach to addressing climate change. Adopted by the government in March 2017, the Climate Protection Policy replaced the previous National Programme for Abating the Impacts of Climate Change. It sets national objectives for reducing greenhouse gas emissions to meet international commitments, supporting a gradual transition to a low-emission, sustainable economy. The Policy outlines both primary and indicative emission reduction targets, aiming for a 32 Mt CO₂eq reduction by 2020 and a 44 Mt CO₂eq reduction by 2030, with further indicative targets of 70 Mt CO₂eq by 2040 and 39 Mt CO₂eq by 2050. It spans the period from 2017 to 2030, with an evaluation in 2021 and updates planned for 2023.

In October 2015, the Czech government also adopted the Strategy for Adaptation to Climate Change, which assesses the impacts of climate change and proposes adaptation measures. The Strategy is implemented through the National Action Plan on Adaptation, adopted in 2017, which addresses specific climate change impacts such as droughts, floods, extreme weather events, and wildfires. The Action Plan includes 33 specific targets, plus a crosscutting target focused on education and awareness. These targets are to be achieved through 52 priority measures, with 160 associated tasks.

Regional

The Central Bohemian Region is in the preparation phase of a new Climate Change Mitigation and Adaptation Strategy for the years 2025-2035. The climate plan could/should contain:

- For the whole region:

- Landscape adaptation strategy (agriculture, forestry, nature conservation and biodiversity, water retention in the landscape, etc.)
- Energy adaptation strategy (RES, ZEVO, heating, distribution, aggregation, accumulation, community and communal energy, etc.)
- Strategy for the adaptation of settlements (blue-green infrastructure, waste management, care for greenery in settlements, buildings with low /zero energy consumption, safety in the event of natural disasters, etc.)
- Waste management
- Implementation in spatial planning
- Binding framework for decision-making by local government bodies in the areas covered by the climate plan
- Analysis of the impacts of climate change on Central Bohemia,
- Proposals for measures to minimise the impacts of changes climate
- Implementation plan

Site

The Czech pilot site considered in INACO is the Vltava river basin. No specific strategies can be found for the district as a whole. However, climate change adaptation policies are available for specific cities, as for example for Prague, which is also part of the pilot site. The Capital City of Prague's Climate Change Adaptation Strategy is aligned with the national Strategy for Adaptation to Climate Change in the Czech Republic, which was approved by the government in 2015. The strategy focuses on reducing the negative impacts of climate change through nature-based solutions, such as green and blue infrastructure, which leverage natural vegetation to cool the environment via evaporation and provide shade. These solutions also help capture, retain, and absorb rainfall, either in soil layers or through infiltration into groundwater. Additionally, the strategy emphasises the conservation of water, soil, and biological resources, as well as the restoration of ecosystems resilient to climate change, contributing to natural disaster prevention through an ecosystem-based approach. In cases where nature-based solutions are not feasible, the strategy incorporates technological (or "grey") measures, including early warning systems and public education campaigns on climate change. The strategy also considers Prague's unique urban landscape, characterised by extensive built-up areas, advanced infrastructure, and uneven distribution of vegetation. By joining the Mayors Adapt Initiative in December 2015, Prague committed to developing a climate change adaptation strategy, monitoring its progress, assessing risks, and preparing biennial reports on adaptation measures. The strategy includes an Implementation Plan for 2018-2019, detailing specific adaptation measures and pilot projects aimed at climate change mitigation, alongside mechanisms for monitoring and evaluating their effectiveness.

Hungary

National

In Hungary different policies involving climate change adaptation are active. The National Assembly adopted the National Sustainable Development Framework Strategy 2012-2024 by the Resolution 18/2013 (III.28.). The overall objective of the sustainability policy is to ensure the conditions of adaptability to the continuously changing social/human economic/natural

external environment, and to improve the quality of cultural adaptation required to this end. A new National Sustainable Development Strategy (NSSDS) is currently under development.

The National Environment Programme (running until 2026) was approved by OGY Resolution 62/2022 (XII.9.). The overall objective of the Programme is to contribute to ensure the environmental conditions for sustainable development. The overall responsibility of the environment sector is to contribute to the socio-economic development of the country by performing its tasks at a high standard, while at the same time to take conscious action against the destruction of social and environmental values and to contribute effectively to environmental awareness. The strategic objectives for achieving the overall objective are:

- Improving environmental conditions for human health and quality of life and reducing the impact of environmental loads.
- Protection, restoration and sustainable use of natural values and resources.
- Improving resource conservation and resource-efficiency, greening the economy and strengthening the circular economy.
- Improving environmental security.

The National Clean Development Strategy 2020-2050 (NCDS or Strategy) outlines a 30-year vision for socioeconomic and technological development. Hungary's long-term Strategy will help reach climate neutrality targets while focusing on the well-being of the Hungarian people and ensuring the protection of natural assets and economic development.

In 2013, the National Assembly adopted the Second National Climate Change Strategy (NES-2) for 2014-2025, looking ahead to 2050, by Resolution 23/2018 (X. 31.). The NES-2 sets out two overall objectives ("Sustainability and sustainable development in a changing world" and "Understanding our capabilities, opportunities and constraints") and four thematic objectives.

The National Strategy for Biodiversity Conservation till 2030 (hereinafter referred to as the 3rd National Biodiversity Strategy) is a comprehensive strategy for the conservation and sustainable use of biodiversity in Hungary, which had to be developed in line with international and EU obligations.

The first National Landscape Strategy of Hungary, adopted by the Government Resolution 1128/2017 (20.III.), is inspired by the European Landscape Convention of the Council of Europe. Accordingly it sets out the objectives and tasks using the threefold instrument of conservation management and planning. The main intention and objective of the National Landscape Strategy is to make the protection, management and planning of the landscape a socially accepted public matter. The overall objective of the strategy is responsible landscape management based on landscape assets. To achieve this, it has three horizontal principles:

- Overall protection of natural resources (including water) and cultural heritage;
- Wise and economical use of land;
- Climate change mitigation and adaptation.

Regional/site

In Hungary, climate strategies have been developed on county-level, and not on geographical characteristics. Therefore, the strategies do not treat Lake Balaton and its catchment, as an unified ecosystem. Moreover, the strategies neither take into account the fact that the lake

has a strong influence on the climate of the surrounding areas and the meteorological events occurring there. Thus, the lake and its surroundings form a region that can only be assessed as a whole and individual region in terms of climate change, which requires a different climate-specific adaptation approach (not county-based approach). Adaptation to climate change is the key to preserve Lake Balaton both as an ecosystem and as an economic potential. Keeping this in mind, the ecosystem of the lake must be protected, since the society, infrastructure and the economy rely on the living system of Lake Balaton. This also means that Lake Balaton must be considered not as a well-defined lake, but as a complex system, taking into account both its direct shoreline and its indirect (catchment) areas.

The climate strategy of the Lake Balaton Area for the period 2020-2030 was approved by the Lake Balaton Development Council in its Decision 6/2020 (21.02.2020). The programme aims to implement mitigation, adaptation, awareness raising and financial incentive measures. The programme identifies 5 emission reduction and 4 adaptation measures for the region for the years 2020-2030, while dedicating a strong emphasis on awareness raising.

The Development Plan of the Lake Balaton Region for the period 2021-2027 was approved by the Lake Balaton Development Council by Resolution 18/2021 (14.05.2021).

The main objective is to boost the Lake Balaton region and to enhance sustainable economy, while preserving the region's ecological system, so that the people living and working in the region can enjoy a high quality living and working environment all year round. The following innovations or major focuses are reflected in the objectives of the documents for the period 2021-2027:

- to create the ecological, social, infrastructural and hydrological conditions to adapt to the effects of climate change and to protect the lake ecosystem;
- to implement complex and coordinated local economic programmes to increase the region's capacity to retain its population, to establish the conditions for "circular economy" on local level, and to develop human services, local communities, regional identity and quality of life;
- a move towards a zero-emission region, focusing on energy efficiency in heating and cooling the buildings and the use of renewable and low-carbon and carbon-neutral energy sources;
- to preserve of the special character of the landscape in the Lake Balaton area and to conserve the townscape
- to design and regulate coastal promenades and the use of the coastlines in accordance with uniform principles in order to achieve sustainable land use and spatial planning.

The Regional Environmental Programme was approved by the Lake Balaton Development Council in its Decision 12/2024 (10.05.2024). The aim of the programme is to analyse the environmental elements, to take stock of the positive and negative processes and to identify the social and economic interrelationships between them, and then to draw up a strategic action plan.

The Balaton Design Manual for the Lake Balaton Area was completed in 2021. It is a guide that reflects the architectural culture of the lake area, a benchmark of public taste, and a glimpse into the characteristics of the landscape that has evolved over the centuries and been shaped

by the community. The aim of the guide is twofold: to present those built and natural values, whose preservation, maintenance and enhancement represents a common interest for everybody and for the local community too, and through the presentation of good examples to provide guidance to the architectural community, builders, those living around the lake and those moving to the shores of Lake Balaton.

Germany

National

Extreme weather events cause enormous damage in Germany and Europe. These will become more frequent in the future and will force society as a whole to take precautions and adapt to the consequences of the climate crisis.

The Climate Adaptation Act (KAnG) in Germany is a new law which sets the strategic framework for future climate adaption at federal, state and local level. It is the first nationwide climate adaption law. The Act was proclaimed in the Federal Law Gazette on December 22nd 2023 and came into force on July 1st 2024.

Risk prevention and adaptation to the consequences of the climate crisis are among the priorities. This also includes consistent climate protection

The following three points are focus:

- the Climate Adaptation Act provides a binding framework for the federal, state and local governments
- with a new, precautionary climate adaptation strategy with measurable targets, the federal government is taking responsibility for itself
- a joint, nationwide funding by the federal and state governments is intended to provide long-term support

With this law, the federal government aims to provide a binding framework for climate adaptation at federal, state and municipal level.

- Develop a precautionary climate adaptation strategy with measurable targets, update these regularly and implement them continuously.
- Review of the objectives by monitoring.
- Federal states develop their own climate adaptation strategies, including realisation
- Federal states develop their own climate adaptation strategies based on risk analyses, including implementation
- Reporting to the federal government on the extent to which climate adaptation concepts exist in the municipalities and districts

The federal government supports the federal states and municipalities in their responsibility for climate adaptation, particularly in the areas of advice and funding. In July 2021, the Federal Ministry for the Environment (BMUV) commissioned the Centre for Climate Adaptation (Zentrum KlimaAnpassung) (ZKA) to advise municipalities and other local stakeholders on

climate adaptation issues and support them in networking. The Climate Adaptation Immediate Action Programme (Sofortprogramm Klimaanpassung) of March 2022 is already supporting sustainable and integrated climate adaptation processes on the local level, for example by promoting climate adaptation managers.

Extreme weather events have increased more and more in recent years. The effects of these extreme weather events affect not only the natural heritage but also the cultural heritage. In times of climate change, it is therefore more important than ever to address the issue of preserving and maintaining/protecting those CNH.

In Germany the KERES project- „Protecting cultural heritage from extreme climate events and increasing resilience“ (“Kulturgüter vor Extremklimaereignissen Schützen und Resilienz erhöhen“), was established to identify the effects of extreme weather events on cultural heritage. The KERES project addresses the following questions:

- What security risks arise from extreme weather events, which are increasing in frequency and extent?
- What adaption strategies need to be developed for Germany?

The aim of this project is to identify the types of buildings at risk and to create a hygrothermal simulation. With the hygrothermal simulation, it is possible to estimate the extent to which a structure absorbs moisture under different temperature conditions (climate change) and whether moisture causes structural damage in the building. Another part is to evaluate the effects of wind on historic gardens and historic tree populations. Different models for stone weathering are also compared, as stone weathering leads to damage to the building fabric and thus to the property. At the same time, it can also lead to personal injury due to spalling.

Regional/site

In Bavaria, a Bavarian Climate Protection Act („Bayerische Klimaschutzgesetz“) (BayKlimaG) came into force for the first time on 1 January 2021. It serves as a framework law to establish legally binding basic climate protection targets. The state government has decided on specific measures in the accompanying climate protection programme. With this programme, Bavaria intends to make a committed contribution to the implementation of the legally stipulated CO₂ reduction targets. However, the central framework conditions for climate protection in Bavaria are still determined at federal and EU level. The first amendment to the BayKlimaG came into force on 1 January 2023. The Bavarian state parliament has thus further tightened Bavaria's ambitious climate protection targets. The state is to be climate-neutral as early as 2040, instead of 2050 as previously, and greenhouse gas emissions per inhabitant are to be reduced by 65% by 2030 compared to 1990, instead of just 55% as previously.

On the scale of district Forchheim there is the Climate Change Adaption Concept of 2024 (“Klimaanpassungskonzept 2024”). This Climate Change Adoption Concept was developed as part of the EU project “STRENCH”, which deals with the risks to cultural heritage caused by climate change. In addition to climate protection, the development of climate adaptation measures is also a priority, which has been defined in the Climate Change Adaption Concept

of 2024. The Climate Change Adaption Concept of 2024 of the district Forchheim helps citizens to better prepare for the consequences of the climate crisis and take precautions against risks. This includes the creation of urban greenery, which provides shade and cooling. Sponge cities absorb water during heavy rainfall and store it for times of drought. Heat action plans are created for citizens. As the water meadows are an intangible cultural heritage, changes to the tangible material are subject to the applicable laws, for example the WFD and the Federal Nature Conservation Act („Bundnaturschutzgesetz“) (BNatSchG).

Poland

National

At the national level, Poland has developed several strategic documents to address climate change adaptation. The Polish National Strategy for Adaptation to Climate Change by 2030 (NAS 2030) has been developed with a view to ensure the conditions of stable socio-economic development in the face of risks posed by climate change, and also with a view to use the positive effect, which the adaptation actions may have not only on the state of the Polish environment, but also on the economic growth. The strategy indicates the following general principles of adaptation policy:

- Minimise the vulnerability to risks associated with climate change, by taking account of, inter alia, climate change on the investment planning stage
- Develop schemes of fast response in the event of climate driven disasters including floods, droughts and heat waves, ensuring that public institutions are prepared to provide immediate assistance to victims
- Determine priority actions in terms of cost-effectiveness
- Concentrate first on counteracting the threats to human health and life, as well as on preventing irreversible damage, such as, e.g.: lost cultural goods and rare ecosystems).

The strategy details adaptation actions to enhance resilience to the impacts of climate change in such sectors as: water management, agriculture, public health, energy, construction and transportation. Adaptive actions aim also at the protection of biodiversity and of the particularly vulnerable Poland's regions, such as: the Baltic coastal zone, the Carpathians and the Sudety Mts. Moreover, actions have been outlined which focus on urban policy.

Climate Adaptation Plans for Cities with more than 100,000 inhabitants (MPA) is included in the Polish National Strategy for Adaptation to Climate Change (SPA 2020). The main objective of the initiative, which was implemented in partnership with the 44 major Polish cities, was to assess the sensitivity and vulnerability to climate change and to develop priority adaptation measures adequate to the identified risks for each city. The use of a common methodology enables further cooperation at the stage of implementing the plans, and the exchange of information and experience, also in relation to smaller cities and non-urbanized areas. Given the scale of the project, as well as the number of partners and the use of a single methodology, it is worth noting that the project is unique at a European scale. The adaptation

plans developed during the project will be adopted and formally binding for cities. Within the project the SEA procedure and wide public consultation were included.

Regional

At the regional level, the Lower Silesian Voivodeship has developed its own strategies in alignment with national goals, focusing on the region's specific vulnerabilities and needs.

The Regional Development Strategy for Lower Silesia 2030 incorporates climate change adaptation as a cross-cutting issue, emphasising sustainable development, environmental protection, and enhancing the region's resilience to climate impacts. It focuses on sectors like water management, biodiversity, agriculture, and urban planning. Lower Silesia has developed the Regional Climate Change Adaptation Plan to address specific regional challenges such as increasing frequency of extreme weather events, water scarcity, and the preservation of natural ecosystems. The plan includes measures like enhancing flood defences, promoting sustainable agriculture, and improving the resilience of public infrastructure.

Site

At the local level, municipalities in the Jelenia Góra Valley are increasingly developing and implementing their own climate adaptation plans, although progress is varied. The City of Wrocław, as the largest city in the region, has been proactive in developing climate adaptation measures. The city has focused on managing flood risks, given its history with flooding (e.g., the 1997 flood). Efforts include improving drainage systems, creating green spaces to absorb rainwater, and enhancing early warning systems. While some smaller municipalities have begun to develop their own adaptation plans, progress is slower compared to larger urban centers. Challenges include limited financial resources, lack of technical expertise, and competing local priorities. However, there is a growing awareness of the need for local adaptation efforts, driven by increasing incidences of extreme weather.

Slovakia

National

At the national level, Slovakia has adopted a comprehensive National Strategy for Adaptation to Climate Change, which was updated in 2018. This strategy reflects international commitments such as the Paris Agreement and aligns with the EU's Adaptation Strategy. The primary goal is to increase the country's resilience to the impacts of climate change, covering various sectors including water management, forestry, agriculture, health, and urban environments. Importantly, cultural and natural heritage (CNH) is recognized as a vulnerable area, particularly due to the risks posed by floods, extreme temperatures, and soil erosion. However, the specific focus on the protection of CNH in this strategy is not as pronounced compared to other sectors, though it does provide a framework for local and regional action.

Regional

At the regional level, the Košice Self-Governing Region (KSK) has aligned its policies with the national strategy but faces several challenges in implementing specific adaptation measures

tailored to the protection of cultural and natural heritage. KSK has identified key vulnerabilities related to climate change, such as increased flood risks in areas with significant CNH sites, like those along the Bodva River. The region has some adaptation projects in place, particularly related to water management and flood prevention, but the inclusion of CNH protection in these plans is still in its early stages.

Site

At the local level (Povodie Bodvy - Medzev, Jasov, Moldava nad Bodvou), particularly in the areas of Medzev, Jasov, and Moldava nad Bodvou, there have been efforts to implement adaptation measures that address climate-related risks, especially flooding. These areas are home to significant CNH assets, such as the Jasov Monastery, a UNESCO-listed site, and other historic buildings that are vulnerable to climate impacts. Local adaptation measures have largely focused on flood management through natural solutions like wetlands restoration and green infrastructure. However, the direct protection of CNH from climate risks remains secondary to broader environmental concerns.

Croatia

National

In April 2020, the Croatian Parliament adopted the Strategy for Adaptation to Climate Change in the Republic of Croatia for the period until 2040 with a view to 2070.

Climate change adaptation is defined as a process that involves assessing the adverse impacts of climate change and taking appropriate measures to prevent or reduce the potential damage it may cause. This is the first national Adaptation Strategy and it deals with the sectors that, according to current knowledge, are most exposed and vulnerable to climate change. The adaptation strategy is developed in synergy with the Sustainable Development Strategy of the Republic of Croatia and with relevant sectoral strategies.

The value of this Adaptation Strategy is that for the first time in a strategic document an assessment of climate change for Croatia by the end of 2040 and 2070, possible impacts and vulnerability assessment is provided, which should be an incentive to further integrate the described risks into sectoral strategic and planning documents at the national and local level. This, and in cooperation with other initiatives, can achieve a good national framework for strengthening the resilience of the entire socio-economic system of the Republic of Croatia to climate change. The Adaptation Strategy envisages a resilient Republic of Croatia to climate change. To achieve this, the following goals have been set:

- reduce the vulnerability of natural systems and societies to the negative impacts of climate change
- increase the ability to recover from the effects of climate change
- exploit the potential positive effects, which may also be a consequence of climate change.

Regional

Regional climate strategies have been developed on the county-level. For Dubrovnik-Neretva County the Program for Mitigation of Climate Change, Adaptation to Climate Change and Protection of the Ozone Layer is integral part of the Environmental Protection Program of the Dubrovnik-Neretva County for the period 2023-2026, together with the Air Protection Program.

<https://www.edubrovnik.org/wp-content/uploads/2023/03/Sluzbeni-glasnik-Dubrovacko-neretvanske-zupanije-broj-4-23-objavljen-17.-ozujka-2023.pdf>

Site

A climate adaptation plan has been developed for Dubrovnik City area, which encompasses the area of river Ombla.

https://dura.hr/wp-content/uploads/2021/02/Climate-Adaptation-Plan_HRV_DURA_finalno.pdf

C.Strengths and weaknesses of Strategies/Plans in local context

Challenges and barriers that prevent adoption

The effects of climate change are being incorporated into management plans, at least to some extent.. What is, however needed, is a more integrated and holistic approach at the intersection of climate change adaptation and disaster risk management. Currently, climate risk analyses are primarily event-based, possible future climatic and also socio-economic developments are not yet sufficiently considered. Despite some positive recent developments, the general disaster management strategy is still focussed more on preparedness and response, rather than prevention. Leitner et al. (2020) also report on uncertainties about roles and responsibilities in climate risk management and suggest the creation of an additional crisis and disaster management body, that coordinates measures taken on different governance levels by different actors. Concerning natural hazard types, flooding has received the most attention. For droughts, there are only incomplete approaches, risk management is focussed on “traditional” activities such as awareness raising and provision of early warnings. Climate change adaptations and future developments are currently only insufficiently considered. Some relevant aspects related to the challenges faced by adaptation strategies, evidenced by the research include the following:

- **Addressing the symptoms rather than the cause.** Adaptation is by itself a limiting factor. Strategies, in fact, are conceived not to address the causes of climate change but rather to contain its impacts and improve adaptation. It is known that the negative effects of climate change may become more pronounced in the near future, thus increasing the associated environmental and natural problems. This can represent a very important limitation especially in very dynamic scenarios of change in climate patterns.

- **Lack of coordination and funding.** There is insufficient coordination between climate adaptation policies at the regional level. Most projects target broader environmental goals, with limited direct interventions aimed at cultural landscapes. Moreover, regional authorities often face administrative and financial challenges within the broader climate adaptation agenda.

Nonetheless, adaptation policies have successfully conveyed important mitigating elements to the effects of climate change. These provide a clear framework for climate adaptation across sectors, including water management and urban planning. The strategy's broad scope enables coordination between various levels of government, ensuring that regional and local entities have guidance. It also aligns with EU funding mechanisms, which support the financing of adaptation projects.

Biodiversity conservation, for example, especially through the protection of flora and the development and expansion of green areas contributes to the absorption of atmospheric carbon dioxide by increasing the carbon dioxide absorption capacity, and also plays a balancing role during extreme weather events, such as summer heat waves, through the favourable microclimatic effects of green areas (and water surfaces). Improving environmental security is presented as an overall objective. It aims to protect the lives and health of citizens by predicting and reducing the damage caused by extreme natural events and natural disasters, and by preventing and reducing disasters and damage from economic activities and industrial accidents. At the local level, communities have adopted practical flood management strategies, including green infrastructure and the rehabilitation of flood plains. These measures have helped mitigate the risks of floods that could severely damage sites. Efforts such as the maintenance of drainage systems are also steps in the right direction.

Existing gaps for the protection of CNH assets sensitive to climate change risk

The protection of cultural heritage from climate induced extreme events is only minorly ensured in adaptation policies and a comprehensive strategy is still missing. Natural heritage, on the other hand, is considered and climate change aspects are taken into account, especially in the management plans of national parks. The major gaps for adequately addressing CNH in adaptation strategies lie in the lack of specific action plans for CNH protection, insufficient funding, and limited technical expertise at regional and local levels. To effectively safeguard CNH from the growing risks of climate change, there is a need for targeted strategies, stronger coordination, and increased financial and technical support. More specifically, the following can be outlined:

- **Insufficient specificity:** adaptation strategies are comprehensive, but often lack detailed guidelines and action plans specifically designed to protect CNH from climate risks. There is a need for the development of targeted plans that address the vulnerabilities of historic buildings and natural landscapes to climate-induced damage. While the strategy acknowledges the vulnerability of cultural heritage, the practical implementation of protection measures for CNH is limited. There is a lack of detailed action plans or specific funding allocations for the direct protection of cultural

heritage sites. This gap results in low prioritisation of CNH in climate adaptation projects, which often focus on infrastructure or environmental protection.

- **Funding limitations:** while the strategy opens the door for EU funding, there is no dedicated funding stream for CNH protection. This gap limits the capacity of national and regional governments to prioritise heritage protection in the face of competing climate-related challenges.
- **Coordination challenges:** one of the major gaps at the regional level is the weak coordination between climate adaptation efforts and CNH preservation. Climate risks to heritage assets are often addressed in isolation rather than through integrated approaches that align with other regional strategies, such as urban development or tourism.
- **Lack of Technical Expertise:** Regional authorities often lack access to the necessary technical expertise to implement complex climate adaptation projects focused on CNH. There is a need for capacity-building programs that equip local and regional governments with the knowledge and skills required for CNH protection in a changing climate.
- **Limited Financial Resources:** At the local level, municipalities in Medzev, Jasov, and Moldava nad Bodvou struggle with limited financial resources, which restricts their ability to implement comprehensive CNH protection measures. Most funding is directed towards immediate climate risks such as flooding, leaving CNH protection underfunded.
- **Ad-hoc Implementation:** CNH protection is often viewed as a secondary concern compared to immediate environmental risks, such as flooding or soil erosion. This results in an ad-hoc approach to safeguarding heritage. The protection of CNH in the face of climate change is often implemented on an ad-hoc basis. For example, drainage improvements near the Jasov Monastery or wetland restoration around Bodva are positive steps, but these are isolated efforts rather than part of a broader, well-coordinated plan specifically designed for heritage protection.

D. Final remarks and conclusions

Although the current state of adoption of climate change adaptation strategies throughout central Europe has been largely achieved at national, regional and local level, there exist a number of shortcomings that need to be addressed, especially when considering the protection of CNH. Climate change adaptation strategies in Central Europe can significantly enhance the protection of cultural and natural heritage by integrating resilience-building

measures into environmental and urban planning. These strategies often focus on reducing the risks posed by extreme weather events, such as flooding, droughts, and heatwaves, which can threaten historic buildings, archaeological sites, and natural landscapes. By promoting nature-based solutions, such as green infrastructure, flood protection through wetlands, or sustainable land management, adaptation plans can safeguard both tangible and intangible heritage from climate-induced degradation. Moreover, these strategies often include measures to preserve biodiversity and protect ecosystems that are integral to the cultural value of landscapes, such as traditional farming systems or historical parks. Climate-resilient urban planning, which incorporates the protection of cultural landmarks and green spaces, further supports heritage conservation. By adopting a holistic approach that combines environmental protection with heritage management, adaptation strategies can ensure that cultural and natural assets are preserved for future generations while also fostering a sustainable relationship between heritage and climate change resilience.