International Conference "Safeguarding cultural heritage from natural and man made disasters"

Pécs, 12 September 2018

Risk Assessment and Sustainable Protection on Cultural Heritage in changing environment. ProteCHt2save Project

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Risk Assesment and sustainable protection of Cultural Heritage in changing environment

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European Regional Development Fund

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The degree of equality in a society may also be treated as a value that belongs to a society as a whole, rather than to any of the individuals who make up the society. Various measures of this value are available, including the Gini coefficient and the Atkinson measure (Gini, 1912; Atkinson, 1970); for an assessment see (Sen, 1973). Section 3.5 explains that the value of equality can alternatively be treated as a feature of the aggregation of individual people's wellbeings, rather than as social value separate from wellbeing.

3.4.3 Wellbeing

Most policy concerned with climate change aims ultimately at making the world better for people to live in. That is to say, it aims to promote people's wellbeing. A person's wellbeing, as the term is used here, includes everything that is good or bad for the person—everything that contributes to making their life go well or badly. What things are those—what constitutes a person's wellbeing? This question has been the subject of an extensive literature since ancient times.[8] One view is that a person's wellbeing is the satisfaction of their preferences. Another is that it consists in good feelings such as pleasure. A third is that wellbeing consists in possessing the ordinary good things of life, such as health, wealth, a long life, and participating well in a too (Dervis and Klugman, 2011). In the context of climate change, many different metrics of value are intended to measure particular components of wellbeing: among them are the numbers of people at risk from hunger, infectious diseases, coastal flooding, or water scarcity. These metrics may be combined to create a more general measure. Schneider et al. (2000) advocates the use of a suite of five metrics: (1) monetary loss, (2) loss of life, (3) quality of life (taking account of forced migration, conflict over resources, cultural diversity, and loss of cultural heritage sites), (4) species or biodiversity loss, and (5) distribution and equity.

3.4.4 Aggregation of wellbeing

Whatever wellbeing consists of, policy-making must take into account the wellbeing of everyone in the society. So the wellbeings of different people have somehow to be aggregated together. How do they combine to make up an aggregate value of wellbeing for a society as a whole? Social choice theory takes up this problem (Arrow, 1963; Sen, 1970). Section 3.6 will explain that the aim of economic valuation is to measure aggregate wellbeing.

Assume that each person has a level of wellbeing at each time they are alive, and call this their 'temporal wellbeing' at that time. In a society, temporal wellbeing is distributed across times and across the people.

Contract EAC-2016-0248

IPCC, 2014: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment. Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

PROJECTS ON IMPACT OF NATURAL MAN-MADE DISASTERS ON CULTURAL HERITAGE

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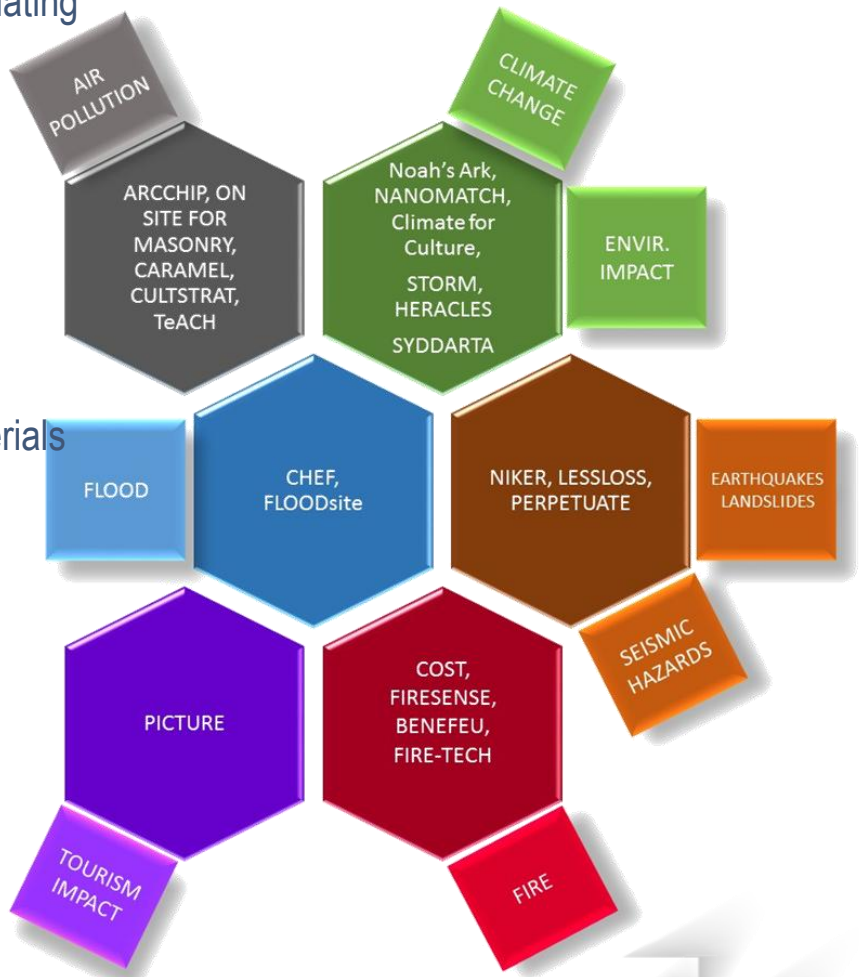
- Lack in observation data: **monitoring** is necessary for correlating damage with climate and its change
- Need of **model downscaling** in space and time
- Improvement of **damage functions** for producing future scenarios (quantitative evaluation, indicators etc.)
- Lack in **scenarios for complex systems**, i.e. urban centres, archaeological sites. Existing scenarios mostly refers to materials
- Lack of exhaustive **multi-risk scenarios**
- Need of **long-term view measures and strategies**
- Need of **early warning system for disasters specifically addresses to CH safeguard** (encouragement of citizens involvement)
- Need of focusing on **preparedness,** measures are mainly based on response to emergency situations



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RESILIENCE STRENGTHENING AND RISK MANAGEMENT - INTERNATIONAL LEVEL

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Hyogo Framework for Action 2005 – 2015	The disaster risks for the cultural heritage was mentioned for the first time, in section 3, “Use knowledge, innovation and education to build a culture of safety and resilience at all levels”, “Key activities”.
Strategy for Risk Reduction at World Heritage Properties	Presented by UNESCO and approved by the World Heritage Committee in 2007 . According to the five main objectives defined by the Hyogo Framework for Action, the priority measures of the Strategy have been structured.
Sendai Framework 2015 – 2030	The new international Disaster Risk Reduction policy includes important references for the protection of culture and heritage from disaster risks.

Cultural heritage as an incentive for enhancing the reduction of the impact of catastrophic events

Protection and enhancement of natural and cultural heritage in support of socio-economic development and sustainable tourism

RESILIENCE STRENGTHENING AND RISK MANAGEMENT –NATIONAL/LOCAL LEVEL

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ITALY

In 2014 three technical-scientific documents were published supporting the "**Strategia Nazionale di Adattamento ai Cambiamenti Climatici (SNAC)**" adopted by the Ministry of Environment and including cultural heritage as one of the priority sectors.

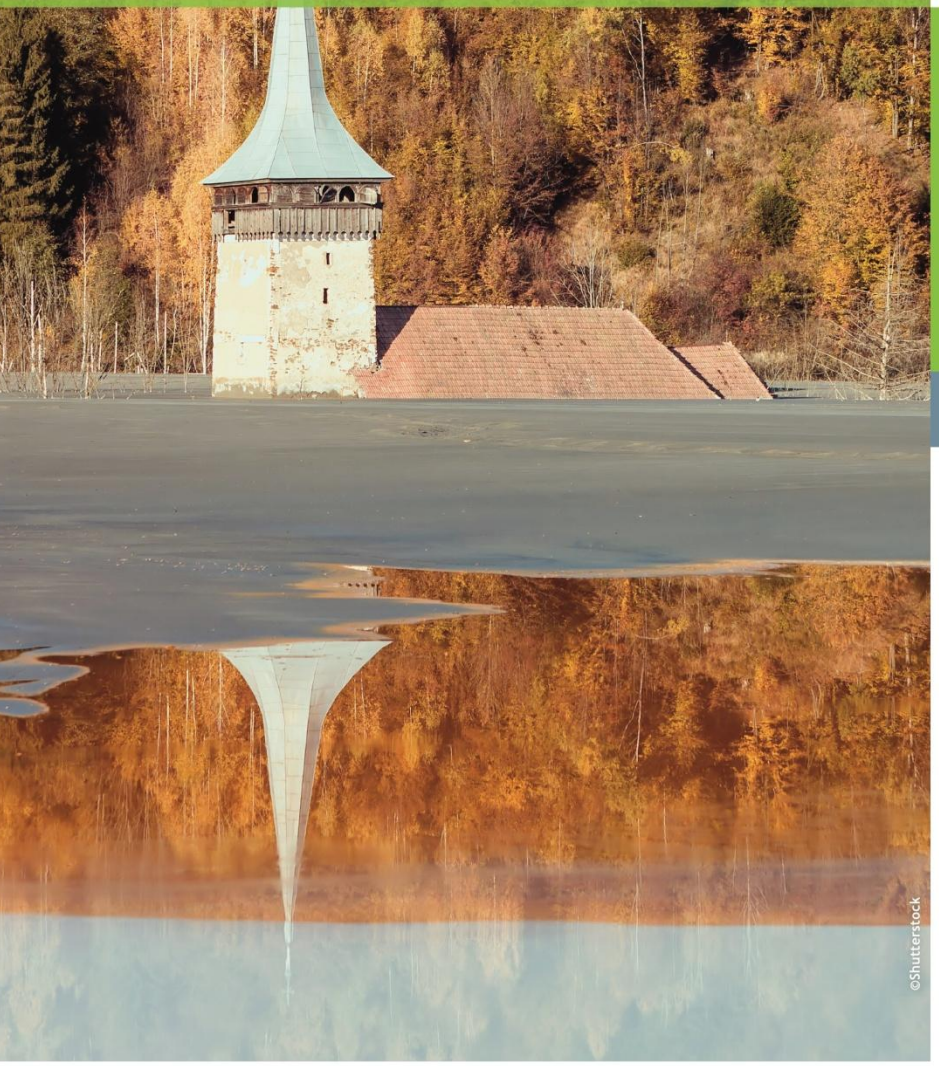
FRANCE

National Climate Change Adaptation - Emerging Practices in Monitoring and Evaluation, the French National Adaptation Strategy, adopted in 2006, identifies four overarching goals to be considered in national planning processes. The 4th is *to preserve French natural heritage*. **Plan national d'adaptation de la France aux effets du changement climatique** 2011 – 2015.

Stones/Bricks/Mortars (Out)	Wood (In/Out)	Metals (Out)
• Surface Recession • Blackening/ Soiling • Thermal Stress • Frost Weathering • Salt Crystallization • Biodegradation	• Mechanical Damage • Fungal Growth	• Corrosion ($T+SO_2$, Steel/Bronze) • Corrosion ($T+Cl^-$, Zinc/Lead/Cupper)

MINISTERO DELL'AMBIENTE
E DELLA TUTELA DEL TERRITORIO E DEL MARE

GUARDING HERITAGE FROM NATURAL HAZARDS



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ProteCHt2save

Climate change and other natural hazards pose a risk for cultural heritage assets and the people around them. ProteCHt2save is a project that works to protect the heritage and nearby populations - especially against the risk of floods. ProteCHt2save produces tools to help local officials manage risks and develop action plans for emergencies.

www.interreg-central.eu/culture

AUSTRIA	Niederösterreich
CROATIA	Jadranska Hrvatska
CZECH REPUBLIC	Praha
HUNGARY	Dél-Dunántúl
ITALY	Emilia-Romagna
POLAND	Śląskie
SLOVENIA	Vzhodna Slovenija

PROJECT BUDGET

2.15 MILLION €

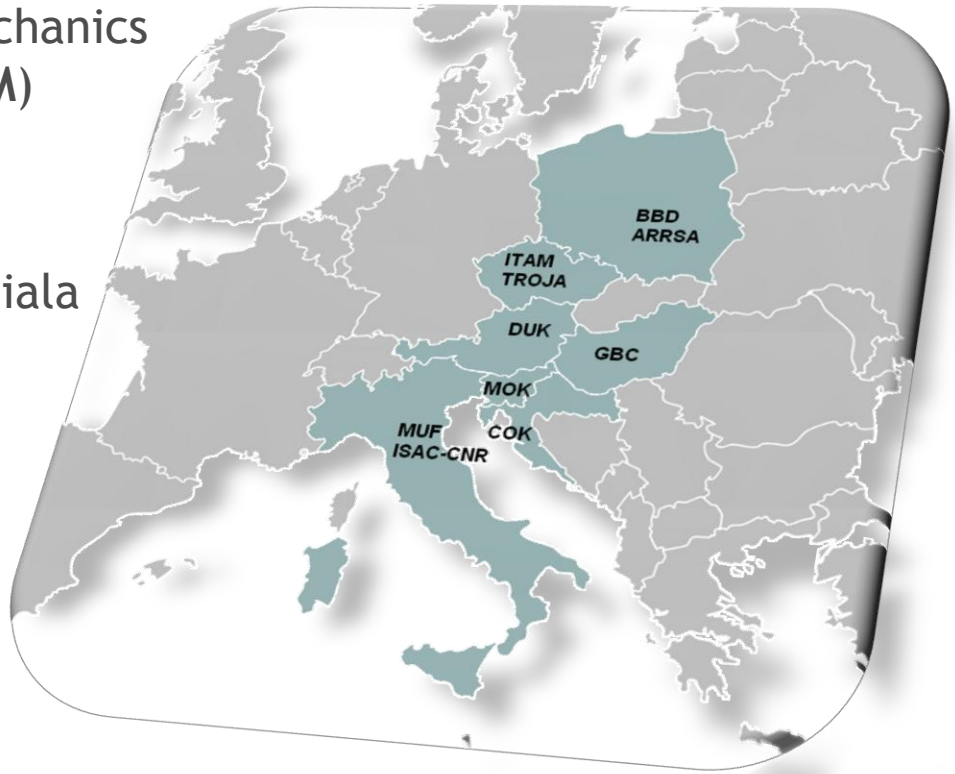
ERDF FUNDING

1.79 MILLION €

Information based on application form | July 2017

PARTNERS

- **Institute of Atmospheric Sciences and Climate National Research Council of Italy (ISAC-CNR)**
- Institute of Theoretical and Applied Mechanics of the Czech Academy of Sciences (**ITAM**)
- Danube University Krems (**DUK**)
- Bielsko-Biala District (**BBD**)
- Regional Development Agency Bielsko-Biala (**ARRSA**)
- Municipality of Ferrara (**MUF**)
- Municipal District Praha-Troja (**TROJA**)
- Government of Baranya County (**GBC**)
- City of Kastela (**COK**)
- Municipality of Kocevje (**MOK**)



OBJECTIVES

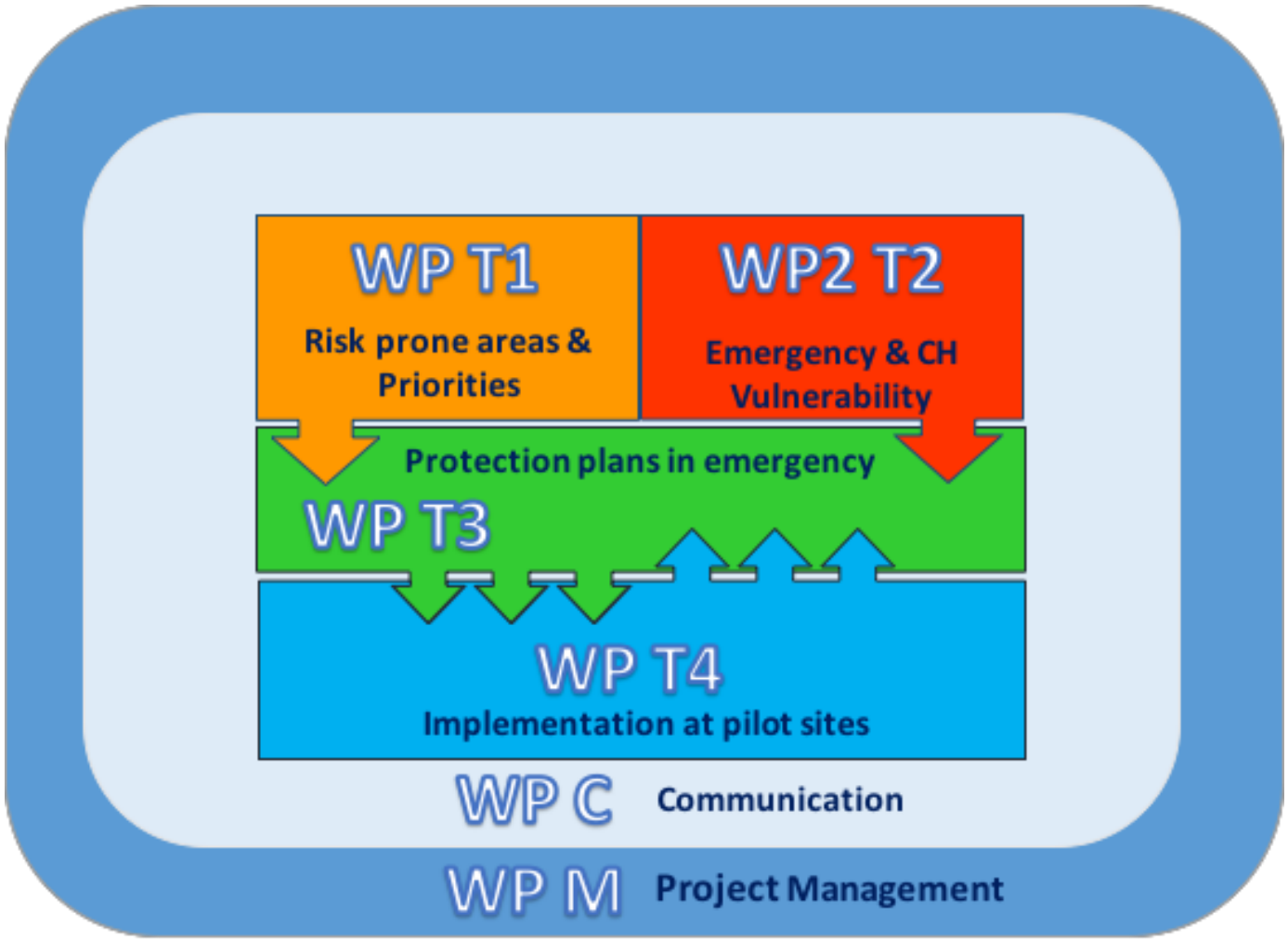
Programme specific objective

3.2 - To improve capacities for the sustainable use of cultural heritage and resources

ProteCht2save main objective: Improved protection, management and sustainable use of CH, as well as its valorization in a changing environment by:

- *Promoting the share of experience on **critical elements** in the **resilience** and **risk management** of CH*
- *Development of:*
  - *ICT solutions (**inventory and maps**) for risk management and protection of CH in Central Europe*
  - *tools (**decision support tool**, **best practices manual**, **handbook on transnational rescue procedures**) with practices/strategies on disaster resilience of CH*
  - ***transnational, regional and local strategies** to favour plans adoption*
- ***Pilot testing** and implementing by active involvement of Municipalities*

PROJECT STRUCTURE



OBJECTIVES

ProteCHt2save specific objectives

- *Defining risk areas for an improved protection and sustainable use of CH in Central Europe susceptible to disasters and climate change impacts.*
- *Determining critical elements for CH vulnerability in the resilience and risk management process.*
- *Setting up of transnational best practices and common strategies for sustainable use and protection of CH to be integrated in joint action plans in a changing environment.*

Extreme Events
Flood
Heavy Rain
Drought periods (Fire)

Cultural Heritage Categories
Monumental complexes with related collections located in urban areas

THEMATIC WORK PACKAGES T1-T4

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2017		2017				2018				2018				2018				2019				2019				2019				2020				2020	
7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6

WP T1
Identification of Risk Areas and Priorities
08. 2017 - 11. 2018

WP T2
Cultural Heritage Vulnerability in Emergency Situations 10. 2017 - 12. 2018

WP T3
Elaboration/Implementation of Plans for Cultural Heritage Protection in Emergency Situations
11. 2018 - 11. 2019

WP T4
Elaboration/Implementation of Plans for Cultural Heritage Protection and Safeguarding in Emergency
06. 2019 - 06. 2020

WP T1 IDENTIFICATION OF RISK AREAS AND PRIORITIES

Activity A.T1.1

D.T1.1.2 Report including and inventory of existing tools for risk evaluation

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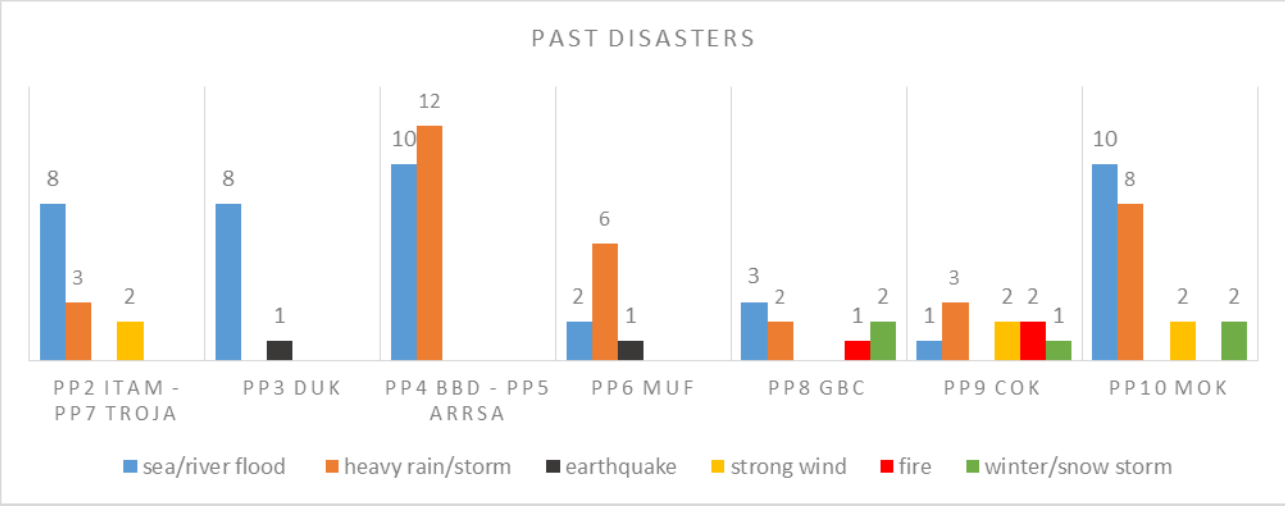
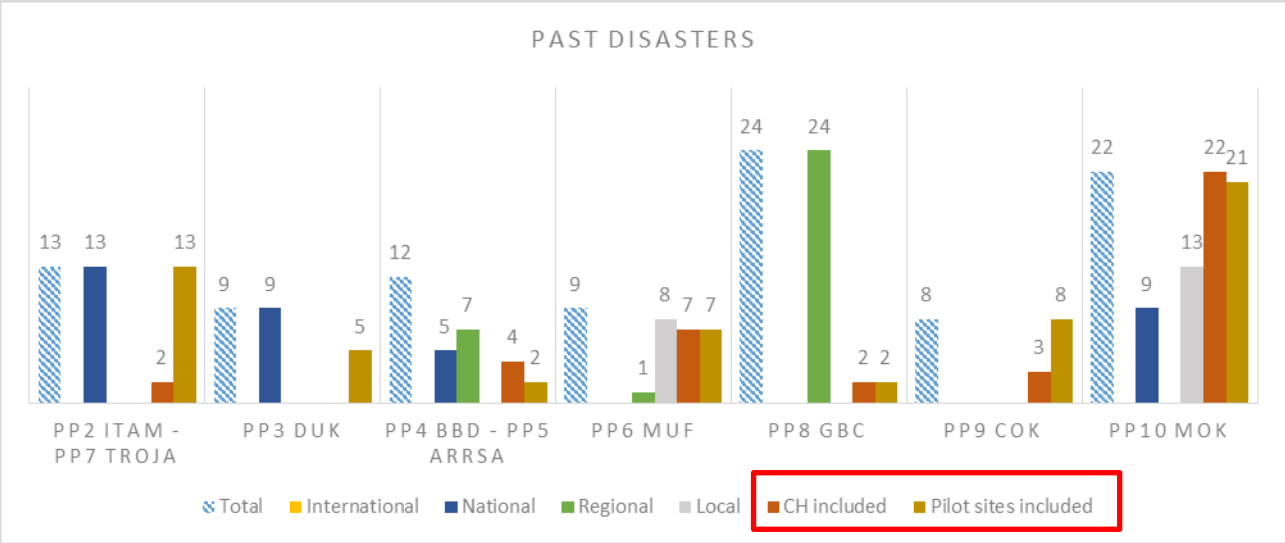
Main natural hazards involved: Flood and Heavy rain



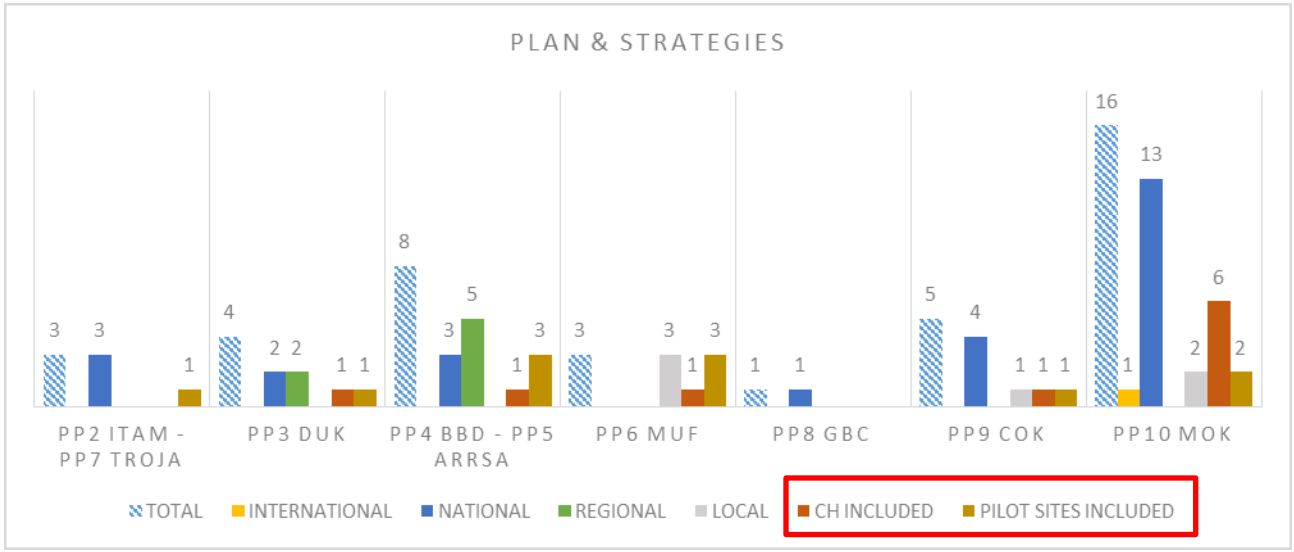
Past disasters:

- **documented disasters on pilot sites**
- **Not always on built CH**

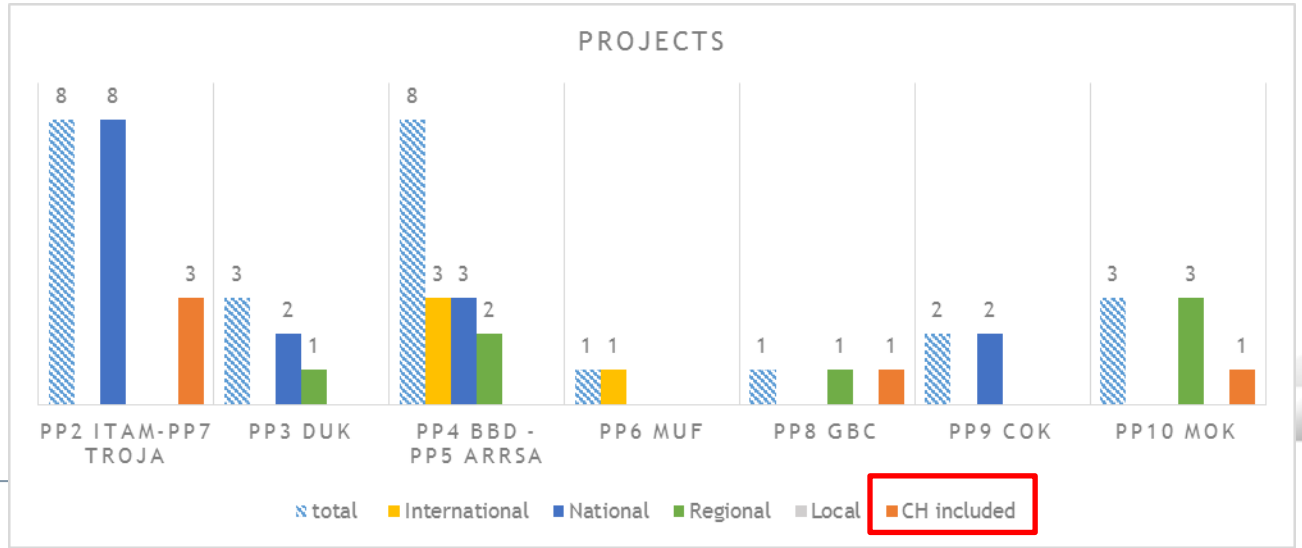


Plan & strategies

The number of plans and strategies including ProteCHt2save pilot sites are highlighted as well as those taking into consideration built heritage (Krems, Bielsko-Biala, Ferrara, Kastela and Kocevje)



Protection and recovery of built CH almost not included



Plan & strategies

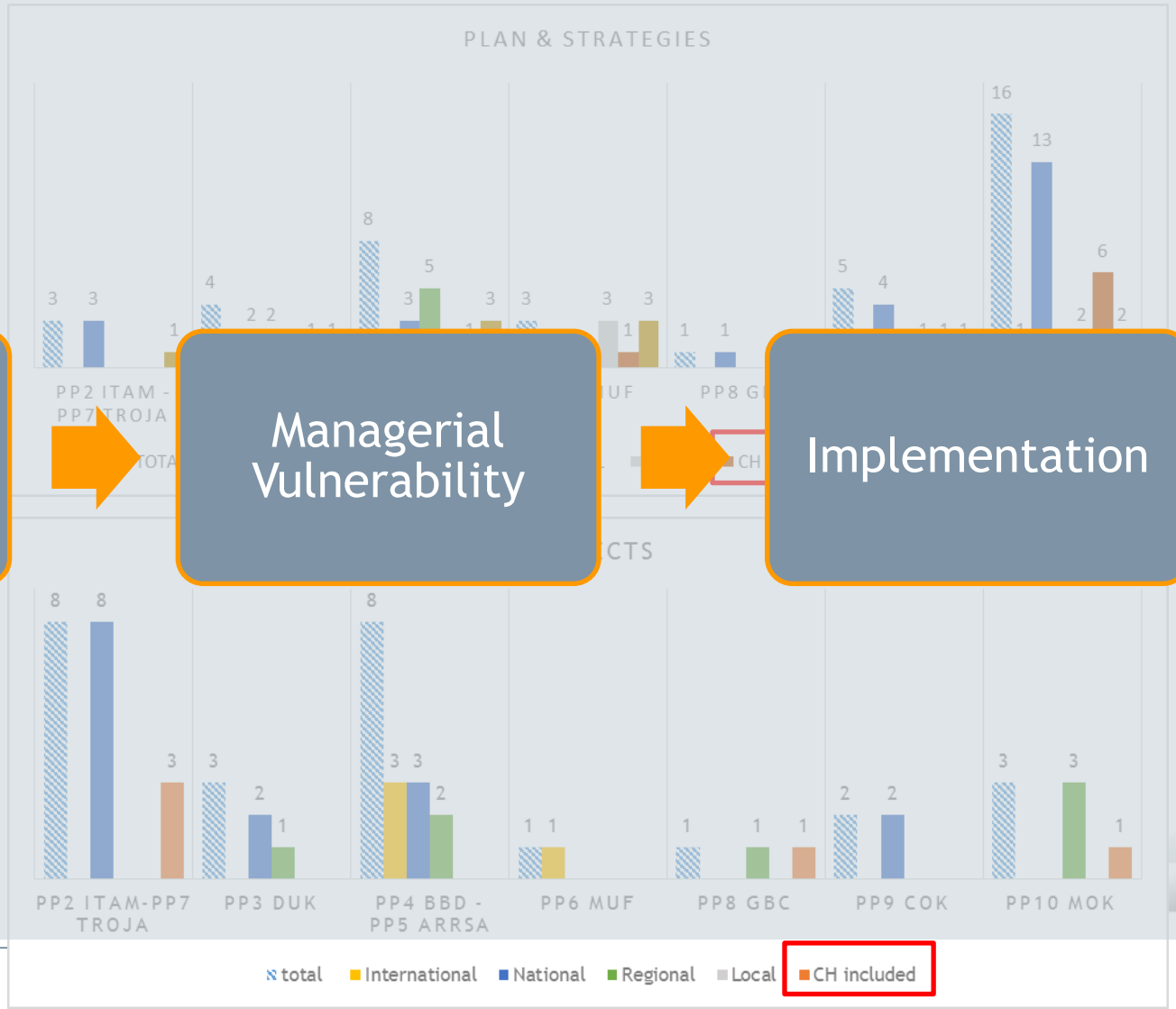
The number of plans and strategies including ProteCHt2save pilot sites are highlighted as well as those taking into consideration built heritage (Bielsko-Biala, Ferrara,

Protection and recovery of built CH almost not included

Managerial Vulnerability

Implementation

Protection and recovery of built CH almost not included



Climate models and downscaling

General Framework

ProteCHt2save

Regional Climate Models (RCMs) — **10-50 km**

Downscaling

Bias correction

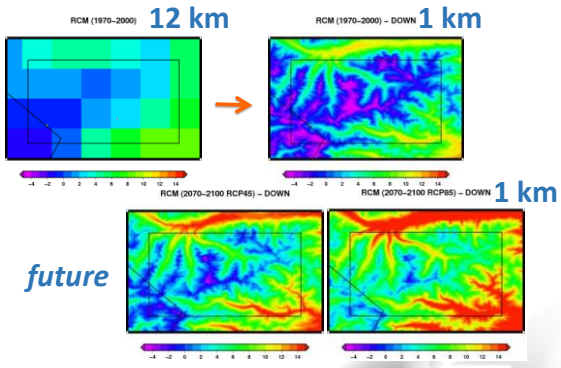
Statistic/Stochastic Downscaling — **1 km**

Euro-CORDEX (Coordinated Downscaling Experiment - European Domain) **RCMs**

- **0.11° lat-lon resolution (~12 km)**
- **Historical and future simulations**
- **Two future scenarios (RCP4.5 and RCP8.5)**

Station based reference dataset E-OBS (25 km), used for correcting the temperature and precipitation provided by the RCMs.

Use of the **RainFARM** downscaling technique: **temperature and precipitation downscaling with orographic correction**



Climate extremes and metrics

Data from models will be used for the production of :

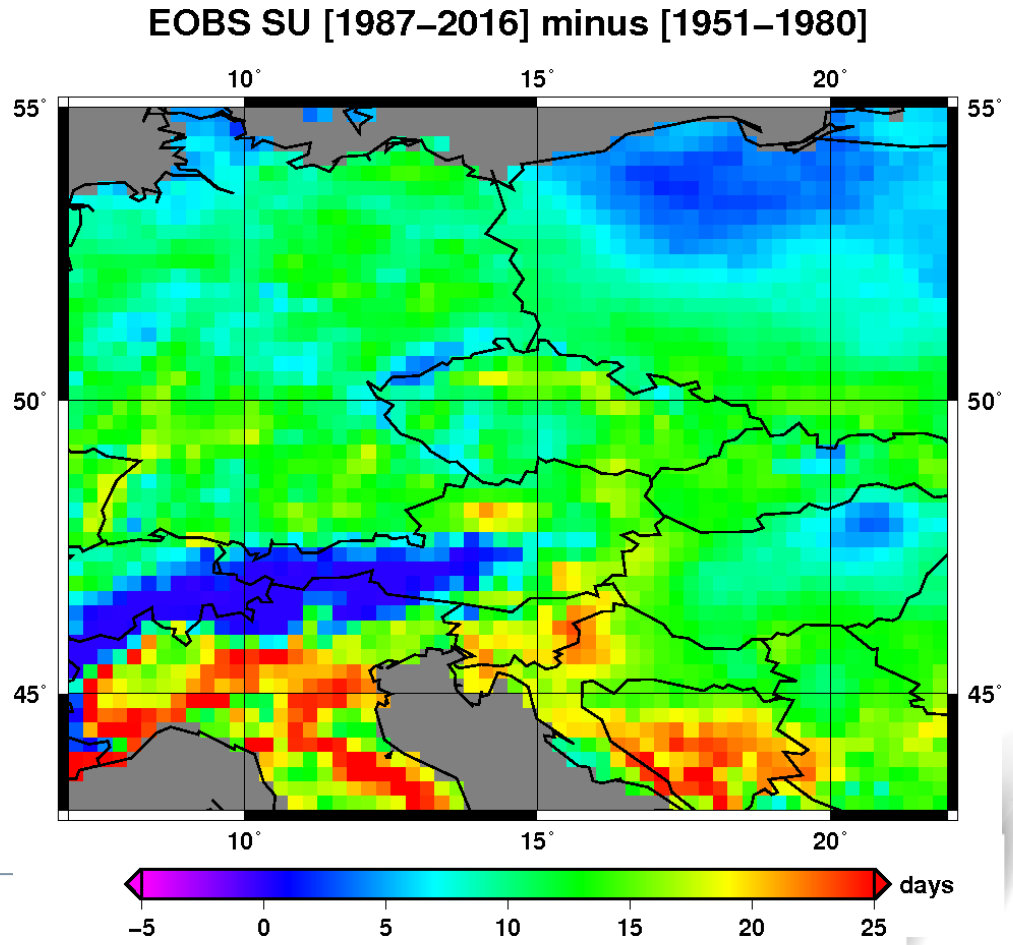
i) maps of changes of principal climate variables (temperature and precipitation)

ii) maps related to climate extremes by using indexes selected among those defined by the CCl/WCRP/JCOMM Expert Team on Climate Change Detection and Indices (ETCCDI) (http://www.climdex.org/indices.html)

SU, Number of summer days.
Annual count of days when TX (daily maximum temperature) > 25°C.

Let TXij be daily maximum temperature on day i in year j. Count the number of days where:
TXij > 25°C.

D.T1.2.3
Elaboration of maps with hot spots of extreme potential impacts on CH



PILOT SITES

7 pilot actions will be conducted linked to climate change and variability associated with hydrometeorological and climate extremes

Monumental Complexes/Museums

Preparedness strategies
Evacuation in emergency

- Flood events in large basin
- Fire due to drought
- Extreme events of heavy rain


Thank you!
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