

LAYMAN'S REPORT



European Union
Civil Protection and
Humanitarian Aid

The project in brief

RECIPE seeks to develop operational recommendations and tools to reinforce civil protection in emergency management and risk planning for different natural hazards across Europe while simultaneously addressing climate change impacts through an integrated risk management approach and exchange of lessons learned and best practice sharing.

Partnership: Forest Science and Technology Centre of Catalonia - CTFC (Lead partner)
Pau Costa Foundation - PCF
Civil Protection General Directorate of Catalonia - DGPC CAT
Forest Research Institute Baden-Württemberg - FVA
CIMA Research Foundation - CIMA
Austrian Research Centre for Forest Natural Hazards and Landscape - BFW
Institute of Cartography and Geology of Catalonia - ICGC
School of Agriculture, University of Lisbon - ISA

Duration: 2020-2021

Co-funded by European Union Humanitarian Aid and Civil Protection (UCPM-2019-PP-AG)



RECIPE

Reinforcing civil protection capabilities into multi-hazard risk assessment under climate change

Natural hazards risk management in a climate change context

Under climate change scenarios, disaster risk management is getting more complex, as the potential impacts of natural hazards on citizens and infrastructures increase, meanwhile decision-making processes must deal with higher levels of uncertainty. Consequently, risk management agencies have to deal with unknown or more severe events. The proper inclusion of emergency response requirements into risk assessment and planning will contribute to reinforce Disaster Risk Reduction Strategies.



WHAT DO WE KNOW ABOUT THE IMPACTS OF CLIMATE CHANGE ON NATURAL HAZARDS?

HOW CIVIL PROTECTION COULD FACE NEW RISK MANAGEMENT CHALLENGES POSED BY CLIMATE CHANGE?

WHAT CAN WE LEARN FROM DIFFERENT DISASTER RISK REDUCTION STRATEGIES?

*** Project approach**

Wildfires Storms Floods Avalanches Rock-falls Landslides

Framing civil protection requirements for integrated multi-hazard risk management

Impacts of climate change projections on multi-hazard risk assessment

Guidelines and decision support tools for integrate climate scenarios into risk assessment and planning

The diagram illustrates a project approach for multi-hazard risk management. It begins with a list of hazards: Wildfires, Storms, Floods, Avalanches, Rock-falls, and Landslides. These hazards are then analyzed through two parallel processes: 'Framing civil protection requirements for integrated multi-hazard risk management' and 'Impacts of climate change projections on multi-hazard risk assessment'. The results of these processes are then used to develop 'Guidelines and decision support tools for integrate climate scenarios into risk assessment and planning'. The background of the diagram features a green field with a large, dark, irregular shape on the right side.



* Defining data attributes for integrated risk assessment and planning of wildfires, floods, storms, avalanches, rockfalls, landslides and their interactions

Conceptual approach

The diagram illustrates a conceptual approach for integrated risk assessment and planning. It is structured into three main columns representing different risk drivers: Hazard, Exposure, and Vulnerability. Each column has a dashed box containing 'Social factors' and 'Physical factors' leading to a central box: 'HAZARD' (green), 'EXPOSURE' (orange), and 'VULNERABILITY (inc. Coping Capacity)' (yellow). These three central boxes are linked by a double-headed arrow with a multiplication sign (X), and they all point to a central blue box labeled 'VALUES AT RISK'. Below each central box is a 'RISK MITIGATION MEASURES' box, which is linked to 'Stakeholders involved' and 'Sectoral tools involved' boxes. A large blue arrow points from the 'VALUES AT RISK' box to a large blue box labeled 'INTEGRATED RISK MANAGEMENT STRATEGY'. This strategy box contains three sub-components: 'RISK MANAGEMENT CYCLE (Prevention, Preparedness, Response & Recovery)', 'MAP OF STAKEHOLDERS & ROLES', and 'SECTORAL POLICIES & PLANING TOOLS'. To the right of the diagram is a tilted image of a 'Template of Assessment scheme of risk driver factors and mitigation measures', which is a complex table with multiple columns and rows, likely for data entry and analysis.

Template of Assessment scheme of risk driver factors and mitigation measures

* Defining data attributes for integrated risk assessment and planning of wildfires, floods, storms, avalanches, rockfalls, landslides and their interactions

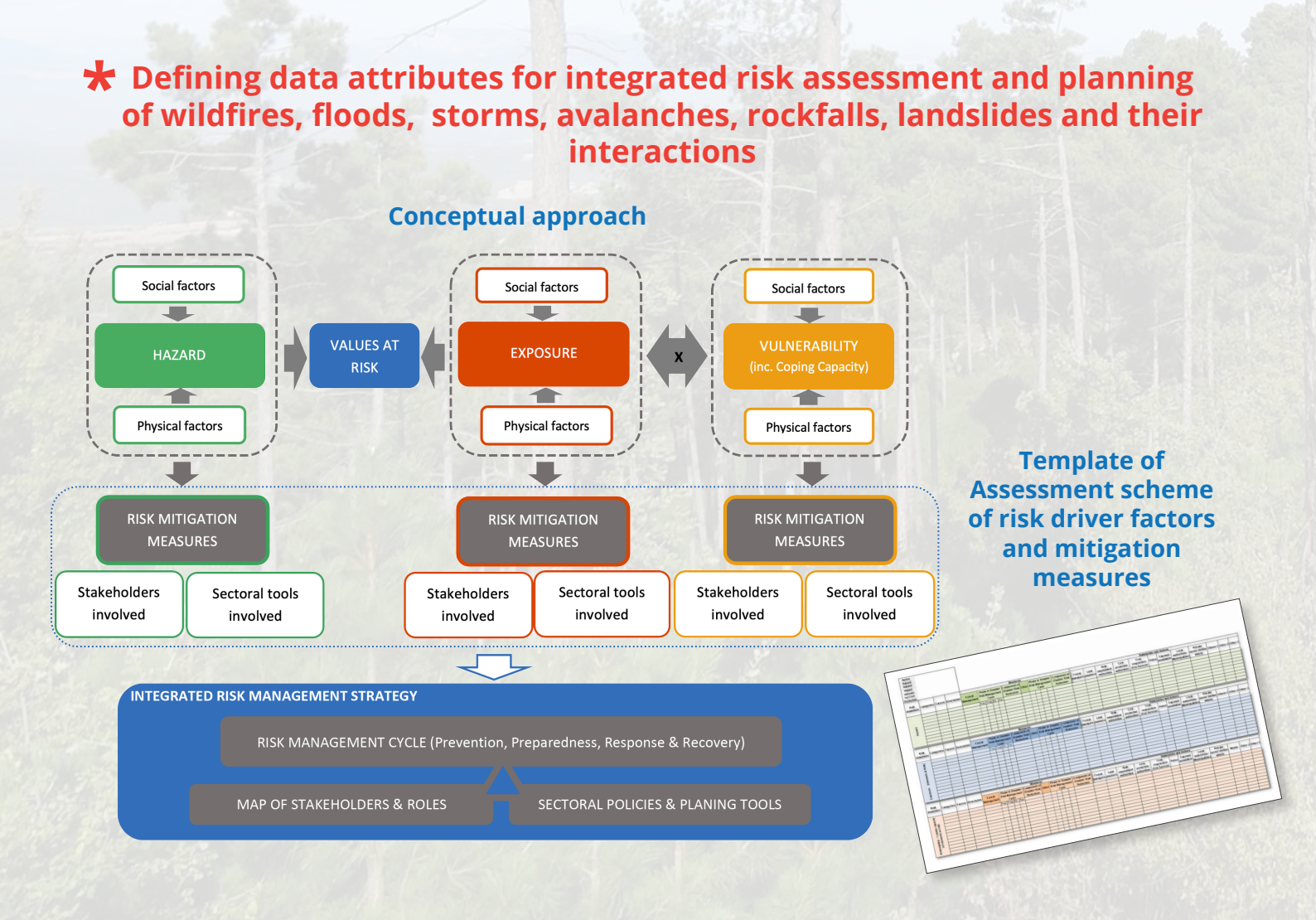
Conceptual approach

The diagram illustrates the conceptual approach for integrated risk assessment and planning. It is structured as follows:

- Hazard Assessment:** Social factors and Physical factors feed into HAZARD (green box).
- Exposure Assessment:** Social factors and Physical factors feed into EXPOSURE (orange box).
- Vulnerability Assessment:** Social factors and Physical factors feed into VULNERABILITY (inc. Coping Capacity) (yellow box).
- Risk Calculation:** HAZARD, EXPOSURE, and VULNERABILITY are combined (indicated by a large 'X' symbol) to determine VALUES AT RISK (blue box).
- Mitigation Measures:** HAZARD, EXPOSURE, and VULNERABILITY each lead to RISK MITIGATION MEASURES (grey boxes).
- Stakeholders and Tools:** RISK MITIGATION MEASURES lead to Stakeholders involved and Sectoral tools involved (white boxes).
- Integrated Risk Management Strategy:** The final output, which includes the RISK MANAGEMENT CYCLE (Prevention, Preparedness, Response & Recovery), MAP OF STAKEHOLDERS & ROLES, and SECTORAL POLICIES & PLANING TOOLS.

Template of Assessment scheme of risk driver factors and mitigation measures

The table is a template for assessing risk driver factors and mitigation measures. It has columns for various factors and rows for different assessment categories. The columns are: Hazard, Exposure, Vulnerability, Risk, and Mitigation Measures. The rows are: Hazard, Exposure, Vulnerability, Risk, and Mitigation Measures. The table is divided into sections for Hazard, Exposure, Vulnerability, Risk, and Mitigation Measures, each with its own set of sub-columns and rows.



* Defining data attributes for integrated risk assessment and planning of wildfires, floods, storms, avalanches, rockfalls, landslides and their interactions

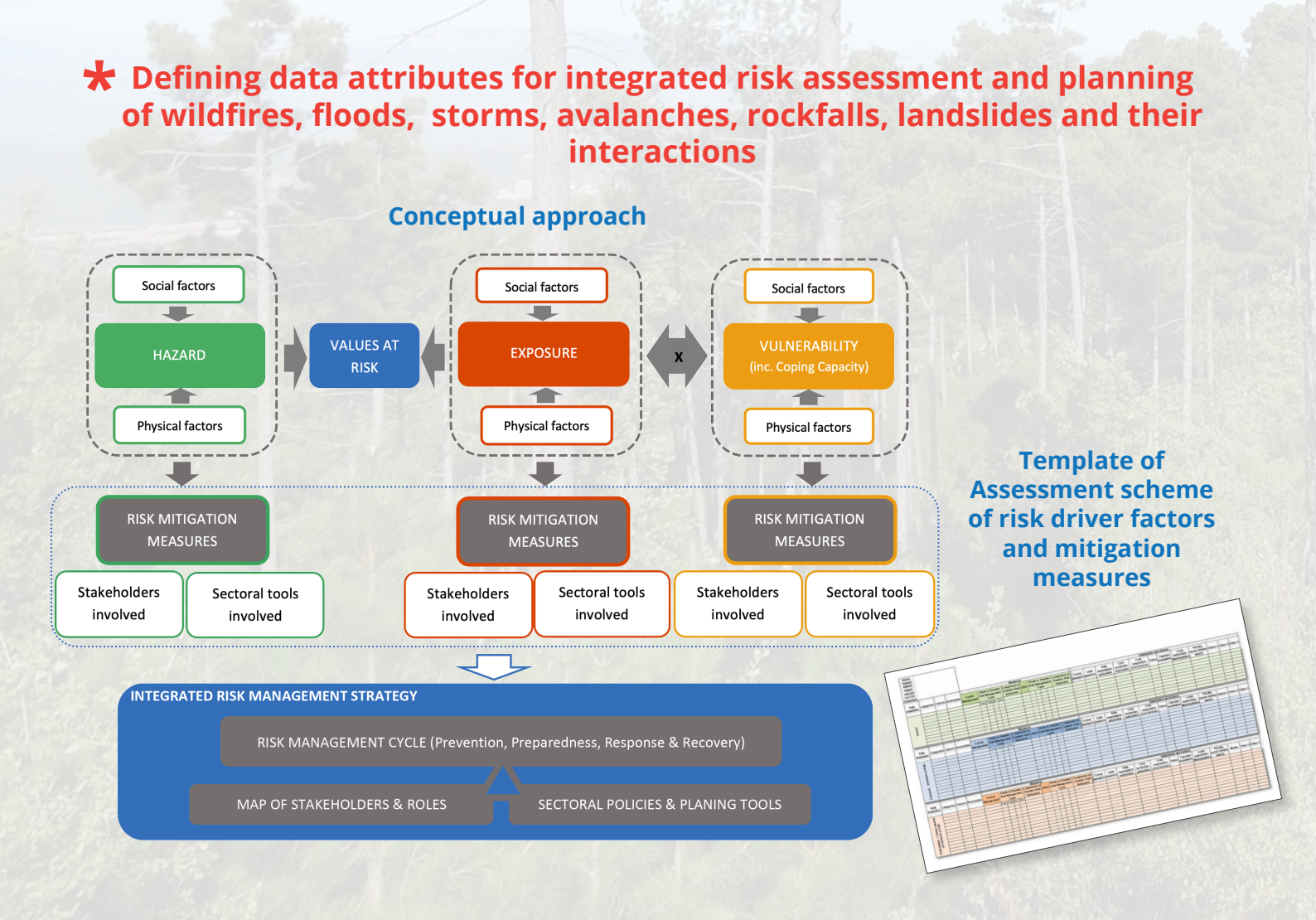
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Template of Assessment scheme of risk driver factors and mitigation measures

The table is a template for assessing risk driver factors and mitigation measures. It has columns for various risk driver factors (e.g., Hazard, Exposure, Vulnerability) and rows for different assessment categories (e.g., Hazard, Exposure, Vulnerability, Risk, Mitigation Measures). The table is color-coded to match the conceptual approach diagram.



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Template of Assessment scheme of risk driver factors and mitigation measures

* Analysing impacts of climate change projections on wildfires, floods, storms, avalanches, rockfalls, landslides and multi-hazard risk management



Multi-hazard scenarios analyzed:

- Storms - Wildfires
- Wildfires - Flash-floods
- Wildfires - Avalanches
- Wildfires - Landslides
- Wildfires - Rockfalls



Connect - Exchange

From responders to forest risk managers

From lessons learned to expected CC projections

From different natural hazards expertise



More in Deliverable 3.1 and 3.2 **Report on impacts of climate change projections on wildfires, floods, storms, avalanches, rockfalls, landslides and multi-hazard risk management**

* Identifying Civil Protection and emergency management requirements to face natural hazards

Around **50 interviews**, covering a wide range of organizations of **5 countries** (Germany, Austria, Italy, Spain and Portugal) from the **national to the local level**: Civil Protection, Fire Service, Decision makers, and Risk managers, among others.

More in Deliverable 2.2 **Report on Civil Protection and emergency management requirements to face natural hazards**.

DATA OF THE INTERVIEW			
Name	Num	Date	Partner
		Email	
Position			
Organization/Service			
Main duties			
MOST COMMON SINGLE AND/OR MULTI NATURAL HAZARD SCENARIOS			
1. What are the most common single and/or multi natural hazard scenarios that you have to deal with? In the case of multi-hazard, could you identify a trigger effect pattern (the effects of one hazard triggers another hazard) in these situations?			
2. How do you proceed (in general, globally)? Which kind of tasks you have to do? What are your responsibilities? (specify for single/multi-hazard situations)			
3. What are the most important operational tools (decision-making, data integration, etc.) you have/lose in these situations? What are the most important needs in these scenarios in terms of operational tools, data quality and integration, procedures and/or inter-agency or multi-actor cooperation? (specify for single/multi-hazard situations)			
4. What kind of actions developed in prevention and preparedness are essential for you in the response stage? What actions do you think could be developed in prevention and preparedness stage to enhance the response capacity? (specify for single/multi-hazard situations)			
5. Do you (team, institution or procedures) currently take into account cost-efficiency criteria in decision-making? In which way (e.g. through an indicators system, Standard Operating Procedures, empirical knowledge or pre-defined values)? (specify for single/multi-hazard situations)			
6. Do you have any post-event lessons learned protocol? How does it work? (e.g., internal and/or including the exposed population)			
7. What are the best practices that the Civil Protection system used during this event?			



* Motivating knowledge exchange and networking

3 International workshops and 2 Regional dissemination activities, around more than 100 experts, practitioners and scientist from different institutions and countries.



* Developing different support tools for civil protection



Guidelines for flood civil protection planning with participatory approach with a prototype tool for

monitoring participatory process



Prototype for improved decision making in landslide and rockfall risk management



Guidelines for a participatory crisis management plan to manage wind throw along roads



Support tool and guidelines for integrated wildfire risk assessment, planning and awareness

- Integrated wildfire risk assessment and planning method including stakeholder engagement for resilient communities at local level
- Tools for enhancing wildfire risk culture and awareness of children and wildland urban interface communities
- DSS module for prioritizing fuel management at wildland urban interfaces in Portugal



Protocol for wildfire and avalanche risk management in mountain areas



Visualizer tool for managing emergency situations in case of high avalanche risk

More in **Support tools** website section

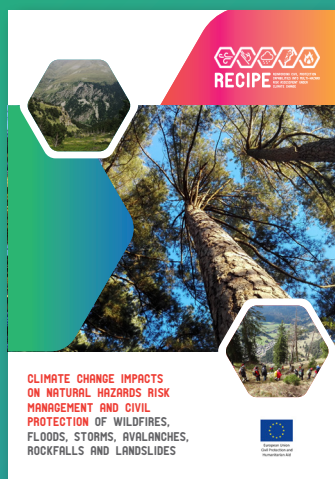
* Analysis of existing decision support systems and the operability to include projected climate change impacts, and guidelines to incorporate projected climate change impacts into DSS and platforms

A total of **18 DSS assessed**, from different countries and risks.

More in Deliverable 4.1 **Guidelines to incorporate projected climate change impacts into Decision Support Systems and platforms**

Free access results
on the project website
<http://recipe.ctfc.cat/>

recipe@ctfc.cat



Final publication on natural hazards risk management in a climate change context

Online available in English, Spanish, Catalan, Italian, German and Portuguese

CTFC

PAU COSTA FOUNDATION

cima
RESEARCH FOUNDATION

ABFW
Austrian Research Centre for Forests

protecció civil

FA
Forstliche Versuchs- und Forschungsanstalt Baden-Württemberg

ICGC
Institut Cartogràfic i Geològic de Catalunya

INSTITUTO SUPERIOR D AGRONOMIA
Universidade de Lisboa