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Alpine Space

X-RISK-CC

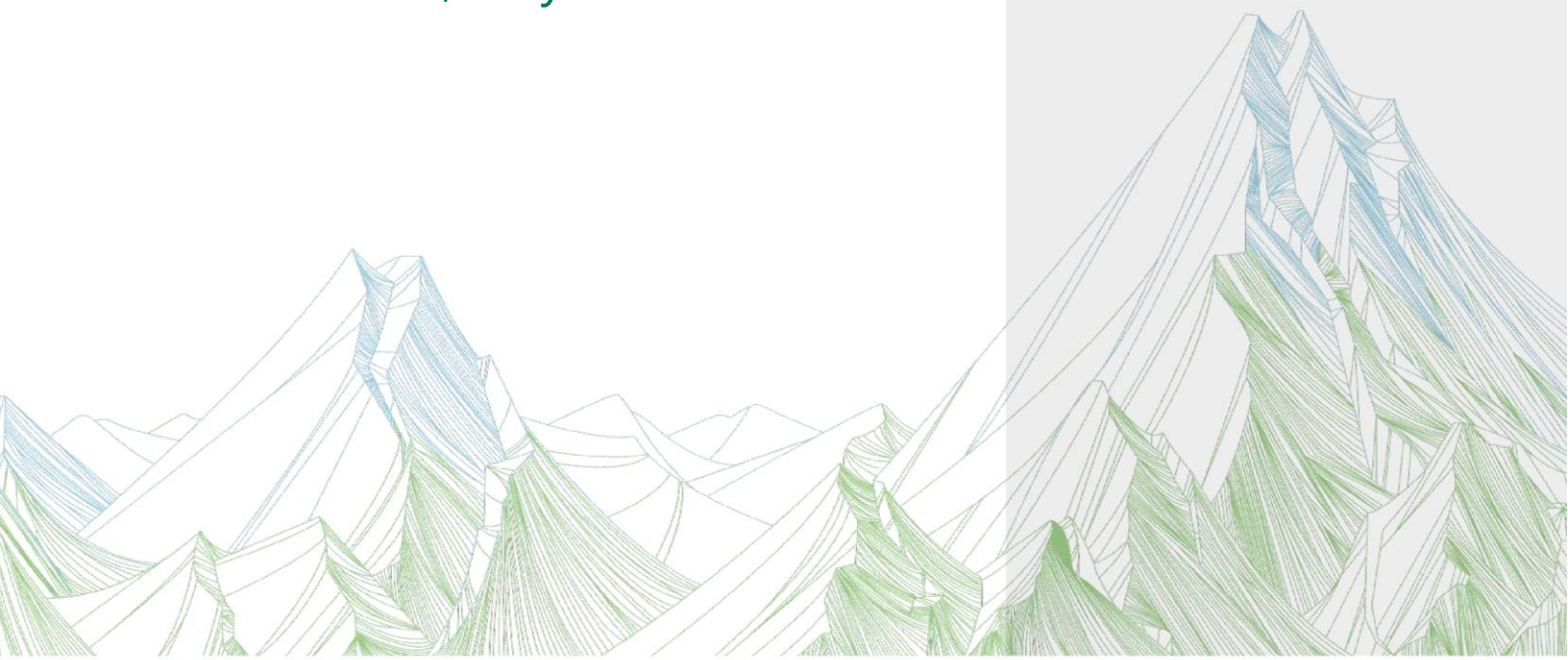
TAILORED ACTION PLAN
FOR RISK MANAGEMENT IMPROVEMENT

Interreg Alpine Space X-RISK-CC project – 2023/2025

PILOT AREA:

Fiemme and Fassa Valleys

In Trentino, Italy



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PROJECT PARTNERS

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PROJECT: **X-RISK-CC**

How to adapt to changing weather eXtremes and associated compound RISKs in the context of Climate Change

IMPRESSUM:

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This publication is available on the project website URL under “Outcomes”:
X-RISK-CC - Alpine Space Programme

DATE:
December 2025

INTRODUCTION TO THE X-RISK-CC PROJECT

Project Background and Objectives

The X-RISK-CC project addresses the increasing challenges posed by climate-related extreme weather events across the Alpine Space. Recent years have demonstrated that compound and cascading extremes—such as storms combined with heavy precipitation, or heatwaves followed by drought and flooding—can challenge current risk management capacities. The unexpected magnitude and intensity of these extremes can cause compound impacts and domino effects that turn into complex, long-lasting, or even irreversible consequences. While scientific evidence links climate change to the increasing intensity and frequency of such events, knowledge and management of their cascading impacts and risks remain insufficient. The X-RISK-CC project aims to improve risk management of such extreme events in the context of climate change. By considering selected pilot areas across the Alpine Space, co-designed, context-specific interventions are elaborated based on a comprehensive assessment of past extreme events, future climate projections, and systematic evaluation of existing risk management capabilities and gaps. This document presents the Tailored Action Plan developed for one of the project pilot areas.

The Pilot Area of Reference

In 2018, the Vaia storm struck the Central Alps, including Fiemme and Fassa Valleys, causing widespread windthrow, damage to river systems, debris flows and long-lasting infrastructure disruptions. Large forest losses on steep slopes created new potential avalanche release areas, later mapped in provincial hazard maps. Windthrow also exposed erosion-prone surfaces and altered catchment response, increasing runoff intensity. The decaying timber facilitated bark beetle outbreaks, which expanded beyond the initial impact, prolonging effects on avalanche, hydrological and hydraulic hazards.

For further details on the pilot area, the natural hazards that occurred and the activities that led to the co-creation of the tailored action plan, refer to the document “PILOT DOSSIER: FIEMME AND FASSA VALLEYS, IN TRENTINO, ITALY” available at the project website under “Outcomes”.

Outcomes:
X-RISK-CC - Alpine Space Programme
https://www.alpine-space.eu/project/x-risk-cc/

X-RISK-CC – Web GIS:
Information on intensity and frequency of weather extremes in the entire Alpine Space
https://cct.eurac.edu/x-risk-cc

THIS DOCUMENT

Based on the results of participatory workshops with local stakeholders, this document presents the Tailored Action Plan (TAP) which outlines the priority actions to strengthen the region's capacity across all phases of the risk management cycle. The TAP addresses key gaps in early warning systems, data integration, coordination mechanisms, infrastructure resilience, legal frameworks, and public awareness. The actions are designed to be implementable, measurable, and aligned with both regional and transnational objectives of the Alpine Space for disaster risk reduction and climate change adaptation.

Purpose and Concept

While this document provides the overall structure and documentation, the TAP itself is conceived as a living set of implementation-oriented actions, forming a dynamic and evolving database of priority measures. The actions can be continuously updated and adapted over time and serve as a practical reference for identifying next steps, tracking ongoing initiatives, and maintaining a clear overview of progress in strengthening regional resilience. This flexible approach acknowledges that effective risk management in the context of climate change requires ongoing learning, adaptation, and coordination among stakeholders.

Methodology

The methodology employed to develop the TAP for each pilot area of the project follows a **Community-Based Approach** engaging stakeholders across all phases of the risk management cycle (prevention, preparedness, response, recovery). **Participatory workshops with local stakeholders** were conducted **between 2023 and 2025** in each pilot area.

Participants in the workshops of the pilot area of Fiemme and Fassa Valleys, in Trentino:

- Basin Service of the Autonomous Province of Trento
- Environment Protection Agency of the Autonomous Province of Trento
- Risk Prevention Service and Single Emergency Center
- Forestry Department
- Fire service of Trento, Fassa Valley and Fiemme Valley
- Department of road services
- EURAC Research
- Magnificent Community of Fiemme
- Stakeholders from the municipalities of Predazzo, Cavalese, Molina of Fiemme, Soraga of Fassa, San Giovanni of Fassa, Tesero
- ASUC (Amministrazione Separata dei beni frazionali di Uso Civico)
- Red cross

Prioritization Strategy

Prioritization was carried out separately for each pilot area in the project and is therefore not uniform across pilot regions, reflecting different risk contexts, institutional settings, and capacities.

The prioritization method applied in the pilot area of Fiemme and Fassa Valleys is based on two key dimensions: feasibility and strategic relevance.

- **Feasibility** assesses how realistic and achievable the action is in terms of resources, time, and implementation capacity.
- **Strategic relevance** measures how strongly the action contributes to long-term objectives and overall strategy.

Each dimension is evaluated on three qualitative levels: Low, Medium, High. By combining the two dimensions, the final priority level is assigned. This ensures that actions with both high feasibility and strong strategic relevance are prioritized, while those with limited impact or lower feasibility are ranked lower.

High-priority actions for Fiemme and Fassa Valleys are presented in the TAP.

STRUCTURE AND CONTENT OF THE TAILORED ACTION PLAN

Each action in this document includes:

- **IDENTIFICATION:** Unique code, title, and summary
- **GAP ADDRESSED:** Specific weakness or need in current risk management
- **FRAMING:** Position in risk cycle, action type, governance level, ownership, target groups
- **DESCRIPTION:** Detailed explanation of the action, preliminary steps, expected benefits, and potential challenges
- **VALIDATION:** Indicators and parameters for monitoring progress and success
- **FEASIBILITY:** Timeline, funding, responsibilities, and implementation pathway

Action Plan Fields Explained

ID Number	Unique identifier assigned to each action. This allows for easy reference, tracking of connections between actions, and integration with other planning documents.
Title of the Action	Brief, descriptive name that clearly communicates the core focus of the action.
Gap(s) it refers to	Specific deficiencies, weaknesses, or missing elements in current risk management practice that this action aims to address. Gaps may include missing infrastructure, inadequate procedures, lack of coordination, insufficient data, legislative limitations, communication deficiencies, or capacity constraints.
Risk Cycle Position	The phase(s) or interphase(s) of the risk management cycle where this action primarily operates: Prevention, Preparedness, Response, Recovery, or Interphases (e.g., "Preparedness-Response," "Recovery-Prevention").
Type	Classification of the action according to its primary mechanism:

	• **Knowledge and Data:** Actions focused on improving information, understanding, monitoring, or data systems • **Communication:** Actions aimed at improving information flow, awareness, warnings, or coordination • **Legislative:** Actions requiring changes to laws, regulations, standards, or formal procedures • **Technical Measures:** Actions involving physical infrastructure, technology deployment, or engineering solutions • **Capacity Building:** Actions focused on training, institutional strengthening, or resource development
Level	The primary governance or implementation scale: Local (municipal level), Provincial/Regional, National, Cross-border/International, or Multiple levels.
Ownership	The institution(s) or organization(s) with primary responsibility for initiating, implementing, and ensuring completion of the action. Ownership implies decision-making authority and accountability.
Actors	Other institutions, organizations, or groups that play significant roles in implementing the action, providing input, or whose cooperation is essential for success.
Target Groups	The populations, sectors, or constituencies that will directly benefit from or be affected by the action. This may include general population, specific vulnerable groups, professional sectors, municipalities, emergency responders, or infrastructure operators.
Priority	Priority level based on the prioritization methodology described above. In TAP only high-priority actions are included.
Funding	Current or anticipated funding status (if any)
Progress Status	Current state of implementation
Connection to other actions (ID)	Lists the ID numbers of related actions that must be completed first (prerequisites), should be coordinated with (synergies), address related gaps (thematic connections), or may conflict with (trade-offs to manage).

TAILORED ACTION PLAN

Table of actions

Table 1 provides a comprehensive overview of all identified actions. Each action is coded according to the system described in the previous section and can be filtered by its position in the risk management cycle, type, priority level, or progress status. **Detailed descriptions of each action are provided in the Annex**, outlining the rationale of each action, the gap or need it addresses, its position within the risk management cycle, institutional ownership and actors involved, intended target groups, and current state of implementation. Together, these descriptions serve to contextualize the actions, support prioritisation and monitoring, and provide a transparent basis for coordination, decision-making, and future updates of the action plan.

ID Number	Title of the Action	Gap(s) it refers to	Risk Cycle position	Type	Level	Ownership	Actors	Target Groups	Priority	Funding	Progress Status	Connection to other actions (ID)
1	Revision Avalanche Prone Areas	Insufficient studies and outdated data on new avalanche zones (APP) emerged after the Vaia storm; limited municipal technical capacity.	prevention and preparedness	Knowledge and Data	provincial/ regional	Autonomous Province of Trento – Department of Civil Protection, Forests, and Fauna (Risk Prevention Service)	Autonomous Province of Trento – Department of Civil Protection, Forests, and Fauna (Risk Prevention Service)	Municipal administrations, technicians and planners, provincial offices responsible for hazard assessment, local communities living near APP.	High	yes partially	work in progress, guidelines are avaiable and now it is important to revise the APP	5
2	Management of the transitional phase from emergency response to forest restoration	Lack of coordination, operational guidelines, and monitoring procedures during the shift from emergency response to forest restoration.	Interphase: Resp - Recov	Knowledge and Data, Communication, and Regulatory	provincial/ regional	Autonomous Province of Trento, specifically the Torrent Control Office (*Servizio Bacini Montani*), the Risk Prevention Service, and the Forestry Corps. Municipalities, ASUC (Civic Use Properties), and the *Magnifica Comunità di Fiemme* .	Autonomous Province of Trento, specifically the Torrent Control Office (*Servizio Bacini Montani*), the Risk Prevention Service, and the Forestry Corps. Municipalities, ASUC (Civic Use Properties), and the *Magnifica Comunità di Fiemme* .	Emergency response personnel, civil protection authorities, local technical operators (municipal workers, foresters), and populations in at-risk areas.	High	yes partially	work in progress	6
3	Return Period	Traditional "return period" indicators are unreliable due to climate change	Prevention	Knowledge, Data, and Legislative.	UE	Autonomous Province of Trento – Risk Prevention Service. Torrent Control Office (Servizio Bacini Montani). Provincial and national environmental and civil protection agencies. Research institutes involved in climate modeling and risk assessment.		Designers and engineers of infrastructure and mitigation works; municipal and provincial planners and decision-makers	High	no		
4	Nowcasting	Lack of public access to real-time, very short-term weather data and difficulty for citizens in interpreting technical bulletins.	Preparedness	Knowledge and Data, Communication	provincial/ regional	Civil Protection Department of the Autonomous Province of Trento (PAT)	Civil Protection Department of the Autonomous Province of Trento (PAT)	Citizens, tourists, agricultural operators, tourism staff, and outdoor commercial activities.	High		work in progress	6 and 7
5	Municipal Civil Protection Plans	Plans are poorly understood by the public/new administrations, rarely updated, and difficult to consult during active emergencies.	Interphase: Prev - Prep	Knowledge and Data, Communication, Legislative/Administrative	provincial/ regional	Municipalities, with technical support and coordination from the Risk Prevention Service and the Single Emergency Response Center (CUE).	Municipalities	Local administrators (newly elected boards), municipal technical staff, Civil Protection operators, citizens, and local stakeholders.	High		work in progress	6 and 7
6	Communication and Understanding of Alerts	Poor public understanding of alert color meanings (yellow/orange/red) and lack of knowledge on specific self-protection behaviors.	Interphase: Prep - Resp	Communication and Knowledge	provincial/ regional	Department of Civil Protection, Forests, and Fauna of the Autonomous Province of Trento (PAT)	Department of Civil Protection, Forests, and Fauna of the Autonomous Province of Trento (PAT)	Resident population, touists, vulnerable groups, civil protection operators, and schools.	Very High		work in progress	4, 5, 7, 8
7	Provincial Alerting System	Information fragmentation among provincial services and need for system resilience against new climate-induced scenarios.	Interphase: Prev - Prep	Knowledge and Data, Communication	provincial/ regional	Autonomous Province of Trento (PAT) - Department of Civil Protection, Forests, and Fauna; Meteotrentino; Risk Prevention Service.	Autonomous Province of Trento (PAT) - Department of Civil Protection, Forests, and Fauna; Meteotrentino; Risk Prevention Service.	Civil Protection system operators (Firefighters, Alpine Rescue, technicians), political decision-makers, and the general population.	High		work in progress	5, 6
8	Communication with the Population	Proliferation of fake news, lack of coordinated official local channels, and vulnerability of communication during technological blackouts.	Response	Communication, Knowledge, and partially infrastructure	provincial/ regional	Press Office of the Autonomous Province of Trento (PAT), technical structures of Civil Protection, Trentino Marketing / VisitTrentino	Press Office of the Autonomous Province of Trento (PAT), technical structures of Civil Protection, Trentino Marketing / VisitTrentino	Resident citizens, tourists, local media, and managers of local social media channels.	High		work in progress	6, 11
9	Coordination of Involved Provincial Entities	Lack of real-time tracking of teams/volunteers in the field and difficulty integrating non-institutional/spontaneous groups.	Response	Knowledge and Data, Communication, and Administrative	Provincial and Local	Department of Civil Protection, Forests, and Fauna; Provincial Firefighting School	Department of Civil Protection, Forests, and Fauna; Provincial Firefighting School	Provincial operational structures, Volunteer and Permanent Firefighters, volunteer organizations, spontaneous groups, and Municipalities.	High			5, 7
10	Coordination of Provincial Entities and Volunteers	Fragmentation between institutional bodies and volunteer associations; lack of a systematic culture of post-event debriefing.	Response	Knowledge and Data, Communication, and Administrative	Provincial and Local	Department of Civil Protection, Forests, and Fauna; Provincial Firefighting School	Department of Civil Protection, Forests, and Fauna; Provincial Firefighting School	Volunteer and Permanent Fire Departments, volunteer associations (White Cross, Red Cross, Alpine Rescue, Nu.Vol.A., etc.), and municipal and provincial technicians.	High			5, 9
11	Debriefing	Absence of a structured, inclusive protocol to transform field experience (including private/tourism sectors) into procedural updates.	Recovery and the interphase between Recovery and Prevention.	Knowledge, Communication, and Administrative	Provincial and Local	Department of Civil Protection, Forests, and Fauna; Risk Prevention Service and the Single Emergency Response Center (CUE).	Department of Civil Protection, Forests, and Fauna; Risk Prevention Service and the Single Emergency Response Center (CUE).	Civil Protection structures, volunteer organizations, law enforcement, private and productive sectors, Tourism Boards (APT), and citizens.	High		already done after some emergencies	
12	Forest Restoration	Fragmented coordination, lack of shared criteria for prioritizing interventions, and technical guidelines not oriented toward climate resilience.	Recovery	Knowledge, Legislative/Administrative	National, Provincial, Local	Provincial Agency for Environmental Protection (APPA) for climate coordination; PAT Forestry Service for technical implementation; Municipal Administrations for territorial management.	Provincial Agency for Environmental Protection (APPA) for climate coordination; PAT Forestry Service for technical implementation; Municipal Administrations for territorial management.	Forest managers, municipal technical offices, forest owners (public and private), and forestry companies.	High			11

TABLE 1: *Complete inventory of the Tailored Action Plan for the Fiemme and Fassa Valleys pilot area.*

The table is visible by zooming in

CONCLUSIONS AND NEXT STEPS

This document represents a living framework for improving risk management in the X-RISK-CC pilot area of Fiemme and Fassa Valleys in response to climate-related extreme events. The actions identified through participatory workshops with local stakeholders address critical gaps across all phases of the risk management cycle.

Key Outcomes:

- Comprehensive inventory of 12 tailored actions co-designed with local stakeholders
- Systematic coding system enabling efficient tracking, monitoring and coordination
- Clear prioritization framework to guide implementation
- Integration of scientific climate projections with local knowledge and practical experience

ANNEX

In the following, each action presented in Table 1 is described individually.

Action 01 – Revision Avalanche Prone Areas

GAP THE ACTION ADDRESSES

New potential avalanche hazard zones caused by the forest damage of the Vaia storm (hereafter called **APP – "Areas to be Further Investigated for Avalanche Hazard"**) remain insufficiently studied or lack updated data. The limited knowledge of local avalanche dynamics in specific areas leads to uncertainty in risk assessment and land-use planning. Municipalities often lack the technical capacity required to independently validate or update APP areas.

FRAME THE ACTION

- **Risk Cycle Phase:** Primarily prevention and preparedness, with relevance to risk assessment as a cross-cutting element.
- **Type of Action:** Knowledge and Data.
- **Levels of Action:** Local (Municipalities, urban planning), Provincial (Autonomous Province of Trento – Forest Service, Risk Prevention Service, Technical Avalanche Committee), National (AINEVA), EU (alignment with Alpine region best practices).
- **Ownership:** Autonomous Province of Trento – Department of Civil Protection, Forests, and Fauna (Risk Prevention Service).
- **Target Groups:** Municipal administrations, technicians and planners, provincial offices responsible for hazard assessment, local communities living near APP zones.
- **Priority:** High. APP represents a source of uncertainty in safety assessments, influencing both prevention and land-use planning.
- **Connections:** Linked to other actions regarding the integration of climate change effects and the improvement of communication toward Municipalities and the general population.

DESCRIPTION OF THE ACTION

The action aims to ensure the systematic reassessment of APP to integrate them into updated hazard maps. This requires targeted field studies, modelling, and monitoring to reduce uncertainties in risk assessment. By clarifying the actual hazard level, the action closes a fundamental knowledge gap and provides stakeholders with reliable data for land-use planning and civil protection.

Concrete objectives:

- Complete detailed studies on APP to confirm their hazard level or downgrade them.
- Update official hazard maps accordingly.
- Provide Municipalities and planners with validated, up-to-date data for informed decision-making.

Preliminary steps:

1. Define a prioritization method to identify the most critical APP to study (based on geomorphological aspects, exposed elements, and the vulnerability of those exposed).
2. Assign responsibilities and methodologies to the technical bodies of the Risk Prevention Service for the revision of avalanche hazard areas within the Hazard Synthesis Map of the Autonomous Province of Trento.
3. Secure resources for field campaigns, LiDAR data, and modelling tools.
4. Establish a matrix and a checklist for the reassessment of these areas.

POSITIVE OUTCOMES

- Increased reliability of avalanche hazard maps through dynamic updating.
- Improved safety for communities and infrastructure within the APP.
- More effective integration of climate change considerations into avalanche hazard mapping.
- More efficient municipal land-use planning.

POSSIBLE CRITICALITIES/ SIDE EFFECTS

- Increased demand for technical and financial resources.
- Potential delays in the approval of local development projects while awaiting updated hazard assessments.
- Need for specific staff training and coordination between different institutions.

VALIDATION/ INDICATORS – ANALYSIS

Progress and success can be measured through:

- **Quantitative indicators:** Number/percentage of APP reassessed within a defined timeframe.
- **Qualitative indicators:** Feedback from planners, civil protection offices, and technicians on the adequacy of the developed matrix.

FEASIBILITY AND TIMELINE

This action has been partially completed as the Autonomous Province of Trento, within the framework of the **X-RISK-CC project**, commissioned the engineering firm *Mountain-eering srl* to create a matrix and guidelines to support public and private stakeholders in the assessment and reassessment of APP in the Hazard Synthesis Map (CSP) of the Autonomous Province of Trento.

Monitoring the application of these guidelines is planned for the coming years through a systematic review of APP within CSP.

This requires:

- Continuation and strengthening of provincial efforts to systematically reassess APP.
- Allocation of sufficient funding for technical studies and monitoring.

Action 02 - Management of the transitional phase from emergency response to forest restoration

GAP THE ACTION ADDRESSES

- **Lack of integrated and effective management** during the transition phase from emergency response to forest restoration.
- **Need to improve coordination and communication** between technical and institutional stakeholders during this sensitive phase.
- **Lack of operational guidelines or procedures** for land management and monitoring, specifically regarding previously unforeseen hazards.
- **Weak integration of local knowledge** (field workers, forest keepers) with provincial coordination.
- **Need to train operators** in land monitoring, with a particular focus on new flood hazards not previously anticipated.

FRAME THE ACTION

- **Risk Cycle Phase/Interphase:** Interphase between Emergency Response and Recovery/Restoration.
- **Type of Action:** Knowledge and Data, Communication, and Regulatory (integration into municipal civil protection plans).
- **Levels of Intervention:** Local (municipalities, operators) and Provincial (PAT - Autonomous Province of Trento).
- **Ownership:** Autonomous Province of Trento, specifically the Torrent Control Office (*Servizio Bacini Montani*), the Risk Prevention Service, and the Forestry Corps. Municipalities, ASUC (Civic Use Properties), and the *Magnifica Comunità di Fiemme*.
- **Target Groups:** Emergency response personnel, civil protection authorities, local technical operators (municipal workers, foresters), and populations in at-risk areas.
- **Priority:** High. It is essential to reshape activities through the integrated management of risk mitigation measures to prevent secondary disasters during the restoration of forest cover.
- **Connections:** Linked to the management of the hydrographic network and emergency communication strategies.

DESCRIPTION OF THE ACTION

The action aims to establish a clear and coordinated framework for the integrated management of risk mitigation measures during the transition period between a catastrophic event and the restoration of forest cover. This critical phase is often characterized by the emergence of new flood hazards or the worsening of existing ones due to the loss of forest cover. The action is based on guidelines developed to promote integrated mitigation, improving coordination between provincial and local entities to identify and monitor previously unforeseen risks.

The objective is to integrate these "extraordinary" monitoring instructions into **Municipal Civil Protection Plans**, providing local operators with practical tools to evaluate affected areas and establish a clear communication flow. By formalizing roles, the action aims to ensure that land

governance remains uninterrupted, optimizing public safety during the delicate passage toward long-term restoration.

Concrete objectives:

- Define and formalize operational procedures for the transition phase between the event and forest reconstruction.
- Improve information flow and resource allocation between local and provincial levels.
- Provide standardized monitoring protocols (forms/modules) for local technical operators.
- Integrate post-event integrated management guidelines into municipal emergency plans.
- Reduce residual risk through the prioritization of interventions based on updated data.

Preliminary steps:

1. **Stakeholder mapping** with clearly assigned roles for the post-emergency phase.
2. **Development and validation** of standardized monitoring forms (based on the *Mountain-eering srl* consultancy).
3. **Design of specific training programs** for local actors regarding flood risk.
4. **Establishing a central mechanism** for the analysis of data sent from the field.

POSITIVE OUTCOMES

- Smoother and better-integrated post-emergency management across different operational levels.
- Timely identification of new post-event hydrogeological hazards.
- Enhancement of local operator skills and improvement of territorial resilience.

POSSIBLE CRITICALITIES/ SIDE EFFECTS

- Initial overhead for local operators during the learning phase of new protocols.
- Need for constant updates to operational procedures based on climate evolution.

VALIDATION/ INDICATORS – ANALYSIS

The success of the action will be evaluated through:

- **Regulatory integration:** Number of municipalities updating their plans to include operational procedures for transition period management.
- **Monitoring effectiveness:** Timely reporting by local entities regarding managed or potentially critical situations related to extreme events.
- **Technical feedback:** Assessment of coordination through post-event debriefings and stakeholder surveys.

FEASIBILITY AND TIMELINE

- **Timeline:** To be defined based on the priorities set by local administrations.
- **Funding:** Covered by provincial allocations and **X-RISK-CC project** funds used for technical consultancy.
- **Responsible Parties:**

- **Torrent Control Office (*Servizio Bacini Montani*):** Technical support, system maintenance, and guidelines.
- **Municipalities and Local Authorities:** Field implementation, monitoring, and reporting.

Action 03 – Return Period

GAP THE ACTION ADDRESSES

- **The traditional concept of "return period"** for analyzing extreme events is becoming unreliable due to climate change.
- **Increased frequency and intensity** of extreme meteorological and hydrological events require the development of new design criteria that incorporate climate change effects into return period definitions.
- **Lack of alternative risk indicators** that include current and future climate scenarios.
- **Failure to integrate climate change factors** into the design and sizing of protection works.

FRAME THE ACTION

- **Risk Cycle Phase:** Prevention.
- **Type of Action:** Knowledge, Data, and Legislative.
- **Levels of Intervention:** Provincial (Autonomous Province of Trento), National (Italian regulatory framework), European Union (climate adaptation directives and standards).
- **Ownership:**
    1. Autonomous Province of Trento – Risk Prevention Service.
    2. Torrent Control Office (*Servizio Bacini Montani*).
    3. Provincial and national environmental and civil protection agencies.
    4. Research institutes are involved in climate modeling and risk assessment.
- **Target Groups:** Designers and engineers of infrastructure and mitigation work; municipal and provincial planners and decision-makers; property owners, infrastructure managers, and local communities; policymakers responsible for legislative and regulatory frameworks.
- **Priority:** High, given the urgent need to adapt infrastructure design to evolving climate realities to reduce future vulnerabilities and costs. However, modifying a consolidated regulatory system based on return periods is complex, as scientifically and technically validated alternative approaches are not yet widely available.

DESCRIPTION OF THE ACTION

The action focuses on moving beyond the traditional approach based solely on the return period concept for the design of hydraulic and hydrogeological protection works, which no longer reliably represents current and future risk patterns. It proposes the adoption of **alternative risk indicators** that consider extreme event frequency alongside climate change. Integrating these indicators allows for a more realistic, dynamic, and site-specific risk assessment. Furthermore, the action requires the inclusion of **climate correction factors** in design criteria, using updated climate scenarios that reflect projected future extremes. In areas with high residual risk where structural mitigation is insufficient, the action promotes **strategic relocation** of vulnerable assets as a long-term resilience strategy.

Concrete objectives:

- Integrate climate scenario effects into design and planning standards.

- Define a provincial framework for climate-resilient design.
- Encourage relocation strategies in areas with unmanageable high risk.

Preliminary steps:

1. **Launch a working group** with regional authorities, research institutes, and professional associations to identify applicable indicators.
2. **Review and alignment** with existing national and European guidelines.
3. **Collection and analysis** of regional climate projection datasets (e.g., temperatures, precipitation extremes, snow cover evolution).

POSITIVE OUTCOMES

- Greater reliability of risk assessments.
- Improved resilience of mitigation works by accounting for climate adaptation during the design phase.
- Integration between climate projections and civil protection planning.
- Long-term reduction of exposure and vulnerability through integrated management policies and relocation.

POSSIBLE CRITICALITIES/ SIDE EFFECTS

- Potential increase in short-term project costs due to higher safety standards.
- Resistance from practitioners is accustomed to traditional statistical approaches.
- Potential social and political challenges related to the relocation of assets or communities.

FEASIBILITY AND TIMELINE

This action currently stands as a **recommendation**, as research and methodological frameworks are still evolving at both national and European levels. Its full implementation requires in-depth scientific studies providing practical, actionable guidance.

Action 04 - Nowcasting

GAP THE ACTION ADDRESSES

- **Lack of public access to nowcasting data** (very short-term forecasts), which is currently available only to Civil Protection operators.
- **Difficulty for the public in correctly interpreting** weather bulletins and technical products, resulting in a risk of underestimating intense phenomena.
- **Need real-time tools** to address extreme and localized weather events, which have become more frequent due to climate change.

FRAME THE ACTION

- **Risk Cycle Phase:** Preparedness ("immediate alert" phase).
- **Type of Action:** Knowledge and Data (opening the system), Communication (meteorological education).
- **Levels of Intervention:** Provincial (Meteotrentino) and Local (citizenship).
- **Ownership:** Civil Protection Department of the Autonomous Province of Trento (PAT) in collaboration with the **Bruno Kessler Foundation (FBK)** for the technological component.
- **Target Groups:** Citizens, tourists, agricultural operators, tourism staff, and outdoor commercial activities.
- **Priority:** High. Nowcasting is the primary tool for managing flash floods and sudden thunderstorms, where reaction times are extremely limited.
- **Connections:** Closely linked to the improvement of alert communication strategies.

DESCRIPTION OF THE ACTION

The goal of this action is to provide citizens with an intuitive visualization of the evolution of intense weather phenomena over the following 30-120 minutes, allowing them to make informed and immediate decisions.

POSITIVE OUTCOMES

- **Drastic reduction in public exposure** to very short-term risks and hazards.
- **Increase in individual resilience**, empowering people to take self-protection measures.
- **Reduced burden on emergency services**, as a better-informed public, makes fewer calls for purely informational queries.

POSSIBLE CRITICALITIES/ SIDE EFFECTS

- **Risk of uncontrolled "self-alerting"**: Users might misinterpret a storm cell on the radar as an official emergency alert. To mitigate this, the system must include clear disclaimers stating that nowcasting is a decision-support tool and does not replace official institutional alerting channels.

FEASIBILITY AND TIMELINE

This intervention is a **concrete operational action**, given that the technological system has already been internally tested. Its use can be extended to the public, either fully or partially provided; it is accompanied by the necessary informative, communicative, and educational support.

Action 05 - Municipal Civil Protection Plans

GAP THE ACTION ADDRESSES

- **Municipal Civil Protection Plans (PPCC) are poorly understood** by both the general population and newly elected administrations.
- **Lack of regular updates** based on territorial changes and emerging risk scenarios (extreme weather events, climate crisis, drought).
- **Unfunctional plan structures** that are difficult to consult during emergencies.

FRAME THE ACTION

- **Risk Cycle Phase/Interphase:** Prevention, Preparedness, and Emergency Management.
- **Type of Action:** Knowledge and Data (plan updates and WebGIS), Communication (information sessions), Legislative/Administrative (revision of templates and procedures).
- **Levels of Intervention:** Local (Municipal) and Provincial.
- **Ownership:** Municipalities, with technical support and coordination from the Risk Prevention Service and the Single Emergency Response Center (CUE).
- **Target Groups:** Local administrators (newly elected boards), municipal technical staff, Civil Protection operators, citizens, and local stakeholders.
- **Priority:** High. Awareness and the effectiveness of plans are fundamental prerequisites for reducing human and territorial vulnerability in the face of increasingly frequent extreme events.
- **Connections:** Links to weather-climate monitoring actions and rapid alerting protocols.

DESCRIPTION OF THE ACTION

The action aims to transform the Civil Protection Plan from a static document into a **dynamic, operational, and shared tool**. The central idea is the integration of technological components (WebGIS) and procedural tools (operational checklists) to make the plan immediately usable during a crisis.

Parallel to this, the action seeks to bridge the knowledge gap through a **"continuous training" strategy** that involves administrations upon taking office and engages citizens through participatory processes. The concrete goal is to ensure that every actor involved knows exactly "what to do and where to go" in the event of an alert for intense phenomena or drought.

POSITIVE OUTCOMES

- Reduction in reaction times for the local civil protection system.
- A more resilient and aware population.

POSSIBLE CRITICALITIES/ SIDE EFFECTS

- **Administrative overload** for smaller municipalities, requiring stronger support from provincial structures.

- **Public "fatigue"** regarding information meetings if they are not sufficiently interactive or based on practical exercises. To mitigate this, incisive communication strategies must be developed (e.g., **gamification**), leveraging recent weather events to increase risk perception, and involving local associations and schools.

VALIDATION/ INDICATORS – ANALYSIS

The success of the action will be evaluated through:

- **Awareness Indicator:** Percentage of administrators participating in post-election training sessions (Target: 100%).
- **Operational Effectiveness:** Reduction in activation times for Municipal Operational Centers (COC) during drills or real events following the introduction of checklists.
- **Engagement:** Number of citizens participating in public information evenings.

FEASIBILITY AND TIMELINE

This intervention is configured as a **concrete action** already underway within the provincial administration. Various training sessions with municipal administrations were held during the Civil Protection Festival in October 2025.

Action 06 - Communication and Understanding of Alerts

GAP THE ACTION ADDRESSES

- **Poor public understanding** of the specific meanings behind different alert levels (e.g., the difference between yellow, orange, and red alerts).
- **Lack of awareness regarding specific self-protection actions** to be taken or behaviors to be avoided based on the assigned color code.
- **Need for consistent risk of communication** during "peacetime" (non-emergency periods), rather than limiting information solely to moments of crisis.

FRAME THE ACTION

- **Risk Cycle Phase:** Forecasting, Preparedness, and Response.
- **Type of Action:** Communication and Knowledge.
- **Levels of Intervention:** Provincial (with local and regional impacts).
- **Ownership:** Department of Civil Protection, Forests, and Fauna of the Autonomous Province of Trento (PAT).
- **Target Groups:** Resident population, tourists, vulnerable groups, civil protection operators, and schools.
- **Priority:** Very High. A technically precise weather alert loses its functionality if it is not understood or fails to trigger correct behaviors; communication is the final and decisive link in the risk chain.
- **Connections:** Closely linked to the knowledge of Municipal Civil Protection Plans, improvement of meteorological-climate data, and the updating of the provincial alerting system.

DESCRIPTION OF THE ACTION

The action aims to bridge the communication gap between the technical body issuing the alert and the citizen receiving it. The central concept is to shift from purely descriptive communication (based on the weather event itself) to **impact-based forecasting** (communication based on impacts and actions).

The plan involves developing a permanent communication strategy using simplified language, intuitive icons, and standardized messages for each criticality level. This ensures that every alert color is uniquely associated with a few clear self-protection rules.

Preliminary Steps:

1. **Mapping of existing channels** and coordination between the Civil Protection Department and press offices to ensure message uniformity.
2. **Multichannel campaigns** (social media, physical installations, short videos) simulate real-world scenarios to explain self-protection behaviors.

POSITIVE OUTCOMES

- Reduction in damage to people and property due to timely preventive behaviors.
- Improved response to emergency stress by a population educated during "peacetime."

POSSIBLE CRITICALITIES/ SIDE EFFECTS

- **"Alert fatigue"**: The risk of over-alerting can lead to public saturation and loss of system credibility. To mitigate this, communication must be calibrated, transparent, and clearly explain the margin of uncertainty in forecasts.

VALIDATION/ INDICATORS – ANALYSIS

The effectiveness of this action will be validated using the following parameters and indicators:

- **Understanding Survey:** Periodic surveys to measure the public's ability to correctly associate alert colors with suggested behaviors.
- **Communication Reach:** Monitoring the dissemination of alert messages on social media and click-through rates on official channels during weather events.
- **Post-Event Behavior Analysis:** Reports on compliance with prohibitions or suggestions (e.g., road closures, evacuation advice).
- **Message Uniformity:** Verification that local media report alerts using the official terminology and graphics provided by the province.

FEASIBILITY AND TIMELINE

This is a **concrete action**, as it builds activities already partially initiated by the Civil Protection Department that require further implementation in terms of coordination and reach.

Action 07 - Provincial Alerting System

GAP THE ACTION ADDRESSES

- **We need to update the provincial alerting system** to ensure resilience against new scenarios induced by climate change.
- **Low public awareness** regarding the technical and institutional functioning of the alerting system.
- **Need for greater data integration and sharing** among the various provincial services that contribute to risk management.

FRAME THE ACTION

- **Risk Cycle Phase:** Prevention and Preparedness.
- **Type of Action:** Knowledge and Data, Communication.
- **Levels of Intervention:** Provincial (Civil Protection Department and connected services).
- **Ownership:** Autonomous Province of Trento (PAT) - Department of Civil Protection, Forests, and Fauna; Meteotrentino; Risk Prevention Service.
- **Target Groups:** Civil Protection system operators (Firefighters, Alpine Rescue, technicians), political decision-makers, and the general population.
- **Priority:** High. This reorganization is fundamental to responding to meteorological events that, due to climate change, present different spatial and temporal dynamics compared to the past.
- **Connections:** Directly connected to the improvement of alert communication and the updating of Municipal Civil Protection Plans.

DESCRIPTION OF THE ACTION

The action involves completing and strengthening the reorganization of the provincial alerting system, with a specific focus on adapting to emerging climate scenarios. The central concept is to overcome information fragmentation through the establishment of a **daily meteo-hydrogeological briefing**. This tool will not only serve as a moment for technical analysis but as a coordination platform involving all essential provincial services to pre-emptively assess the impact of weather events on the territory.

VALIDATION/ INDICATORS – ANALYSIS

The validation of this action will be based on the following success indicators:

- **System Reliability:** The ratio between alerts issued and events that occurred.
- **Level of Integration:** The number of provincial services actively involved in the shared monitoring platform.
- **Public Knowledge:** Results from tests or sample interviews regarding the population's understanding of the origin and value of the provincial alerting system.

FEASIBILITY AND TIMELINE

This is a **concrete action** as many activities are already in progress but need to be systematized and strengthened.

- **Funding:** Primarily covered by the ordinary budget of the Autonomous Province of Trento (personnel and IT infrastructure costs), with potential supplements from applied climate research projects.
- **Responsible Parties:** PAT Civil Protection Department.

Action 08 - Communication with the Population

GAP THE ACTION ADDRESSES

- **Lack of clear, timely, and coordinated communication** directed at the population during emergencies, especially at the local level.
- **Proliferation of "fake news"** and unverified information due to the low visibility/recognition of official channels during "peacetime."
- **Need alternative communication systems** in the event of a technological blackout (failure of the electrical or telephone network).
- **Low public awareness** regarding which authoritative sources should be consulted during a crisis.

FRAME THE ACTION

- **Risk Cycle Phase:** Response.
- **Type of Action:** Communication, Knowledge, and partially Infrastructure (alternative systems for blackouts).
- **Levels of Intervention:** Provincial.
- **Ownership:** Press Office of the Autonomous Province of Trento (PAT), technical structures of Civil Protection, Trentino Marketing / VisitTrentino (specifically for tourists).
- **Target Groups:** Resident citizens, tourists, local media, and managers of local social media channels.
- **Priority:** High. Incorrect or delayed communication can undermine technical rescue efforts and lead the population to engage in dangerous behaviors.
- **Connections:** Linked to the communication of alerts to the population and the action regarding structured post-event debriefings.

DESCRIPTION OF THE ACTION

The central idea is to establish the role of a **"Crisis Communication Manager"** within the Civil Protection structures, capable of coordinating messages between the provincial Press Office, Municipalities, and tourism promotion agencies. In parallel, the action aims to invest in the resilience of information channels by providing **emergency communication systems** (such as variable message signs, radio networks, or satellite messaging) ready for deployment if cellular networks collapse.

Preliminary Steps:

1. **Strengthening social channels and institutional apps** during "peacetime," turning them into daily reference points for weather and safety.
2. **Defining protocols** to rapidly debunk false information circulating in local groups.
3. **Training municipal officials** in crisis communication and launching specific campaigns (e.g., the "Io non rischio" / "I don't take risks" campaign) to help tourists and residents identify official sources.

POSITIVE OUTCOMES

- A calmer, better-informed, and more cooperative population capable of correctly adopting self-protection measures.
- Integration of Trentino Marketing ensures that tourists—often the most vulnerable due to a lack of local knowledge—receive precise information in their own language.

POSSIBLE CRITICALITIES/ SIDE EFFECTS

- Excessive centralization of communication might initially slow down the release of news.

VALIDATION/ INDICATORS – ANALYSIS

The effectiveness of the action will be validated through:

- **Channel Recognition:** Periodic surveys to verify if citizens can identify at least two official information channels.
- **First Message Timeliness:** Measuring the time elapsed between an event/alert and the publication of the first official post or statement.
- **Disinformation Monitoring:** Counting the instances of fake news detected and officially debunked during emergencies or drills.
- **Technical Resilience:** Successful testing of alternative communication channels during total blackout simulations.

FEASIBILITY AND TIMELINE

This action is already being implemented within the provincial administration and integrates existing human resources with new technological investments.

- **Funding:** Provincial funds for institutional communication and civil protection; specific resources for digitalization and cybersecurity.
- **Responsible Parties:** Head of the PAT Press Office, PAT Civil Protection Department, Communication Manager of Trentino Marketing.

Action 09 - Coordination of Involved Provincial Entities

GAP THE ACTION ADDRESSES

- **Coordination difficulties** among different provincial and local structures during complex events (e.g., the Vaia storm).
- **Lack of a real-time overview** regarding the location and activities of volunteer teams and technical staff.
- **Risk of operational inefficiency** due to overlaps (multiple teams in the same area) or the oversight of critical zones.
- **Need to integrate non-institutional actors** and spontaneous groups into the chain of command.

FRAME THE ACTION

- **Risk Cycle Phase:** Response.
- **Type of Action:** Knowledge and Data (stakeholder mapping and GPS), Communication (activation protocols), and Administrative (drills/exercises).
- **Levels of Intervention:** Provincial and Local.
- **Ownership:** Department of Civil Protection, Forests, and Fauna; Provincial Firefighting School (for the training component).
- **Target Groups:** Provincial operational structures, Volunteer and Permanent Firefighters, volunteer organizations, spontaneous groups, and Municipalities.
- **Priority:** High. Optimizing human resources in the field is decisive for safeguarding lives and reducing response times during an emergency.
- **Connections:** Linked to Municipal Civil Protection Plans regarding operational phases and the reorganization of the alerting system for the integration of information flows.

DESCRIPTION OF THE ACTION

The action aims to digitalize and standardize the management of operational personnel in the field to ensure effective coordination among all actors of the Trentino civil protection system. This will allow the operations center to assign tasks appropriately by instantly visualizing "who is doing what and where," including properly registered non-institutional groups in the system.

POSITIVE OUTCOMES

- Smoother emergency management with comprehensive territorial coverage and drastic reduction in coordination errors.
- Capitalization of knowledge gained during the event prevents the loss of useful information for post-emergency debriefing.

POSSIBLE CRITICALITIES/ SIDE EFFECTS

- **Cultural resistance** to the introduction of GPS tracking must be managed. This will be addressed through specific training that highlights the safety benefits for the operators themselves.

VALIDATION/ INDICATORS – ANALYSIS

The validation of this action will be based on the following indicators:

- **Tracking Coverage:** Percentage of operational teams equipped with active GPS systems during exercises or emergencies.
- **Coordination Effectiveness:** Analysis of "downtime" and overlaps detected during post-implementation exercises compared to historical data.
- **Stakeholder Integration Level:** Number of non-institutional organizations registered and integrated into official activation protocols.
- **Exercise Outcomes:** Number of multi-level exercises conducted annually with positive results regarding the information flows tested.

FEASIBILITY AND TIMELINE

This intervention is configured as a **concrete action,** and the Autonomous Province of Trento is already working on its implementation.

Action 10 - Coordination of Provincial Entities and Volunteers

GAP THE ACTION ADDRESSES

- **Fragmentation and insufficient coordination** between various entities (institutional and technical) and the numerous volunteer associations during emergencies.
- **Lack of a systematic debriefing culture** to transform field experience into procedural improvements.

FRAME THE ACTION

- **Risk Cycle Phase/Interphase:** Preparedness (exercises) and Response (coordination), with impacts on the Recovery phase (regarding learning through debriefing).
- **Type of Action:** Administrative (exercises), Communication (channels and protocols), and Knowledge (debriefing).
- **Levels of Intervention:** Provincial and Local (Municipal/Intermunicipal).
- **Ownership:** Provincial Firefighting School (training and logistical coordination) in collaboration with the Civil Protection Department.
- **Target Groups:** Volunteer and Permanent Fire Departments, volunteer associations (White Cross, Red Cross, Alpine Rescue, Nu.Vol.A., etc.), and municipal and provincial technicians.
- **Priority:** High. The Trentino system relies on volunteering; optimizing their integration with public entities is vital for the system's overall effectiveness.
- **Connections:** Integrated with actions regarding the coordination of provincial entities during emergencies and the action on Municipal Civil Protection Plans and the integration of measures within them.

DESCRIPTION OF THE ACTION

The action aims to elevate the quality of the operational response through a **"culture of interoperability."** The primary goal is to ensure that, during an emergency, every entity and association shares the same operational foundations and knows exactly how to fit into the provincial chain of command. This is pursued through the technological strengthening of communication channels and, above all, through the design of joint exercises that serve as true stress tests of the coordination capacity between different subjects based on scenarios derived from Municipal Civil Protection Plans.

The objective is to introduce **"participatory debriefing"** within a few days of the conclusion of every test or real event, using structured and standardized analysis methodologies that allow critical issues and best practices to emerge constructively.

POSITIVE OUTCOMES

- Greater fluidity in rescue operations, a reduction in role confusion, and increased safety for the operators themselves.
- The systematization of debriefing will ensure a continuous update of procedures based on real-world data.

POSSIBLE CRITICALITIES/ SIDE EFFECTS

- Potential initial difficulty in aligning associations with different organizational cultures toward unified standards; this will require constant mediation by the Provincial Firefighting School and incentives for joint participation.

VALIDATION/ INDICATORS – ANALYSIS

To monitor the progress and success of the action, the following indicators are defined:

- **Participation Index:** The number of different entities and associations involved in each exercise.
- **Implementation of Corrective Actions:** The percentage of critical issues identified during debriefings that are resolved or integrated into procedures as improvement tools for subsequent emergencies.

FEASIBILITY AND TIMELINE

This intervention is configured as a **concrete action** requiring structural funding.

- **Funding:** Funding must be stably guaranteed by provincial funds (PAT) as a core civil protection activity.
- **Responsible Parties:** Director of the Provincial Firefighting School (execution), Director of the Civil Protection Department (strategy), and representatives of the Volunteer Federations.

Action 11 - Debriefing

GAP THE ACTION ADDRESSES

- **Absence of a structured, systematic, and inclusive debriefing phase** following emergency events.
- **Lack of involvement of key actors** during post-event analysis (private sector, tourism, volunteer associations, and the public).
- **Loss of valuable knowledge** and territorial feedback necessary to improve future planning and collective resilience.

FRAME THE ACTION

- **Risk Cycle Phase:** Recovery and the Interphase Between Recovery and Prevention.
- **Type of Action:** Knowledge, Communication, and Administrative.
- **Levels of Intervention:** Provincial and Local (involving Tourism Boards and local economic actors).
- **Ownership:** Department of Civil Protection, Forests, and Fauna; Risk Prevention Service and the Single Emergency Response Center (CUE).
- **Target Groups:** Civil Protection structures, volunteer organizations, law enforcement, private and productive sectors, Tourism Boards (APT), and citizens.
- **Priority:** High. Without structured debriefing, errors tend to repeat, and spontaneous innovations born during emergencies are never formalized.

DESCRIPTION OF THE ACTION

The action aims to establish a formal "continuous learning" protocol that transforms emergencies into growth opportunities for the entire territorial system. The core idea is to move beyond purely technical and internal debriefing toward a **participatory model**. Two levels are envisioned: a **"hot" debriefing** (short-term), focused on operational effectiveness, and a **"cold" debriefing** (long-term), to analyze socio-economic impacts and the overall endurance of the "Trentino-system." An innovative element is the systematic inclusion of the private and tourism sectors, which are often overlooked but vital for the territory's economic resilience.

Preliminary Steps:

1. **Dynamic stakeholder mapping** (public, private, and social) to ensure all voices are included.
2. **Drafting of a "Debriefing Manual"** defining timelines, data collection methods, and communication channels for public consultation. This phase is not a search for blame but a moment to gather objective and subjective feedback on the effectiveness of the measures adopted.

POSITIVE OUTCOMES

- Increased trust in institutions from citizens and businesses.
- Updates to Civil Protection Plans based on real-world evidence.

POSSIBLE CRITICALITIES/ SIDE EFFECTS

- Potential post-emergency conflicts may emerge; professional moderation of working groups will be essential to maintain focus on technical and procedural improvements.

VALIDATION/ INDICATORS – ANALYSIS

The validation of this action will be based on the following indicators:

- **Inclusivity Rate:** Ratio between the categories of stakeholders mapped and those involved in the debriefings.
- **Procedural Output:** Number of changes made to Civil Protection Plans or operational procedures following recommendations in debriefing reports.
- **Timeliness:** Adherence to scheduled times (e.g., short-term debriefing within 15 days; long-term within 6 months).
- **Stakeholder Satisfaction:** Assessment via brief surveys of the perceived utility by participants in the debriefing tables.

FEASIBILITY AND TIMELINE

This is a **concrete action**. Within the framework of the X-RISK-CC project, a structured debriefing was successfully conducted with various stakeholders involved in managing the emergency of the Vaia storm. There is already a clear institutional will within the Autonomous Province of Trento to implement structured debriefings after both emergencies and exercises.

Action 12 - Forest Restoration

GAP THE ACTION ADDRESSES

- **Fragmentation in coordination** between provincial and local entities during the post-emergency forest restoration phase.
- **Lack of objective and shared criteria** for establishing priorities for forestry interventions is important.
- **We need to update technical guidelines**, which are currently too tied to traditional patterns and lack a strong orientation toward climate resilience.
- **Bureaucratic and managerial difficulties** faced by Municipalities in meeting reporting deadlines and handling the complexity of financial flows.

FRAME THE ACTION

- **Risk Cycle Phase/Interphase:** Recovery (Restoration) and Prevention (Climate Change Adaptation).
- **Type of Action:** Knowledge (priority matrix), Legislative/Administrative (updating regulations and forestry plans).
- **Levels of Intervention:** National (technical standards), Provincial (adaptation coordination), Local (municipal implementation).
- **Ownership:** Provincial Agency for Environmental Protection (**APPA**) for climate coordination; **PAT Forestry Service** for technical implementation; Municipal Administrations for territorial management.
- **Target Groups:** Forest managers, municipal technical offices, forest owners (public and private), and forestry companies.
- **Priority:** High. The pace of climate change requires that restoration is not merely a reconstruction of the forest of the past, but the design of the forest of the future.
- **Connections:** Linked to the implementation of structured post-event debriefings.

DESCRIPTION OF THE ACTION

The action aims to integrate the concepts of resilience and climate adaptation into both ordinary and extraordinary forest management. The central idea is the development of a **priority matrix** that allows for informed decisions on where and how to intervene following an emergency (such as the Vaia storm or the bark beetle outbreak), based on scientific data and criteria for soil protection and biodiversity. This approach transforms forest restoration from a series of fragmented interventions into a coordinated strategy capable of mitigating future hydrogeological risks.

Preliminary Steps:

1. **Establish a coordination table** between APPA and the Forestry Service to translate the goals of the Provincial Strategy for Mitigation and Adaptation to Climate Change into operational technical standards.
2. **Updating Corporate Forestry Plans**, introducing the possibility of experimenting with tree species and management techniques that are more resistant to drought and extreme winds.

POSITIVE OUTCOMES

- Higher survival rates for new forest plantations.
- Improved protection of slopes, fulfilling the role of "protection forests" against rockfalls and avalanche releases.

POSSIBLE CRITICALITIES/ SIDE EFFECTS

- Bureaucratic timelines tend to expand once the official "state of emergency" ends.
- Resistance from Municipalities due to the complexity of reporting criteria may slow implementation; therefore, **procedural simplification** must be an integral part of the action itself.

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DATE:
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