Programma Tech4You (codice ECS 00000009) (PNRR)

MISSIONE 4 COMPONENTE 2, "Dalla ricerca all'impresa"
INVESTIMENTO 1.5, "Creazione e rafforzamento di "Ecosistemi dell'innovazione"
costruzione di "leader Territoriali di R&S" –

Bando a cascata Spoke 1

Allegato A

Descrizione Spoke 1

Circular technologies to mitigate geo-hydrological and forest fire risks

Leader: CNR	Affiliated: UNICAL, UNIBAS, UNIRC
Coordinator: Tommaso Moramarco (IRPI-CNR)	

Mission of the Spoke: make available innovative solutions for a sustainable development of communities, taking into account the ongoing climate impact. In line with the specific goals of the Tech4You program "mitigation of natural risk" (SO1), it will contribute to reaching multiple SDGs with the most direct impact on SGS10 (Reduce inequalities), SDG 11 (Sustainable Cities and Communities), SDG 13 (Climate Action), and SDG 15 (Life on land). The research activities proposed by Spoke's coordinator fit with the scientific expertise of the involved research groups to a) increase territorial safety and mitigate natural risk by simulating the landslide mechanisms, taking into account the ongoing climate change scenarios and different scales of analyses; b) enhance flood risk prevention; c) improve environmental management. The use of an early warning system represents one of the most important non-structural interventions for the reduction of hydrogeological and hydraulic risk, in full compliance with the DNSH principle.

Target group: Citizens, Municipalities, Regional governments, Territorial Agencies (national parks, environmental agencies, etc.), ICT companies, early warning management companies, and safety managers.

G1.1	Technologies and innovative multi-scale tools for landslide risk prevention
Goal Leader: Roberto Coscarelli (IRPI-CNR)	

Activity Plan: a) multi-scale, interoperable and upgradeable databases; b)integrated and interdisciplinary digital multi-scale tools and their circular updating for transferring knowledge; c)multi-scale demonstrators to validate and develop databases and tools, advanced sensors and integrated systems for landslide risk management; d)digital tools for designing circular, multi-scale and interdisciplinary methodological paths for the definition of phenomenological models of typified landslides; e)multi-scale digital tools for the quantitative assessment of landslide risk to support the choice and design of prevention actions; f) digital protocols for the use and/or the specific implementation of multi-scale demonstrators.

Pilot Projects	Description
1	Multi-scale and interdisciplinary on-site laboratories as demonstration systems and knowledge generators in decision support for the management of landslide risk (adaptation,

	mitigation, reduction)(Coordinator: Roberto Coscarelli, CNR)
2	Methods and tools for quantitative modelling of diffuse and local landslides, aiming at planning, scheduling and designing landslide risk adaptation, mitigation and reduction (Coordinator Nicola Moraci, Unirc)

G1.2	Models, technologies and innovative tools for prevention and identification of hydraulic and geo-hydrological risks at basin and urban scales
Goal Leader: Aurelia Sole (UNIBAS)	

Activity Plan: 1) Climate Services to support the planning and management of risk phenomena: a) Weather-hydrological coupled modelling; b) hydrological - hydraulic coupled modelling; c) Fluid-structure interaction modelling; d) Monitoring of flood areas in sample basins; e) Flood propagation models implemented in sample warning areas; f) Integrated modelling with advanced sensors for urban runoffs and flood control; g) Implementation of user-friendly systems (app) for the issue of critical issues; h) Innovative techniques for monitoring; i) Nature-Based Solutions for Risk Reduction; j) Short and medium-term weather forecasting systems; 2) Real-time forecasting systems with: a) artificial intelligence techniques and smartphone communication, fluid-structure interaction phenomena for the assessment of structural vulnerability in the presence of flood events multi-scale, interoperable and upgradeable databases; b) integrated and interdisciplinary digital multi-scale tools and their circular updating for transferring knowledge; c) multi-scale demonstrators to validate and develop databases and tools, advanced sensors and integrated systems for landslide risk management; d) digital tools for designing circular, multi-scale and interdisciplinary methodological paths for the definition of phenomenological models of typified landslides; e) multi-scale digital tools for the quantitative assessment of landslide risk to support the choice and design of prevention actions; f) digital protocols for the use and/or the specific implementation of multi-scale demonstrators.

Pilot Projects	Description
1	Multi-scale Early Warning System for the operational management of hydrological and hydraulic risk (Coordinator: Lorenzo Marchi, CNR)
2	Innovative methods and tools for the research, the quality-quantitative assessment and protection to pollution of the fissured aquifers' strategic groundwater resources of the Lucanian and Calabrian Apennines (Coordinator: Francesco Sdao, Unibas)
3	System for Risk Analysis and Forecast for Critical Infrastructures (hydraulic and road network)(Coordinator Mario Maiolo, Unical)
4	Predictive models to estimate flash floods and soil losses (Coordinator Giuseppe Bombino, Unical)
5	System for monitoring, forecasting, warning and drought risk management (Coordinator Alfonso Senatore, Unical)

6	Integrated and multidisciplinary framework for the management of environmental sustainability regulations (Coordinator Maristella Amisano, Unical)

G1.3	Models, technologies and innovative tools for identification and prevention of coastal erosion risk
Goal Leader: Mario Maiolo (UNICAL)	

Activity Plan: a) implementation of platforms for Early Warning, to predict damages and identify mitigation techniques for coastal erosion; b) implementation of numerical methods and models for extreme wave event forecasting, and wave measurement systems for erosion risk mitigation; c) integration to quantify natural sediment delivery to river mouths by measuring the resulting shoreline evolution.

Pilot Projects	Description
1	Advanced satellite and in situ monitoring techniques for coastal erosion assessment and innovative solutions for coastal protection and beach nourishment (Coordinator Manuela Carini, Unical)
2	Early Warning system for coastal erosion risk through advanced measurement and monitoring systems (Coordinator Felice Arena, Unirc)

G1.4	Models, technologies and innovative tools for mitigation and prevention of forest fire risk
Goal Leader: Pasquale Marziliano (UNIRC)	

Action Plan: The extent of forest fires, even if human-induced, is strongly influenced by the weather and climatic conditions, but also by the soil moisture. Fire spread models and software will support the emergency activities, also creating forecasting tools based on high-resolution atmospheric models for assessing the effectiveness of silvicultural practices on forest fire prevention. Through the identification of pilot areas: a) estimating the fuel and fire severity, (b) monitoring the post-fire vegetation dynamics, (c) evaluating the effects of forest fires, (d) demonstration sites for evaluating the effectiveness of silvicultural practices, (e) Forest fire modelling can be based on spatiotemporal probabilistic spread models, already developed in other frameworks, (f) Multi-sensor monitoring systems with robust satellite techniques (RST).

Pilot Projects	Description
1	Multi-sensor monitoring systems and robust satellite techniques (RST) for forest fire risk warning (Coordinator Giuseppe Mendicino, Unical)
2	Multidisciplinary experimental and demonstration sites for the study, analysis, monitoring and quantification of the ecological and environmental effects of forest fires (Coordinator Fabio Lombardi, Unirc)
3	Probabilistic space-time models for forest fire spreading (Coordinator Roberto Beneduci, Unical)