MISSIONE 4
ISTRUZIONE RICERCA

RETURN - MULTI-RISK SCIENCE FOR RESILIENT COMMUNITIES UNDER A CHANGING CLIMATE

RISCHI AMBIENTALI, NATURALI E ANTROPICI

Finanziato dall'Unione europea NextGenerationEU
Ministero dell'Università e della Ricerca
Italiadomani PIANO NAZIONALE DI RIPRESA E RESILIENZA

Tematica 3 RISCHI AMBIENTALI, NATURALI E ANTROPICI

Obiettivi *(Sez A dell'Annex 1)*

An increasing number of disaster events has been recorded worldwide in the last twenty years compared to the previous two decades (UNDRR, 2020: The human cost of disasters: an overview of the last 20 years - 2000-2019). A total number of 7,348 natural hazard-related disasters (excluding biological and technological), globally affected over 4 billion people and led to about US$3 trillion (adjusted to inflation for US$ 2019) in economic losses, approximately doubled with respect to the previous twenty years. What is more, this rate of disaster occurrence is likely to further increase due to climate and environmental change. On the other hand, the exposure of people and assets has increased in all countries faster than vulnerability has decreased (Sendai Framework for Disaster Risk Reduction 2015–2030), thus yielding a steady increase in impacts in the economic, social, health, cultural and environmental sectors.

Italy is one of the nations most exposed to natural risks, particularly to those deriving from geological, seismic, volcanic, geomorphological, hydrological, hydraulic and meteorological events, which combined to pollution and other sources of environmental degradation call for multi-risk multi-scale approaches. On average, about twenty destructive earthquakes per century occur, which have claimed over 100,000 lives in the past century. Volcanic eruptions are infrequent but potentially devastating. More than 600,000 landslides were experienced in the past century, an average of two per km2. Floods are common in both lowland and mountain environments. One third of the coasts is affected by soil erosion. Climate changes will lead to widespread phenomena of heat waves, heavy rains, reduction in rainfall and, consequently, drought, desertification, soil loss and salinization of aquifers and rise of sea level. At the same time, a variety of traditional and emerging pollutant are released in the environment.

Given the global distribution and the potentially increasing frequency of disaster events and severity of the impacts, as a result of climate change, and the increasing exposure and vulnerability of socio-ecological systems, it is urgent to develop a comprehensive framework providing a better understanding of complex natural multi-hazard dynamics and improved predictive models to quantify multi-risk from the short- to the long-time scales. A reductionist approach, focusing on individual hazards occurring in particular geographic areas, and on the analysis of impacts on individual sectors is inadequate, and severely underestimates actual risk. Conversely, an effective approach must tackle environmental, natural and anthropogenic hazards through a comprehensive multi-hazard and multisectoral approach.

The *Extended Partnership (EP) RETURN* - multi-Risk sciEnce for resilienT commUnities undeR a changiNg climate - is created with respect to the theme "Environmental, natural and anthropogenic risks" to strengthen research chains at national level and to promote their participation in European and global strategic value chains. The EP RETURN will contribute to enforce the **key competences, the technological and knowledge transfer**, and to strengthen Italian **governance in managing disaster risk**, through the **enhancement of basic knowledge** (low TRL) **towards technology application and exploitation** (medium-high TRL), with the involvement of public administrations, stakeholders, and private companies.

The main scientific objectives of the *EP RETURN*, pursuant with new challenges proposed by the National Research Plan (PNR) objectives and priorities, are:

− A better UNDERSTANDING of Environmental, Natural and Anthropic Risks, as well as their interrelation with the effect of climate change effects.
− Enhance risk prevision and methodologies for prevention, adaptation and mitigation.
− Develop new methodologies/technologies for monitoring.
− Foster a more efficient and sustainable use of data, products and services.

− STRENGTHEN THE BRIDGE FROM RESEARCH TO FINAL PRODUCTS while transversally enhancing the competences, technological transfer, and service integration.

The enhanced **process understanding will improve the predictive skills and promote the effective use of planning and forecasting tools towards the development of an integrated framework**, incorporating data from monitoring networks for different environmental, natural and anthropogenic hazards, handling with both traditional and advanced technologies, with background data (demographic registries, cadastral registries, land use chart and topographic maps), as strongly suggested by PNR. The use of such an **integrated framework** unlocks unprecedented opportunities in disaster risk management, removing the fragmentation of information and **strengthening a holistic management** within a **multi-disciplinary culture**. In such a way the *EP RETURN* aims to develop a common input exchange protocol among the different thematic areas to ensure interoperability of models developed within and across them.

Partner

N TOTALE SOGGETTI: 26 di cui 23 partner di progetto

Proponente: Università degli Studi di Napoli Federico II

Partecipanti:

SOGGETTI PUBBLICI

Università

- Università degli Studi di Napoli Federico II
- Università degli Studi di Bari Aldo Moro
- Alma Mater Studiorum Università di Bologna
- Università degli Studi di Cagliari
- Università degli Studi di Firenze
- Università degli Studi di Genova
- Università degli Studi di Padova
- Università degli Studi di Palermo
- Sapienza Università di Roma
- Politecnico di Milano
- Politecnico di Torino

Organismi di Ricerca

- Istituto Nazionale di Oceanografia e di Geofisica Sperimentale
- Agenzia Nazionale per le nuove tecnologie, l'energia e lo sviluppo economico sostenibile
- Autorità di Bacino Distrettuale dell'Appennino Meridionale
- Agenzia regionale per la prevenzione, l'ambiente e l'energia dell´Emilia-Romagna
- Dipartimento della Protezione Civile

SOGGETTI PRIVATI:

Organismi di ricerca

- Università degli Studi di Enna Kore
- Fondazione CIMA
- Fondazione Università Ca' Foscari
- Eurac Research

Imprese

- AlmavivA SpA
- Eni Rewind
- Engineering Ingegneria Informatica SpA
- Generali
- Holding Ferrovie dello Stato Italiane
- IREN

Gli Spoke

Spoke 1 - *VS1: Water*

Leader spoke: Politecnico di Milano, supported by Università degli Studi di Padova

Affiliati allo spoke:

All partners

Spoke 2 - *VS2: Ground instabilities*

Leader spoke: Sapienza Università di Roma, supported by Università degli Studi di Napoli Federico II

Affiliati allo spoke:

All partners

Spoke 3 - *VS3: Earthquakes and Volcanoes*

Leader spoke: Università degli Studi di Bari Aldo Moro, supported by Università degli Studi di Napoli Federico II

Affiliati allo spoke:

All partners

Spoke 4 - VS4: *Environmental Degradation*

Leader spoke: Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, supported by Università degli Studi di Palermo

Affiliati allo spoke: All partners

Spoke 5 - TS1: ***Urban and metropolitan settlements***

Leader Spoke: Università degli Studi di Napoli Federico II, supported by Eurac research

Affiliati allo spoke:

All partners

Spoke 6 - TS2: ***Multi-Risk Resilience of Critical Infrastructures***

Leader spoke: Politecnico di Torino, supported by Engineering Ingegneria Informatica SpA

Affiliati allo spoke:

All partners

Spoke 7 - TS3: ***Communities' resilience to risks: social, economic, legal and cultural dimensions***

Leader spoke: Università degli Studi di Firenze, supported by Fondazione CIMA

Affiliati allo spoke:

All partners

Spoke 8 - DS*: Science underpinning Climate services for risk mitigation and adaptation*

Leader spoke: Alma Mater Studiorum Università di Bologna, supported by Università degli Studi Di Padova

Affiliati allo spoke:

All partners

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