

Title: Earth surface contamination and environmental risk assessment as a starting point to determine priority targets in regional land recovery plans: exploring the critical role of geological features and anthropization.

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Co-tutor(s): --

Proposal

The surface environment is the point of contact between humans and ecosystems. Historical and pre-historical presence of humans on the surface has generated, across the centuries, relevant changes in the compositional features of involved environmental media, posing a risk to the survival of several sensitive living species.

In developed countries, anthropization's impact is often vast and hard to be adequately defined. Several indices have been proposed, but some fail to correctly discriminate the anthropogenic contribution from the natural geochemical enrichments deriving from the geolithological features of the territory.

However, the increased incidence in the population of illnesses well related to environmental exposure to contaminants is an "alarm bell" that cannot be ignored. In some cases, the resources available for the territory's recovery are insufficient due to the extent of the anthropic impact. In such conditions, it is necessary to operate a classification of the contaminated areas to define an order of priority of the possible interventions.

In this frame, developing a method allowing decision-makers to take action becomes crucial. The basis of the decision process should be a regional risk assessment with human beings at its core. In this process, variables could have a deterministic habit but also consider the variability associated with the geological environment and human behaviors by including "uncertainty" in the assessment flow.

The proposed project will explore developing a method based on stochastic approaches, which could define and classify regional territories based on geochemical, geological, and human characteristics. Campania region will be used as an experimental target, although experiences abroad for not less than six months will allow the candidate eventually selected to face different environmental contexts.

Collaboration on other topics related to the primary research direction will be possible.

Research Program

Schedule of activities (indicative)

First Year

- Acquisition of specific skills on environmental and health risk assessment methods (Review of both the regulatory context and national and international scientific literature).
- Acquisition of specific skills on statistical data analysis methods with deterministic and stochastic approaches (Participation in training courses aimed at learning compositional and multivariate analysis techniques)
- Data collection and optimization for the creation of a database to be used for the development of the method at which the project is aimed.
- Active collaboration in ongoing research and data processing activities with inclusion in the workflow of a scientific paper development and writing.

Second Year

- Experience of 3-6 months at a foreign academic institution for the elaboration of a preliminary model in collaboration with experts at a specialized computing center.
- Drafting and submission of scientific work synthesizing the results obtained during the experience abroad and downstream of the preparatory work carried out.

III^o year

- Definitive elaboration of a stochastic environmental risk estimation model with integration of geological, geochemical, and socio-economic parameters
- Drafting and submission of a scientific work synthesizing the results obtained.
- Preparation and submission of thesis work

International collaborations with potential experiences abroad at:

- Hubei Polytechnic Institute, Hubei (China) – Prof. Wen Sun
- Geological Survey of Finland, Espoo (Finland) – Dr. Timo Tarvainen
- China University of Geosciences, Wuhan (China) – Prof. Chengkai Qu
- Universidad de Chile, Santiago (Chile) – Prof. Linda Daniele

Funds

- Departmental research funds
- Funds from agreement with Istituto Sperimentale Zooprofilattico del Mezzogiorno (to be defined)
- Funds from active research agreements with institutions and private companies

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