



## Hydro-geomorphological risks in Portugal: driving forces and application for land use planning

### Financing



FORLAND is financing by National funds through Foundation for Science and Technology

FORLAND is made up of a multidisciplinary team of 22 researchers that studies the driving forces behind hydro-geomorphological disasters in Portugal and proposes proactive guidelines for land use planning

BUDGET (€)

192.248

START DATE:

2016

END DATE:

2019



### ACTIONS PLANS

- Portugal

<https://www.ceg.ulisboa.pt/forland/>



### CONTACT INFORMATION

Susana Da Silva Pereira

e-mail: [susana-pereira@campus.ul.pt](mailto:susana-pereira@campus.ul.pt)

Telephone: +351 21.044.30.00



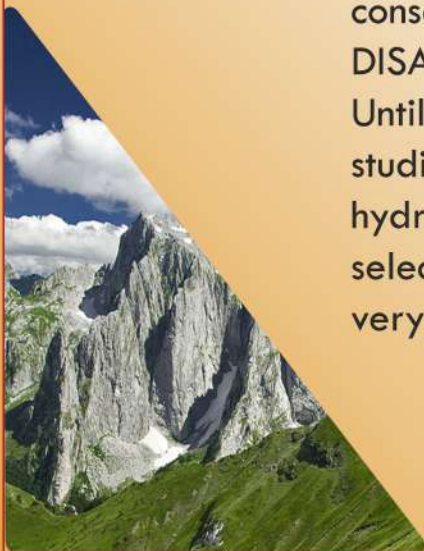


## Hydro-geomorphological risks in Portugal: driving forces and application for land use planning

»» **Goal** The project focused on the following objectives: To identify and characterize the hydro-geomorphologic disaster events occurred in Portugal during the period 1865-2015 using the Disaster database as data source; To analyse the geographical distribution and temporal trends of the HG disaster events; To identify and discuss the main drivers of HG disasters in Portugal; 4. To build risk profiles of the Portuguese municipalities; To propose disaster risk management strategies and practices, involving stakeholders from the Portuguese municipalities; To propose adaptation strategies to reduce the disasters' impact and guidelines for spatial planning and risk governance; To identify climate change adaptation measures at the local level; To design the FORLAND Toolbox including criteria, guidelines and tools for disaster risk management and decision support system.

»» **Introduction** The increasing number of hydro-geomorphologic disasters worldwide has been related to the increasing frequency and magnitude of flood and landslide events, as a direct consequence of climate change, but also as a consequence of the increasing exposure of people and assets to disaster risk. In Portugal floods and landslides are on the top of natural disasters. A recent improvement has been achieved with the gathering of basic information on past floods and landslides that caused social consequences in Portugal for the period 1865-2010 through the DISASTER database.

Until now, the hydro-geomorphological disaster events were not studied in detail to correctly characterize the climatic forcing of hydro-geomorphologic risk in Portugal. The previous analyses of selected case studies were focused on extreme events, which present very different large-scale atmospheric conditions in their genesis.





## Hydro-geomorphological risks in Portugal: driving forces and application for land use planning

**Methodological** The project is divided into four work packages (WP):

### » approach **WP1–Disastrous data collection and analysis**

Task 1. Hydro-geomorphologic disaster events identification and characterization.

Task 2. Spatial and temporal trends of the hydro-geomorphologic disasters.

### **WP2–Driving forces of the hydro-geomorphological disasters.**

Task 3. Large scale atmospheric conditions and weather patterns associated to hydro-geomorphologic disasters.

Task 4. Hydrologic and geomorphologic constrains of disastrous floods and landslides.

Task 5. Land use changes, exposure and adaptation measures

Task 6. Territorial vulnerability

### **WP3–Application for land use planning**

Task 7. Risk profiles of the Portuguese municipalities

Task 8. Disaster risk management involving stakeholders

Task 9. Adaptation strategies to reduce the disasters impact: guidelines for spatial planning

### **WP4–Project dissemination**

Task 10. Website and FORLAND toolbox. The implementation process of the Toolbox is summarized as follows:

1) Defining the objectives

2) Production of knowledge

3) Selection of strategies

4) Planning of strategies

5) Implementation

6) Monitoring





## Hydro-geomorphological risks in Portugal: driving forces and application for land use planning

» **Results** According to the Flood Risk Index obtained for the Portuguese municipalities (Fig.1), a selection of the structural and non-structural measures to be developed in flood risk management strategies was developed (Table 1). A priority not checked in a given cluster is not meaning that the respective non-selected measure would not be necessary, but only that it is not considered as priority when confronted with the other measures. FORLAND was also carried out the Landslide Risk Index obtained for the Portuguese municipalities (Fig.2).

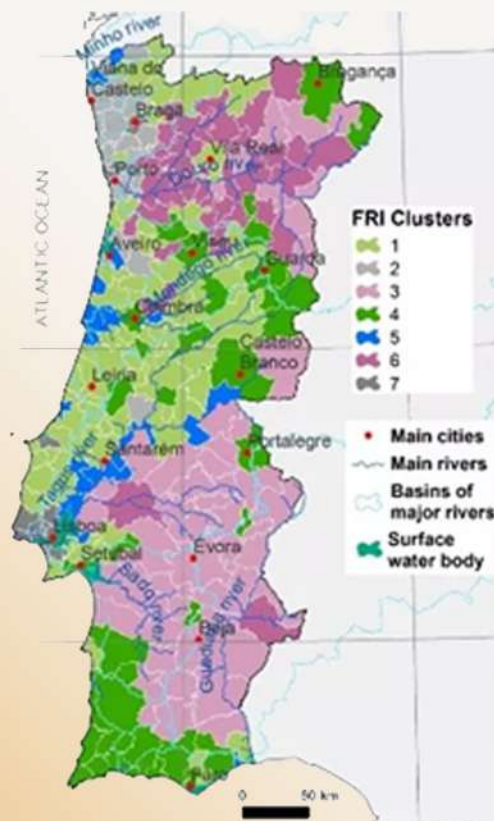


Figure 1

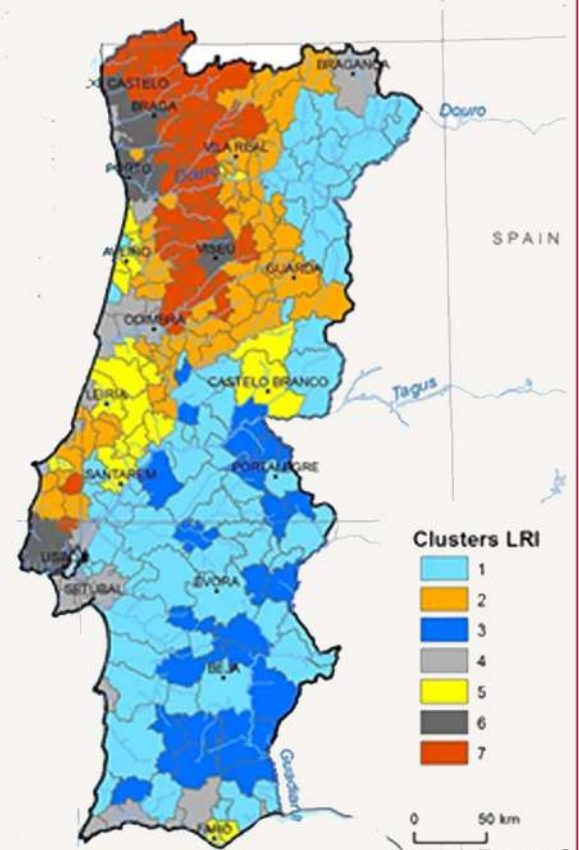


Figure 2

Measures	FRI Clusters						
	1	2	3	4	5	6	7
Structural							
Retention					•		
Protection		•			•		•
Drainage systems	•	•		•	•	•	•
Non-structural	•	•	•	•	•	•	•

Table 1

