

Designação do Projeto	Landslide Early Warning soft technology prototype to improve community and adaptation to environmental change
Código do Projeto	PTDC/GES-AMB/30052/2017
Objetivo Principal	«Objectivos_Científicos»
Região de Intervenção	Lisboa
Entidade Beneficiária	FCiências.ID – Associação para a Investigação e Desenvolvimento de Ciências
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Objetivos

As observed worldwide during the last decades, landslides are major deadliest natural hazards in mainland Portugal and Azores archipelago. In Portugal the number of deaths resulting from landslides registered an increasing trend (1865-2010), opposing the decreasing verified with other hydro-geomorphological hazards, such as floods [01]. The overall increment of the building environment quality observed in the last decades in Portugal in response to the increasing quality of building construction techniques and codes did not result in the reduction of deaths due to landslides. Fatalities occurred mostly associated to rapid shallow landslides affecting people inside buildings and, more recently, inside vehicles, as a consequence of the increasing people's mobility. From land use planning perspective, new urban areas are safeguarded since 2008 by the Portuguese regulations and practices that established land use restrictions on landslide hazard prone areas [02]. However, these regulations do not solve the existing risk problem of people living in houses that were previously constructed in hazardous slopes. The high number of deaths and affected people as well as the frequent destruction of assets and disruption of economic and social activities due to landslides justifies the implementation of a landslide early warning system at the regional scale. This project aims to develop and implement a soft technology/low cost prototype for landslide early warning, allowing a dynamic adjustment to a changing climate and changing land use working at a scenario basis. On the one hand, future changes on regional rainfall patterns due to climate change will be incorporated and evaluated in the warning system; on the other hand, expectable changes in land use will be considered to approximate future exposure and effects in risk analysis. In this project attention will be given to two different types of landslide events that will be permanently monitored within the regional early warning system in hotspot risk areas: (i) Major disastrous landslide events. In this scenario a generalized regional occurrence of landslides is considered. Our main goal is to provide information to civil protection services in order to anticipate and manage people mass evacuation from generalized landslide prone areas. (ii) Minor landslide events. In this scenario different levels of territorial disruption are considered. Different frequency of landslide occurrence is expected to occur. The main target is to ensure the maintenance and operability of regional transport, energy and communications networks and the safeguarding of people lives. The application of the early warning system will define warning communication procedures, assess response capacity of stakeholders and develop social capacity practices, reduce vulnerability and mitigate risk, providing a reduction of affected people, economic losses and critical infrastructures/ basic services disruptions.

Atividades

organized in four Work Packages (WP) containing 11 discrete tasks (see Annex 2 and Annex 3) and will last 36 months. Research activity within different WP and Tasks will be promoted in a dynamic way between social sciences researchers and natural sciences researchers allowing the close cooperation among the different partners of the project. The WP 1 (Rainfall-induced Landslide Hazard and Exposure) includes four discrete tasks and is devoted to assess actual landslide hazard, exposure and definition of landslide risk hotspots (Tasks 1 to 3) and future exposure trends considering global change (climatic and environmental) scenarios (Task 4). Task 1 is devoted to determine/update regional rainfall thresholds until the end of 2016/2017 climatological year. Task 2 aims to produce statistic data-driven and dynamic physically-based landslide susceptibility/hazard models and to identify landslide hazard hotspots that will be used as input spatial data for landslide warning models. Task 3 ambition is to evaluate actual exposure (people and critical assets) and identification of landslide risk hotspots which justifies the development of the LEWS. Task 4 is based in state of the art climate change scenarios (RCP 2.6 and RCP 8.5) and aims to assess the impact of climate change on landslide activity and consequently on future exposure trends. Task 1 and 3 will be supervised by the IGOT team and involves all BeSafeSlide teams that have solid experience on both the definition of rainfall thresholds and the assessment of exposure and risk assessment. Task 2 and 4 will be supervised by FC.ID team and involves all teams (Task 2) and the IGOT, FC.ID and FGF teams (Task 4) that had previous experience on landslide susceptibility and hazard assessment (Task 2) and exposure assessment in a global change context, in particular climate change (Task 4). Output of WP 1 is the input of WP 2 (Development of LEWS soft technology prototype) that is devoted to ensemble core components of the BeSafeSlide prototype, monitoring, forecast, warning and operational procedures. WP 2 includes 3 discrete tasks separated in two temporal components: present-Day and Future influenced by global changes scenarios. Tasks 5, 6 will focus on the development of the Landslide Early Warning System prototype (WP 2) considering rainfall nowcast and forecast inputs in a present-day scenario (Tasks 5), the definition of warning levels, the operational procedures when activated and their validation will be developed in Task 6. Adjustment of LEWS to future global changes scenarios (in association to rainfall thresholds) and future exposure trends (IPCC scenarios RCP2.6 and RCP8.5) will be made in Task 7. Task 5 will be made under the supervision of the FGF and Tasks 6 and 7 will be supervised by the IGOT team which also coordinate de WP 2. Outputs of Tasks 5, 6 and 7 will directly contribute to WP 3 that is devoted to the LEWS application for resilience and adaptive capacity building. The WP 3 includes 3 discrete tasks. Task 8 aims to define the warning communication strategy and management to different types of potential landslide events: (i) major disastrous landslide events and (ii) minor disruptive landslide events. This Task will involve all the teams of the project under the supervision of the CES team. Task 9 aims to assess preparedness and response capacity of landslide risk communities. Lastly, Task 10 will be focused on the integration of scientific knowledge with national, regional and municipal stakeholders in order to ameliorate community-based adaptation to disaster risk management and to improve landslide disaster risk reduction based on LEWS. WP 4 is devoted to the project dissemination and has a single Task (Task 11) that will create the BeSafeSlide project Website and Guidelines for LEWS implementation. This

Resultados Esperados / Atingidos

This project aims to develop a soft

technology/low cost prototype for landslide early warning, applicable in different geological/geomorphological settings and for different landslide types. The regional landslide hazardous study areas in the project are: the Lisbon region, the Douro Valley and the S. Miguel Island, Azores. The LEWS will be developed to allow a dynamic adjustment to a future changing climate and changing land use on a scenario basis. Future changes on rainfall patterns due to climate change will be incorporated and evaluated in the warning system. Expectable changes in land use will be considered to approximate future exposure and effects in risk analysis. Two different types of landslide events will be permanently monitored: major disastrous landslide events and minor disruptive landslide events. The schematic conceptual model of the BeSafeSlide Project is in Annex 1. The LEWS prototype will be conceptualized to be people-centered, that is, not specifically focused on hazardous processes, but on reducing exposure and vulnerability, allowing an effective implementation of adaptation and risk management strategies. This strategy is up-to-date with a recent COST action proposal (OC-2016-2-21254 - Landslide early warning system as tools for community resilience - LandAWARE), which aims to create a multidisciplinary pan-European network of researchers and stakeholders for defining LEWS interdisciplinary methods in order to increase resilience of communities exposed to landslide risk. The IR of BeSafeSlide project, is one of the 41 proponents of LandWARE project that involve social sciences and natural sciences researches from most of the European countries. Taking into account this rationale, the BeSafeSlide project has the following specific objectives: ? To guarantee the continuity of regional rainfall series acquisition in the Lisbon region and the Douro Valley with the installation of two rain gauges; ? To determine rainfall thresholds for landslide occurrence for different geological/geomorphological settings and landslide types; ? To identify landslide hazard hotspots and risk hotspots to be managed at different risk mitigation and vulnerability reduction scales; ? To assess to what extent the increment of frequency of rainfall extreme events resulting from climate change and raise of shallow slides frequency will aggravate the exposure trends; ? To develop a low cost /soft technology people-centered Landslide EWS prototype; ? To identify and manage on LEWS different types of landslide events: (i) major landslide disastrous events and (ii) minor disruptive landslide events. ? To produce a portfolio of non-structural vulnerability reduction and landslide risk mitigation measures applicable within the context of landslide early warning systems; ? To engage stakeholders cooperation and resources that operate at different spatial scales (national civil protection service, regional and local stakeholders and communities) on the different components of LEWS that can contribute to disaster and disruption risk reduction; ? To develop the BeSafeSlide project website; ? To promote the publication of project results in Peer-reviewed international journals and define guidelines to promote knowledge transfer on LEWS community resilience to landslides and risk.

