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ROADMAP

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Fourth periodical bulletin

ROADMAP in a nutshell

The ROADMAP (EuROpean observAtory on Disaster risk and crisis MAnagement best Practices) Project, is a 18 months project funded by DG-ECHO under the call UCPM-2020-KN-AG. The project started on the 1st January 2021 and the main objective is to establish a European "Doctrine on disaster risk and crisis management", funded on the mutual cooperation between scientific communities and DRM authorities. The doctrine, that is intended as "a shared understanding of disaster management between decision-makers and scientific actors", will be based on selected experiences, best practices and implemented solutions in EU Member States.

- **Advisory Group**
  The Advisory Group (**https://roadmap.ci3r.it/advisory-group/**) is formed by selected experts on both science and decision-making in DRM from several Countries, covering different risks and phases of DRM cycle. The networking activities between the Project Consortium, that is composed by recognized research institutes, competence centres for disaster risk reduction and Civil Protection authorities, and the Advisory Group will result in the establishment of a European think tank/ observatory on disaster risk and crisis management good practices that could represent a first step towards a Community of Practice to operate within the Union Civil Protection Mechanism, in collaboration with the Disaster Risk Management Knowledge Center.

Project updates

In these last months of the project many activities have been carried out, in particular:

- on-going work on the definition of the Solutions Explorer web platform: a mockup was presented at the 5th DRMKC annual seminar on 18th November - SESSION 5: Co-designing the Science Pillar;
- on-going work on the content of the three thematic papers that will be published during 2022;
- the 2nd webinar, entitled "Communication issues in DRM", was held on December 6th, at 10 AM (CET) (https://roadmap.ci3r.it/publications/);
- constant engagement with the AG through the AG meetings in September and November 2021, to achieve the objectives of the project.

RISK – Good practices

Earthquake	Forest fires	Industrial accident
Hydrogeological	Biological	**Climate**

This fourth bulletin focuses on floods and landslides due to their potential severe and even disastrous consequences with fatalities, diseases, construction and infrastructure failures, and can damage or completely destroy vast areas of a country.

According to the IPCC (IPCC 2021), both the probability and the consequences of floods and landslides are expected to increase in the coming decades, as a result of climate change and increased vulnerabilities and exposure, especially in urban areas.

The exceptional flood events observed during summer 2021 are only the last dramatic series of events that impact so heavily our societies. We have witnessed the inundation of the subway systems in New York City and London; the flooding hitting several communities in Central Europe, where at least 190 people lost their lives in Germany and at least 38 in Belgium, due to the exceptional rainfall observed throughout August 2021; the flooding in China's Henan province, where the provincial authorities reported 302 deaths (292 in Zhengzhou), while over 50 were missing following the dramatic floodings events observed in July 2021.

To cope with these risks, both structural and non-structural prevention measures can be implemented to reduce risks. Good practices of structural prevention measures are barriers, dikes, embankments, walls, dams as well as LID (low impact development) and green infrastructures (Luan et al. 2017; Son et al. 2017), and relocation of structures and infrastructures at risk (Nalau and Handmer , 2018).

Landslides can on the other hand be prevented by re-balancing the sedimentary cycle and by soil reinforcements and erosion-prevention measures in the most landslide-prone areas. In this light, nature-based solutions are progressively developing, and for this reason several good practices described below deal with these techniques. The most effective, nature-based solution to control soil erosion on slopes is to plant vegetation. Not only will vegetation help to slow down raindrops as they fall, the roots of the plants will mitigate soil erosion. Other than vegetation, a variety of engineered solutions are available to control erosion. Many of these solutions use biodegradable or geosynthetic mats that are designed to prevent erosion and give freshly planted vegetation a chance to grow. For steeper slopes, a cellular confinement system (e.g. Geoweb or Geocell) may be necessary. These engineered erosion control solutions may be used in conjunction with ground anchoring solutions to provide a stable slope. Geogrids or meshing can be used in conjunction with ground anchors to further control any surface erosion. These geotextile mesh grids allow vegetation to grow through them making them almost invisible and also further supporting the top soil when in place.

Some of the more important good practices of non-structural prevention include education programmes, information campaigns, communication with landowners, subsidies, the establishment of risk management networks as well as recommendations and restrictions in master plans and in detailed spatial planning. Other key measures are the development of early warning systems (Collins and Kapucu, 2008; Brazzola and Helander, 2018) and of flood zoning (Tariq, 2013; Rossi et al, 1994).

Thus, for prevention, protection and mitigation related to floods and landslides, a good combination of structural measures, non-structural good practices and operational measures are necessary: e.g., building codes and legislation to avoid the presence of buildings in flood and/or landslide prone areas, appropriate land use, adequately designed floodplains and flood control structures planning, early-warning systems, correct risk communication and information to the population on how to act during floods, play a key role. In some cases, even relocation of extremely endangered activities and buildings may be advisable. Landslides are in several cases associated with floods, events that may be characterized by a transboundary dimension; therefore, it is indicated to organise the water management systems and improve forecasting, flood defence measures and crisis management on a river basin basis, cutting across regional boundaries and country borders. This should be done in cooperation with the relevant organisations in the fields of hydrology and meteorology, mitigation planning, river control, civil protection and crisis management units.

Experience has shown that effective measures for flood prevention and protection have to be taken in the level of river basins and that it is necessary to take into account interdependence and interaction of effects of individual measures implemented along water courses.

Moreover, as pointed out above, the ongoing climate change further emphasises the need for early warning and flood forecasting, particularly in flood plain areas at immediate and high risk.

Traditional measuring instruments such as rain gauges should play a fundamental role as far as possible. Broader information provided by innovative technologies, such as radar and numerical weather forecasts, need to become more accessible so that traditional and the new technologies coexist in an efficient manner and can be used for mutual data verification and comparison.

Stories of good practices

Current Practice in Flood Risk Management in the European Union[1]

This European Commission report presents a compilation of current practices in Flood Risk Management (FRM) in the European Union (EU). Although this is not intended to be an exhaustive overview of current practice of FRM in the EU, the report focuses on particular aspects identified by Member States (MS) as being challenging to tackle through the review of 34 cases that have been made available by MS and meetings with practitioners from 15 MS. The analyzed practices concern the following themes: Assessing mapping and communicating flood risk, climate change, land use planning, planning and implementation of measures, working in partnership, working with the public, measuring progress, nature-based solutions and urban flood risk management.

Guidance document: Nature-based solutions for site-specific landslide risk mitigation[2].

This "Guidance Document on Use of Nature-based Solutions for Site Specific Landslide Risk Mitigation" is an outcome of the World Bank funded Nature Based Landslide Risk Management Project in Sri Lanka. This document is expected to serve as a Guidance Document on application of nature-based as well as hybrid solutions. Some of the good practices of bio-engineering for stabilization of vulnerable slopes and reducing the erosion potential are included in the document. The nature-based and especially the hybrid solutions presented in this guide are tailored to Sri Lanka's need for landslide risk reduction but, given their general nature, can be considered applicable to other areas around the world. In addition, it is expected that the vegetation cover may make the appearance of slopes as natural as possible, and help in creating not only safer but also more visually acceptable and ecologically sustainable slopes, positively affecting the landscape. Specifically, within the document is analyzed the case study of the pilot site of Badulusirigama in the district of Badulla where it was possible to assess the positive impacts brought by the proposed solution with regard to the stabilization of the landslide slope. The document aims at enhancing awareness and knowledge dissemination on nature-based solutions for landslide risk mitigation.

Check for flooding in England[3]

The British government has made available to citizens a web service called "Check for flooding in England" with the aim of informing citizens about the flood risk. In England there are around 3,500 measuring stations and most are along main rivers and the coast, to allow continuous monitoring of the situation. Over 5 million homes are at risk of flooding and there are practical steps people can take to reduce the impact, including **signing up to flood warnings** and downloading '**What to do in a Flood**' plan (web tool).
Using this web tool, they can check:

- current flood warnings;
- river, sea, groundwater and rain levels;
- risk of flooding in the next 5 days.

Guidelines on Flood Adaptation for Rehabilitating Historic Buildings[4]

The goal of these Guidelines, published by U.S. Department of the Interior National Park Service Technical Preservation Services Washington, is to provide information about how to adapt American historic buildings to be more resilient to flooding risk in a manner that will preserve their historic character. In particular, in the document are reported four case studies in which: water-resistant barriers, more resistant materials, elevations of structures above the established flood risk level and new foundation with helical piers have been put in place.

1 https://op.europa.eu/en/publication-detail/-/publication/21d8c5c2-2199-11ec-bd8e-01aa75ed71a1/language-en
2 https://reliefweb.int/report/sri-lanka/guidance-document-nature-based-solutions-site-specific-landslide-risk-mitigation
3 https://check-for-flooding.service.gov.uk/
4 https://www.nps.gov/orgs/1739/upload/flood-adaptation-guidelines-2021.pdf

Nature Based Solutions - Landslides Safety Measures[5]

This report, produced by Klima 2050[6], presents an overview of Nature-Based Solutions (NBS) and their main applications to address climate-related challenges (temperature, floods, sea level rise, landslides, droughts) with a special emphasis on innovative physical measures for landslides mitigation. In particular, the report is focused on innovative solutions suitable for landslides protection in accordance with Work Package 3 (Landslides triggered by hydrometeorological processes), but it also includes elements relevant for flood and stormwater protection (Stormwater management in small catchments -WP2 in Klima 2050).
The aim of Klima 2050 is to strengthen Norway's innovation ability and competitiveness within climate adaptation, through collaboration between the world of research, industry and trade.

PHUSICOS Project[7]

The aim of the Horizon 2020 Project, led by Norwegian Geotechnical Institute, is to demonstrate that nature-based and nature-inspired solutions (NBS), for reducing the impact of extreme weather events in rural mountain landscapes, are technically viable, socially acceptable, cost-effective and implementable at the regional scale. In this project five case studies have been proposed. The good practices proposed and partially implemented foresee the use of old dams built with natural local materials, the insertion of buffer strips vegetated with plants to stabilize the soil and reduce the flow of sediments and pollutants and reshaping the slope through terracing techniques, with the establishment of vegetation to stabilize the sediments, together with a drainage system to prevent water to erode and reduce stability of the slope.

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DRM Initiatives & News

Within the ROADMAP project goal of establishing a European observatory on disaster risk and crisis management good practices, some recent initiatives at international level deserve to be reported and briefly summarized hereafter.

- **Union Civil Protection Knowledge Network Day**[8]
  The Knowledge Network Day took place online on 7th December 2021. During the event, the knowledge network was launched and its vision, mission and activities were highlighted, as well as its tangible contribution to more effective disaster management within the Union Civil Protection Mechanism.

5 https://oppla.eu/product/20066
6 Klima 2050 - Risk reduction through climate adaptation of buildings and infrastructure is a Centre for Research-based Innovation (SFI) financed by the Research Council of Norway and the consortium partners
7 https://phusicos.eu/
8 https://ec.europa.eu/echo/news-stories/events/union-civil-protection-knowledge-network-day_en

- **The multiple location-based full-scale field exercise[9] (30 August – 3 September, 2022)**
  The multiple location-based full-scale field exercise will take place between 30 August – 3 September, 2022 in Hungary, Slovakia and Romania. The scenario will simulate parallel flooding in Tisa and Danube rivers, occurring at the same time but in different tributaries and sections. This exercise was conducted as part of the DG ECHO project PROFOUND EXERCISE.

- **8th International Conference on Flood and Urban Water Management[10] (6–8 July 2022 Milan, Italy)**
  FRIAR (Flood Recovery, Innovation And Response) 2022 is the eighth conference of this successful series. The conference provides a rich forum for the development of innovative solutions that can help bring about multiple benefits toward achieving integrated flood risk and urban water management strategies and policy.

9 http://profoundexercise.eu/the-exercise/
10 https://www.wessex.ac.uk/conferences/2022/friar-2022