

# Natural Risk Zones – Executive Summary

This document contains the data specification on INSPIRE Annex III spatial data theme 12, *Natural Risk Zones*. This specification is the work of the *Natural Risk Zones* thematic working group (TWG-NZ)- a multinational team of experts volunteered from the community of SDICs (Spatial Data Interest Communities) and LMOs (Legally Mandated Organisations) of INSPIRE.

Using the latest research and experience available, TWG-NZ has defined *Natural Risk Zones* as areas where natural hazards are coincident with populated areas and/or areas of particular environmental/cultural or economic value. Risk in this context is defined as:

## **Risk = Hazard x Exposure x Vulnerability**

*of human health, the environmental, cultural and economic assets in the zone considered.*

Precise definitions of these widely used terms (see Chapter 2.1) as well as a clear distinction between “hazard” and “risk” is essential for understanding of this data specification.

The domain of the *Natural Risk Zones* data specification is potentially very large, it encompasses hazards from floods to geomagnetic storms, and exposed elements from buildings to designated environmental features this is described further in Chapter 2 of this report.

The data and information that is included in this data specification take as a starting point the existence of the delineation of a hazard area. For some hazards, for example meteorological hazards it is not straight forward to delineate concrete hazard areas as occurrence depends on complex, respectively chaotic meteorological conditions. Source data for each hazard are mostly in the domain of other INSPIRE Annex I, II and III themes for example fault lines as a source for earthquakes, in the Geology theme. As a consequence, this data specification does not include the modelling of the processes and scientific methods that were used in the delineation of hazard areas.

The approach taken to model *Natural Risk Zones* is generic in its treatment of each of hazard, exposure, vulnerability and risk, but five use cases have been created to demonstrate the fit of the model with specific examples for different types of hazard:

- Floods (calculation of flood impact, reporting and flood hazard/risk mapping)
- Risk Management Scenario (an example from a national perspective)
- Landslides (hazard mapping, vulnerability assessment and risk assessment)
- Forest fires (danger, vulnerability and risk mapping)
- Earthquake insurance

These use cases are listed in Annex B.

The case of flood hazard has also been used to demonstrate the capacity for extension of the model where a requirement to be more specific exists (see Annex D). Flood risk is significantly more precisely defined than other hazards, due in part to the development of the Floods Directive (2007/60/EC - FD) and collaboration with the relevant (FD) expert group.

The data specification includes modelling of risk zones caused by natural phenomena – primarily. Nevertheless, it is anticipated that the core of the model may be valid for the modelling of other types of hazards beyond the immediate domain of the *Natural Risk Zones* specification.

In the real world, hazards can be single, sequential or combined in their origin and effects. There are complexities in adequately modelling these circumstances that complicate the communication of good practice in modelling more simple hazard and risk relationships. At this time the *Natural Risk Zones* data model has not been designed so that it could also operate in multi-risk circumstances.

The model includes measured past events and modelled future events. It does not deal with real-time data and respectively events as they are happening. This is the domain of monitoring and emergency response which is largely out of the domain of *Natural Risk Zones*.

*Natural Risk Zones* also involve significant engagement with other thematic areas from INSPIRE. This involvement stems from the nature of hazard, exposure, vulnerability and risk as defined in this document. Several other thematic areas will input attributes vital to understanding the nature of hazard, yet others are vital in the understanding of exposure while others model the monitoring of hazard areas.

The concepts included in the model are abstract and can be specialised using either vector or coverage spatial representation. This is done in order to create a framework which enables exchange of data that are either vector or coverage, considering that any of the spatial objects can be modelled in either way.

There are 4 key spatial object types that are modelled;

- Hazard area
- Observed event
- Risk zone
- Exposed element

While preparing the data specification, three primary categories of natural risk zone data provider have been identified:

- Natural hazards data providers (past event registers and/or modelled hazards)
- Vulnerability data providers (including exposure information)
- Risk data providers

It is important for all potential users of natural risk zones information to know which hazard is causing a particular risk zone. It is crucial for the mitigation and management of the risk. For that reason, any provider should identify which type of natural hazard their data is related to; and for vulnerability data providers, which kind of exposed element is at risk.

In order to facilitate semantic interoperability, this data specification includes a simple, high level classification through two code lists providing type of natural hazards and type of exposed element categorizations. These code lists are not meant to be exhaustive, but can be extended with narrower terms by Member States. Moreover, data providers can add a more specific classification for both concepts.

One of the main purposes of hazard and risk maps is to inform clearly thus supporting effective communication between modellers, data providers, policy makers and the citizen. We hope that this data specification can play a part in improving this communication.