

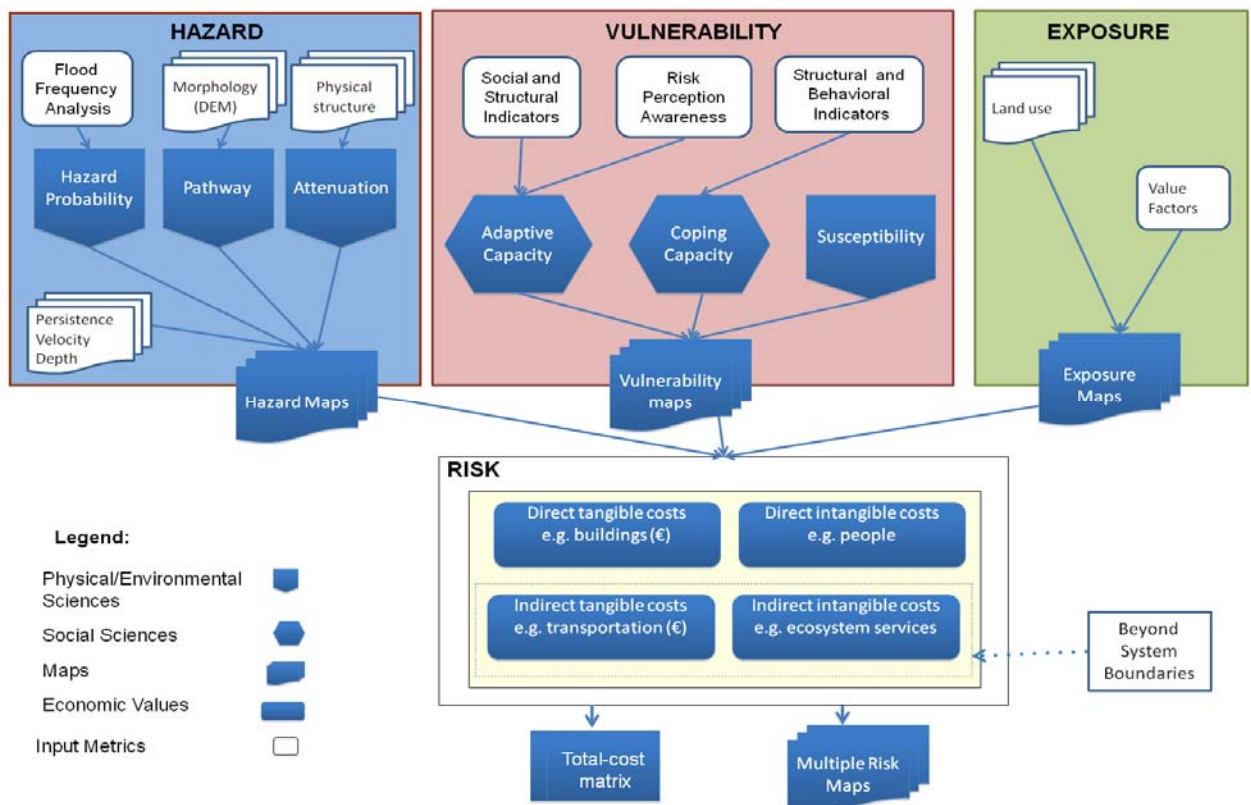


## Preface

Benjamin Franklin's famous quote "an ounce of prevention is better than a pound of cure" is a common saying in many languages. However, common experience shows that such a message is not fully applied when it comes to natural hazards. In this context, the KULTURisk project aims to demonstrate the benefits of risk prevention measures in reducing the impact of water-related disasters, such as floods and landslides.

Prevention here is meant as the objective to reduce risk to an acceptable level. This is achieved by reducing one or more components of risk, defined as a combination of hazard, exposure and vulnerability. Structural measures (such as levees and other flood defence structures) can be used to reduce hazard, while non-structural measures can decrease exposure or vulnerability. For example, a conscious land use planning can largely reduce the exposure of houses (and of their inhabitants) to flooding. People awareness, starting from children education, promotes a better behaviour during dangerous events and therefore reduces vulnerability. More examples are published in the KULTURisk project reports (available at [www.kulturisk.eu](http://www.kulturisk.eu)), including the proposed methodology, able to provide an accountability scheme for these actions and demonstrate the benefits of risk prevention.

This policy brief reports four main messages of the project, providing answers to four main questions: 1. how can we better promote a culture of risk prevention? 2. How can intangible/indirect damages be taken into account? 3. How can we cope with uncertainty? 4. How does risk communication shapes perception and contribute to the implementation of risk prevention measures?



**Policy brief 1: Prevention strategies can be accountable and key to secure a smart, sustainable and inclusive growth of well being**

The EU2020 strategy for a smart, sustainable and inclusive growth could be jeopardized by the impacts of natural hazards, if they become disruptive disasters. As too often experienced, a disaster not only affects assets and economy, but also human lives, environment and cultural heritages. In addition, social differences are often enlarged by disasters because their consequences are suffered more by the weaker parts of societies.

Increasing the resilience of a society, by means of a proper prevention strategy, is a basic condition for a secure path towards a durable and enduring growth.

The costs of taking measures before the occurrence of a hazardous event to reduce its probability and/or mitigate its potential consequences are often less than the restoration and recovery costs. However, in practice, prevention initiatives attract less attention and are only seldom rewarded.

The KULTURisk project outcomes demonstrate that prevention is accountable. As a matter of fact, an adaptable practical methodology was developed and validated in different cases, related to various water-related hazards. The approach is both rigorous and flexible and allows considering different spatial-temporal scales. On this base, investments on prevention by Public Administrations can be better evaluated and

shared with citizens, also in order to support the rising of a culture of prevention in the whole society.

We have found out how the lack of “political rewards”, added to the cost of some measures, is one of the main causes for not implementing

prevention measures. Some examples of local administration involvement and rewarding are present (e.g. in the UNISDR campaign “Making cities resilient”), but a real cultural shift is necessary, underpinning and promoting a new Social Pact for a Secure Growth, at European, national and local level.

In order to promote Public Administration (financial) investments in prevention actions, the quality of “growth-enabler” of these investments should be recognised, when discussing possible revisions of Stability and Growth Pact (SGP)<sup>1</sup> (both at EU and national levels). An investment for safeguarding the territory

should have a priority lane (or exception from SGP) to when compared to others, e.g. involving soil consumption.

This could be one concrete answer to the recent OECD conclusion that “*The key policy question is what type of rewards and incentives can be created in the near term for governments to*

***The benefits of risk prevention***

*The KULTURisk methodology was applied to diverse European case studies to evaluate the social and economic benefits of risk prevention, i.e. reduction of potential flood losses due to the implementation of prevention measures. Among many outcomes\*, it was demonstrated that the implementation of early warning systems can significantly (between 30 and 40%, depending on various factors) reduce the potential flood damage in the Danube river basin countries indicating that investments in preparedness and early warning systems can be highly beneficial. In the Ubaye Valley (France), it was found out that a combination of structural and non-structural prevention measures can remarkably reduce the potential impact of flooding in Barcelonnette for different receptors (70% less for people, 84% for buildings, 77% for infrastructures, 91% for agriculture). In Zurich (Switzerland), prevention measures reduce the potential damage caused by extreme flood events in the Sihl River by 50%, while additional prevention options in Zurich (e.g. discharge tunnel) were found to potentially reduce flood losses near zero with benefits more than 10 times higher than the costs of prevention measures.*

*\* More details about case studies are published in the KULTURisk available at [www.kulturisk.eu](http://www.kulturisk.eu)*

<sup>1</sup> The Stability and Growth Pact (SGP) is a rule-based framework for the coordination of national fiscal policies in the EU. See: [http://ec.europa.eu/economy\\_finance/economic\\_governance/sgp/](http://ec.europa.eu/economy_finance/economic_governance/sgp/)

*invest on risk prevention and mitigation*"<sup>2</sup>. In addition, public investments and framework rules (starting from an effective implementation of EU legislation<sup>3</sup> and including land use planning) are also triggering factors for innovation in risk management<sup>4</sup> and therefore can carry a direct contribution to the economy growth.

**Policy Brief 2: Intangible and indirect damages matter; social capacities can change prevention actions if accounted for**

The actual costs of natural hazards are difficult to quantify. For this reason, tangible costs such as the number of destroyed houses, loss of production and the costs of evacuation are traditionally used to get a picture of the magnitude of the impact of natural hazards.

The KULTURisk project developed a methodology that accounts for intangible costs, such as lives of people, psychological trauma, loss of working time, quality of environment and cultural heritage, as well as indirect damages such as loss of services (i.e. hospitals and other critical hot spots) that are often neglected, mainly due to the difficulty of their quantitative estimation.

One of the main outcomes of the KULTURisk project is the methodology to assess the vulnerability of societies and relate it to the economic benefits of risk prevention and mitigation by either cost-benefit analysis (CBA), or cost-effectiveness analysis (CEA) that helps accounting also for intangible/indirect damages.

The methodology considers economic, social, cultural, and environmental receptors as indicated by the Flood Directive and allows the evaluation of benefits of risk prevention measures through a participatory process involving all actors, being policymakers or people.

---

<sup>2</sup> High-level risk forum expert meeting: Governing Effective Prevention and Mitigation of Disruptive Shocks, Paris, Sep 2013.

<sup>3</sup> Which includes the directives on flood risks, protection of European Critical Infrastructures, the Water Framework Directive (drought management).

<sup>4</sup> See SEC(2010) 1626 final (Risk Assessment and Mapping Guidelines for Disaster Management)

The methodology was tested and validated for a variety of case studies across Europe and also for several types of water related hazards. Furthermore, it proved to be adoptable to different needs of stakeholder and end-users, scales, and data availability. Lastly, the flexibility of the methodology and potential applicability to other natural hazards was demonstrated.

**Policy Brief 3: Recognizing and estimating uncertainty lead to more robust risk assessment**

Risk prevention is about acting before events happen. This implies that most decisions must be taken based on modelling of future scenarios. In particular, when dealing with floods, many factors are uncertain, such as weather forecasts, hydrological and hydraulic modelling, climate projections, geotechnical parameters, but also the exposed people and assets as well as their vulnerability.

Uncertainty must be acknowledged given that methods and models used to support risk studies are always affected by uncertainty. Ignoring uncertainty may lead to potentially negative situations. Thus, any scientifically-sound advice should provide a transparent overview of the assumptions, their impact on the results and the associated uncertainty.

KULTURisk findings show that considering and estimating uncertainty, and explicitly communicating it, is not only a more scientific approach, but also very useful from a practical viewpoint as the estimation of the uncertainty increases the value of information and often leads to more robust decisions in the field of risk management.

Since decision makers have to deal with uncertainty, an explicit accounting of it is necessary to generate more robust and conscious decisions. Although uncertainty has been discussed in the scientific arena for some years, translation of the knowledge to practical applications has been difficult. While many decision-makers have become more and more confident in dealing with uncertainty, a legal framework that explicitly accounts for the presence of uncertainty is still missing.

The KULTURisk project has made significant contributions to the understanding and estimation of uncertainty, especially for flood hazard and risk mapping and for flood forecasting, with the purpose of considering it in practical applications. The KULTURisk Framework proved to be capable to integrate several of the above mentioned sources of uncertainty into the risk assessment methodology.

Moreover, evaluating the impact of climate and socio-economic changes on the occurrence and impact of natural hazards, such as floods, appears a mandatory component of long term risk assessments, but it adds a new dimension to the management of uncertainty, going beyond consolidated approaches.

**Policy Brief 4. Two-way risk communication increases consensus about prevention measures and trust in authorities**

Knowledge about natural hazards makes communities more resilient and better prepared to respond. Facilitating such knowledge is one of the purposes of risk communication, which is fundamental when turning from hazard control to risk management.

Risk communication helps building not only awareness, but also participation and responsibility in the communities. However, risk communication is challenging because it must take place among all relevant actors, who have specific risk-related understandings and interests.

The KULTURisk project systematically evaluated a wide range of communication activities to understand the factors affecting risk communication and reveal the elements that make it more effective. Different target groups were analysed with different risk situations and communication goals, using qualitative interviews, standardized surveys, experimental evaluation and media analysis.

It was found that the compressibility, readability, completeness and usefulness of the information material, as well as the trust on its source, are key factors that affect risk communication. This is important because stakeholders generally

adopt the messages they consider relevant to their needs.

One-way communication is the most widely used method, but is the least cost effective. It has a moderate positive effect on risk awareness and on the motivation to implement individual prevention measures. Although target-group tailored information can have a substantial impact on both risk awareness and prevention, it must be presented in a way that addresses their concerns and way of thinking. This requires more efforts in practice and research.

On the contrary, two-way communication increases consensus about prevention measures and trust in the authorities, although it is costly and only reaches a limited circle of stakeholders directly.

Risk communication is about communicating constantly and is needed to achieve awareness for any risk-related topic among heterogeneous end-user groups. It must be included in any long-term communication strategy. Risk communication can be improved through education, being primary and secondary schools the ideal target.

Although mass media are important for risk communication, they tend to highlight measures of traditional hazard control (levees or dikes for flood defence) rather than the wide set of risk prevention measures (structural and non-structural). Proactive media information by risk managers or responsible offices would therefore be a relevant tool to establish a comprehensive culture of risk prevention.

The work described in this policy brief was supported by the European Community (Seventh Framework Programme EC FP7) through the Collaborative Research Project KULTURisk (Grant agreement number: 265280)

*Coordination:*  
UNESCO-IHE Institute for Water Education  
Delft, The Netherlands

*Contact:*  
Leonardo Alfonso, l.alfonso@unesco-ihe.org