

A risk governance in response to climate change and territorial densification in the canton Fribourg, Switzerland

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CONTEXT

Encompassing both „plateau“ landscapes and steep hills of the Prealps, the canton Fribourg is subject to a wide range of natural hazards. Since the seventies, much work has been done in order to assess natural hazards affecting each portion of the territory. Nowadays, hazard maps are completed for the whole canton and allow, in the scope of land use planning, to manage and mitigate natural hazard-related risks according to a series of federal guidelines. However, in many cases, this practice has shown its limits.

In this study we focus on flood hazards, which represent the main cause of hazard-related damage in Switzerland. For instance, according to the present guidelines, safety measures are not compulsory in areas assessed as low-danger (yellow areas in hazard maps). Nevertheless, experience showed that low-intensity, frequent flood events in these areas generate high-cost damages. In such cases, authorities should enhance hazard assessment by integrating risk analysis and be allowed to prescribe conditions for new constructions. On the contrary, new buildings or renovations are prohibited in high danger sectors (red areas in hazard maps). In some cases however, strict building conditions in high danger areas could considerably reduce risk.

Within the current context of climate change and territory densification, risk is increasing and it appears very important to develop and improve our methods.

OBJECTIVES AND METHODOLOGY

This study aims at the integration of risk assessment into land planning procedures. The new cantonal master plan of the Canton Fribourg is now being designed. Its completion is planned for 2019. Our work represents a great opportunity to make a step

forward in the domain of risk mitigation by integrating risk management into the new master plan. The main objectives of this study are to:

1. Evaluate and improve present methodologies of flood hazard, and economical and human vulnerability assessment within a test municipality in canton Fribourg.

In order to integrate changes induced by climate evolution into flood hazard, flood intensities are analyzed with a new methodology, encompassing additional hazard assessment criteria such as flood sediment load, flood arrival time, and flood duration (Fig. 1). The approach reflects the experience accumulated in several countries and is aimed at enhancing the Swiss methodology. Physical vulnerability to floods is equally evaluated taking into account the aggravating factors listed above. Finally, risk assessment is designed for the study site.

2. Undertake a synthesis of current flood hazard and risk management practices in Canton Fribourg. This study takes into account organizational and financial aspects as well as risk perception among stakeholders (authorities, insurers, and population). An analysis of the legal framework of hazard-related risk management practice within the Canton and a series of interviews with local and cantonal stakeholders are undertaken.

3. Design a tool box together with its „user manual“ by integrating results of steps 1 and 2. New tools focus on land planning and should allow land planners to take into account the risks.

From a technical point of view, risk assessment integrating flood characteristics and aggravating factors represents the basis for territorial decision making. A series of risk-aware building prescriptions are designed according to the assessment. From a planning point of view, solutions are sought for implementing technical and legal prescriptions

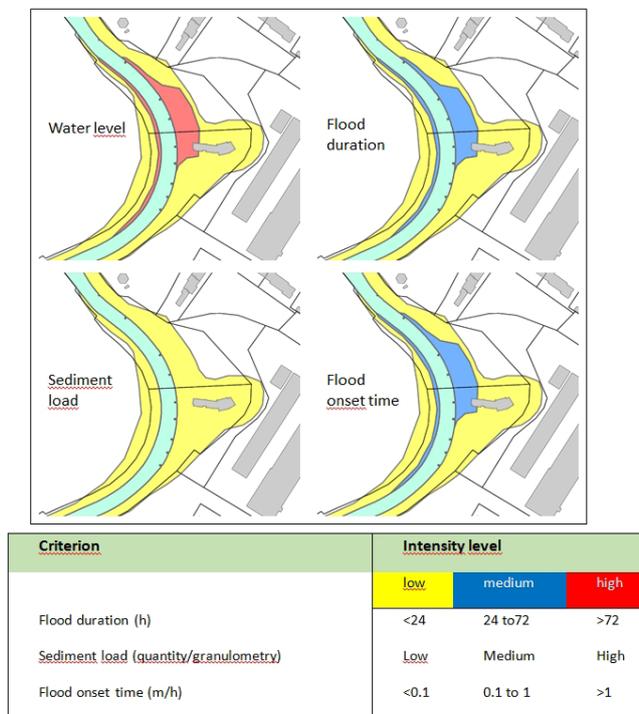


Figure 1. Additional criteria used to refine the flood intensity evaluation

within the present land planning tools (e.g. Cantonal and municipal master plans).

STUDY AREA

Risk assessment methodologies are tested for improvement by analyzing flood risks in Châtel-St-Denis, a fast-developing municipality set on both mountainous and flat landscapes in the southern part of Canton Fribourg. A regional economical center, Châtel-St-Denis has undergone rapid development during the last 20 years due mainly to its attractive location along an important transportation axis and its proximity of the Swiss Riviera region. Floods, landslides and debris flows represent the main hazards in the area. Flood hazard management practice is analyzed at a broader scale

KEYWORDS

Hazard and risk assessment; Land planning; Master plan; Châtel-St-Denis.

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via interviews with stakeholders and case studies in several municipalities, cantonal offices and insurers.

PRELIMINARY RESULTS

This project is ongoing. At this stage a sound methodology for hazard and vulnerability assessment was outlined and applied to the study area in Châtel-St-Denis. Vulnerability and risk maps were designed and a list of building prescriptions for several flood scenarios was build. Analysis of the legal framework and interviews with risk management stakeholders showed, at the local level, a lack of knowledge of hazards, and of the legal framework related to hazard management. Equally analysis concluded that risk is insufficiently taken into account during the planning process. In a subsequent stage of this project these results are to be integrated within a framework containing tools prescribing building and land planning conditions at all hazard levels. Thus, new tools might possibly take the form of decisional trees. At the end of the study, the tools will be examined from a legal point of view in order to be applied in practical terms to other municipalities and included within the established administrative procedures.

CONCLUSION

In a context of rapid urbanization and ongoing climate change, risk related to natural hazards needs to be addressed at all levels urban activities. This project represents a step forward toward integrating the concept of risk in planning tools thus allowing to bridge expertise from the fields of natural hazard science and urban planning in order to mitigate risks.