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Coupling GIS analysis and field survey for the vulnerability assessment of flood hazard

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Since a few years, analysis of territorial vulnerability has taken an increasingly significant place in natural hazard management. This orientation is expressed in literacy by many recent scientific researches and in decision makers requests expressed from various territorial actors specially in urban and regional planning. However, a quantitative estimation of potential affected populations, buildings or economical losses only defines a global vulnerability which does not meet the real needs of operational management and mitigation strategies in hydrological crisis period. It is thus necessary to develop both qualitative and quantitative methods of territorial diagnosis to assess the heterogeneity of stakes and the territorial complexity of vulnerabilities.

This communication presents a compared analysis of several methods used within the framework of three physical geography projects carried out on the hydrological risk. The first case study is focussing on alpine torrential risk in the Clarée and Guisane valleys (Southern Alps, France). The second case study relates to floodplain inundations in the three main valleys of the Eure basin (Basin of Paris, France). In these two cases several tools and methodologies based on GIS and field survey have been implemented to estimate various types of vulnerabilities in flood risk exposed areas. GIS tools based on various types of maps and aerial photographs were used to create multi-source geodatabases. The main objective was to integrate and extract spatialized information to identify the areas of vulnerabilities and to quantify the evolution of local stakes within the second half of the twentieth century. These geodatabases were then supplemented by geolocalized quantitative data (i.e.topometric measures, stakes estimation, economical impacts), qualitative data (i.e. building typology, architectural vulnerabilities) and participative data (i.e. sociological impacts, population representation of floodrisk). In both cases, collected data came from official sources (i.e. aerial

photographs, state services maps and archives) or from specific field surveys (i.e. topometric campaign, population inquiry . . .) led after several torrential debris flow and a thirty year return floodplain inundation.

The results obtained clearly demonstrate the interest and the potential uses of coupling GIS tools and field survey to produce an operational vulnerability assessment. The methods can be easily used in almost all types of natural hazards. They can also provide a sufficient help in developing risk management strategies and regional planning that have to cope the complex reality of heterogeneous vulnerabilities.