

“CARTOZONING”

FROM RISK MAPPING TO RISK ZONING

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Cartography and zoning represent a vital challenge today for the spatial management of avalanche risk. They are indeed closely linked, in their research and evaluation as well as in their graphic representation. The concrete method proposed here is based on 25 years of expertise in avalanche assessment, and on the fact that risk documents have often been incapable of predicting major avalanches not indicated on the risk maps (in 1999 for example).

METHOD

The technique consists in analyzing a given site, adding up the different identified elements, and then presenting them in a single, final summary document. The principle is based on the successive superimposition of layers of information on an aerial photograph (of the orthophotomosaic type) constituting the main background of the map. The expert assessments are carried out by a multidisciplinary team: specialists in nivology, dendromorphology, history, glaciology, etc. Each analysis represents a constituent phase, and the intermediate results are copied onto a transparency.

This method was experimentally applied to an urbanized mountainous area exposed to several large avalanches (the Chamonix valley). The first investigation phase is carried out by an avalanche specialist and a dendromorphologist: analysis of the fine topography, traces in the vegetation and geomorphological traces. Thus the 1st "overlay" reveals potential avalanche start zones, the paths followed, and the visible avalanche surfaces covered and extensions.

In the 2nd phase, historians reveal or confirm exceptional trajectories or extensions by studying the historical records. These contributions are combined with the first site analysis and complete it. For sites where land occupancy is a very sensitive question, numerical modeling can be used to refine avalanche intensities and frequencies.

3rd phase: the avalanche map distinguishes ordinary phenomena from exceptional phenomena (those with a rare frequency), resulting in a risk map indicating the surfaces covered according to these different intensities and frequencies.

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RESULTS

Finally, on a last transparency that precisely locates high-stake targets and vulnerabilities (apartment buildings, railroad, etc.), a summary is made by superimposing all these layers of information. The proposal is then to zone the risks using 4 colors for 4 zones:

- white – presumed without risk
- red - high-risk, building prohibited
- red and white stripes - intermediate zone, with progressive transition, and average risks
- yellow - corresponding to extreme phenomena (disasters only occurring every several centuries)

(Note: It will be possible to make a complete live demonstration, based on a real site.)

CONCLUSION

The advantage of this method is that it provides the authorities (elected officials, State agencies) with a finished product that they can immediately use. It also saves time, since avalanche maps, risk maps and regulatory zoning are acquired successively and presented together, each phase being justified by the previous phase, while at the same time applying a constant "double viewpoint" (taking into account the opinions of several professionals), guaranteeing greater reliability.

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