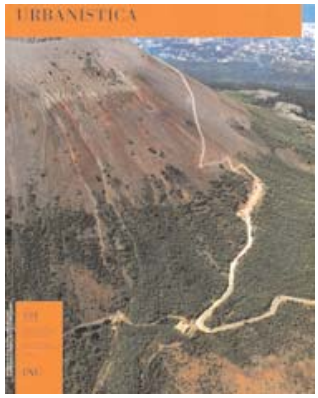

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Risk, prevention and urban planning

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An analysis of the European situation shows a persisting gap between scientific achievements in the field of natural hazards and their implementation in current land use plans. Two obstacles can be mentioned in particular: the lack of communication among experts of different disciplines including urban planners, and the difficulties in moving from reactive to pro-active policies. Looking at ways to overcome those problems, the Eu funded Armonia project aimed at connecting experts with various backgrounds, achieving some interesting results: a state of art of current planning practices in hazardous zones in some european countries; a method to link risk assessment to land use and location choices, applied on the Arno river basin, selected as the project test area.

State of the art in Europe

Although the need to consider land use planning as a fundamental component of non structural prevention measures has been widely recognised by scholars and by international agencies, in most European countries natural risks are still emergency driven and fully appreciated only in the aftermath of a disaster.
The approach to risks is sectoral and focused mostly on hazards characteristics, rather than being multirisk and attentive to vulnerability issues, that are so relevant not only to determine communities' response but also because they must be the core concern of planners, who have limited capacities to intervene on the hazard itself while influencing the way settlements are developed and organised.
Furthermore, while participation has been increasingly called to support cities growth, transformation and management decisions, it is surprisingly absent when risk is the concern.
Nonetheless, the whole blame cannot be put on planners only: analyses provided by scientists often lack crucial information to make sound land use decisions. First, as already mentioned, scientists are still too focused on hazard analysis, aimed at supporting structural rather than non structural measures; second, once exposure is considered, a linear relation between hazard, exposure and damage is assumed without any reference to how differential vulnerability conditions may alter this assumption. Third, once damage assessment is provided, it is in the form of a too synthetic index, as monetary cost or human losses, that are hard to translate into plans, determining the intensity, type and spatial organisation of land uses.
Sectoral plans are the only arena where scientific risk analyses and planning actually meet: an example is provided by the Italian watershed plan, the limitations of which, particularly when norms prescribed at the river basin level must be implemented at the local scale, have been widely discussed, also in this journal.
The French Plan de prevention des risques (risk prevention plan) is probably the best tool not only in Europe but also worldwide, as it constitutes the closest tool to an ideal translating scientific information into operable planning decisions. The French risk plan addresses the hazards threatening a municipal area and the exposed elements, producing a resulting map showing three risk levels: high, medium and no risk.
In the first two cases, a set of recommendations and prescriptions are provided, ranging from building limitations to architectural and urban design so as to mitigate the potential impact of recognised hazards.
Furthermore the map is a reference for the insurance compulsory French Catnat system. The weakest element of the described tool is the lack of a full vulnerability assessment, including not only physical but also systemic and social factors.

The Armonia proposal

In order to overcome some of the recognised weaknesses of the european approach to natural risks prevention, the Armonia project proposed a method to guide planners through a comprehensive risk assessment, including vulnerability, and linking the latter to a variety of planning options. Such a method constitutes the skeleton of a decision support system aimed at assisting planners in their work when compatibility concerns with existing hazards or risks are at stake. With respect to vulnerability, a large effort was made to identify parameters to assess physical fragility with respect to all hazards (while those have been developed mainly if not exclusively for seismic risk) and extending the attention to objects and systems other than buildings (as it has been the case until now).
Furthermore some coping capacity indicators have been provided, limiting the attention to those on which land use planning may have some influence.
The risk assessment must be carried out at the beginning of the planning process, so as to appraise the present situation, before any decision is made. The latter may preserve current land uses (not necessarily a good choice, if high risk levels have been recognised in the area of concern) or transform them. In the latter case, the risk assessment procedure must be run again to confront the expected results of the transformation with pre-existing levels of risk. At the end, planners are guided through a set of criteria to verify how compatible are preservation or transformation decisions with respect to existing hazards or risks. While the answer cannot be made automatic, different possibilities are foreseen between the opposite acceptance or refusal of the designed proposal.
Alternative mitigation measures may address the various components of risk, hazard, exposure and vulnerability. This way an integrative approach is pursued between structural and non structural measures; in the case insurance against natural hazards exists (the only measure actually addressing risk in terms of expected damage) an integration with land use plans is recommended. The method makes clear that planning tools require a variety of inputs rather than synthetic indexes: depending on the context, preventive measure may address all the risk components or just one or two of them.
In order to test the proposed method, an application was carried out in the Arno river basin in a group of municipalities that are part of the Firenze, Prato and Arezzo provinces.
One of the most interesting result of the application is a multilayered Gis architecture in which the information regarding risk has been organised in point shaped, linear and plane objects depending on the type of use to be represented (strategic facilities, lifelines or areas corresponding to a given urban function).
The method developed within the Armonia project and its application provides

important elements for further research and operational development, that can be summarised in the provision of a path to be followed in a variety of planning processes (aimed at new development, urban restoration
and even rural areas preservation) focusing on the vulnerability of settlements and on the coping capacity of systems and communities. This method has been included in a directive proposal to orient future land use planning activities in Europe, recognising not only the need for larger homogeneity as recourse to common recovery funds is increasing but also the transboundary nature of some risks and particularly of their potential impact.