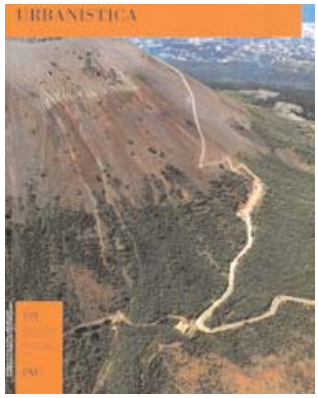

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Seismic risk and urban planning process: towards the integration

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The attention paid to the prevention and mitigation of natural risks in the international context since the Nineties has reinforced the awareness of the central role that land use planning choices play, either as 'factors' of potential amplification of risk or as an 'opportunity' for effective prevention and mitigation. The rules are, however, mostly sectorial, and the focus is on single hazards while the attention to other risk factors (exposure and vulnerability) is scarce. During the last years, however, the evolution towards the expression of seismic european and national rules relating to performance has come about. Furthermore, the necessity of the integration of environmental assessment into plans and programs was identified and ratified by the European directive 42/01 on the Strategic environmental assessment.
In Italy, the central role of sustainability in the most recent regional urban planning laws and the specific reference to the actions to be taken for risk reduction in the *Strategia di azione ambientale per lo sviluppo sostenibile* lay the ground for an efficient integration of the risk analysis in the processes of the territorial government.
A recent proposal of the national law on the principles for territory government includes relevant references so as to carry out planning in view of preventing natural and anthropical risks.
An important contribution towards the integration was given by some recent research projects: the Project Interreg III B Sisma (System integrated for security management activities 2004-07) and the National research program (Prin) *The safeguarding of historical and cultural values, along with the landscape in the Italian seismic zones* (2002-04).
Both projects pay particular attention to the prevention and mitigation of seismic risk in the historical centres. The projects have the common objective of reinforcing the connection between the expert knowledge in the field of risk analysis and urban planning as well as the awareness in the local authorities, in charge of land use planning at different scales, on the relationship between urban and territorial planning choices and their consequences on risk conditions.
They order and clarify the methods and techniques for the knowledge, evaluation, prevention and mitigation of seismic risk, even by means of experimental applications on many case-studies.
Only few case-studies have been selected for a detailed presentation, based on their representative characteristics such as: dimension, geographical position and institutional features. Another reason for this choice is that the selected case studies include a synthetic risk assessment.
Both projects underline an integrated disciplinary approach, focusing on the systemic characteristics of risk. They also provide a 'revision' of the methods and techniques for seismic risk analysis, favour their integration in the land use planning processes.
One of the main results of these projects regard the methods and techniques for the fast study of buildings' seismic vulnerability both as regards the average vulnerability of single buildings and the structural interactions between buildings (induced vulnerability).
Particular attention has been paid to the possible influences induced by the features of subsoil modified by a long period of anthropical use (for example: tunnels, cavities, foundation of urban walls, transferred soil, covered canals and channels) on the vulnerability of single buildings and aggregates and to the network services vulnerability.
One of the most important results of the projects is the progress on the systemic vulnerability studies which have not been very well consolidated until now.
These studies consider the city as a spatial and functional complex system, looking at its comprehensive behaviour with respect to hazardous events, such as earthquakes. The projects propose three different ways of analysis and evaluation which are likely to be integrated into future projects.
The first focuses on the tendency of the most important functional systems for urban quality and for facing emergency to lose their structure and organisation and to reduce their performances after a catastrophic event. The second refers to the capability of the city to face emergency, providing safety spaces, services and performance suitable to the community's necessities.
The third focuses on the 'minimal urban structure', meaning the togetherness of spaces which ensure the connections between the strategical functions and the urban fabric.
The projects also revise the methodologies and techniques for risk evaluations. Until now these techniques have been focused on 'quantifying' the expected damage expressed through synthetic indexes (economic costs, victims, etc.), taking into account only the physical vulnerability.
These estimates are not very effective in guiding land use planning choices towards risk mitigation and are not very useful for the evaluation of the effects of policies and actions on risk conditions.
The case studies show actions of risk reduction implemented through land use planning. They also provide complementary building and urban rules.
The case studies underline the necessity for urban choices to be coherent with vulnerability analyses.
The results of the projects are still to be perfected and developed, but they already provide parameters and procedures to evaluate territorial and urban risk in a fast way, even though only partially quantitative.
Parameters and procedures could even today support the implementation of risk assessment within the Strategical environmental assessments of programmes and plans.
The progress of risk analysis methods on an urban scale could and should in any case find further acknowledgement in the rules and regulations. A closer link should be created between the seismic technical rules and regulations and the 'laws of principles' which give power to the local councils. The role of planning (and of related studies) in overcoming sectorial approaches and involving local communities, up until now marginalized, in decision-making processes, should be recognised too.