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Multi-risk assessment: from natural hazards to climate change

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The World Bank report on the main hotspots of natural hazards highlights that million people in the world are relatively highly exposed to at least two hazards and additional impacts on natural and human systems can be posed by climate change. Therefore, a major challenge for natural hazard and climate impact research is to develop new methods and tools for the aggregation of cumulative effects expected from multiple impacts forced by natural and anthropogenic drivers across different regions and sectors, taking into account changing climate, exposure and vulnerability. So far, a hazard by hazard approach has been generally applied for evaluating the consequences of natural and climate change hazards on the analyzed region (e.g. heavy precipitations, floods, sea-level rise, coastal erosion, storm surges). However, different natural hazards and climate-related impacts affecting a region should be handled according to a multi-risk approach in order to aggregate, compare and rank different kinds of concurrent impacts caused by climate change. Several EU funded projects (e.g. ESPON-HAZARD, ARMONIA, MATRIX) were developed so far in order to provide sound scientific advancement towards the elaboration of multi-risk approaches.
A full multi-risk approach entails both a multi-hazard and multi-vulnerability perspective. However, internationally, most of the work concerning multi-hazards focused especially on natural hazards (e.g. flooding, storm surges, landslides, seismicity, droughts) affecting the same area. Moreover, multi-risk approaches developed so far refer only to the assessment of different hazards and rely on the analysis of static vulnerability (i.e. no time-dependent vulnerabilities for different exposed elements), also called multi-hazard risk assessment.
A relevant challenge is therefore to develop a comprehensive formal approach for the assessment of different natural and climate-induced hazards and risks at the regional scale.
A critical review of existing multi-risk assessment methodologies and approaches was undertaken at the Euro-Mediterranean Centre for Climate Change (CMCC), in order to provide a solid scientific support for the development of a multi-risk methodology addressing cumulative climate change and natural hazards impacts on different systems and sectors. The main outcomes of the multi-risk review highlighting major issues to be tackled by the climate change impact community and the main steps of the multi-risk methodology and will be here presented and discussed.