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Climate change, geological and hydrological hazard and adaptation policy in Italy

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The present work try to underling the scientific and technical background for a national plan for adaptation to climate change in the field of geo hydrological disasters. The adaptation policy represents the need tool to prevent from the adverse effect of climate change, minimizing the impacts and maximizing the opportunity from these changes. The "decision and policy makers" therefore needs to understand the vulnerability of existing territory in terms of impacts, related risks, opportunities, costs and consequences of different options and scenarios. Climate change has significant impacts on the hydrological cycle and all its related phenomena. Landslide and floods represent the conflict between natural and physic system and social and economical setting, constituting a fundamental imbalance and risk for population. Italian territory due to geological and geomorphological settings is always been interested by geological and hydrological extreme events. Between 1279 and 2002 A.D. in Italy, the AVI catalog (http://avi.gndci.cnr.it) recorded 4521 extreme events in terms of damages. In the same period we had 13.8 victims per year during landslide and 49.6 victims per year due to floods. To define a strong correlation between actual trend in occurrence of geological and hydrological hazards and future scenarios, it seems to be very difficult. The correlation should consider the relationship between meteorological trigger mechanisms (not yet very well associated to climate change) and hazard. For the Italian situations the most recent models provide the following scenario: further increase in temperature (steadily increasing trend already in the last two decades) with increasing periods of drought and heat waves; a general decrease in average precipitation; a decrease in wet days; an increase in intensity of rainfall (extreme events). Such trend seem to be more relevant in the southern part of Italy. The same problems arise when defining the socio economic impacts. The potential main consequences on geological and hydrological hazard, considering the investigated meteorological triggering mechanism could be synthesize as follow: the increase of intensity of precipitation may increase events such as mass movement (debris flow); higher temperature and more concentrated rainfall may also result in an increase of soil erosion; the decrease of total annual rainfall suggests the reduction of the intensity of slow movement triggered by prolonged rainfall, due to the low recharge of water table susceptible to trigger such phenomena; the heavy rainfall may cause triggering of flash flood especially in the Alpine foothills and mountain ranges; the decrease of annual average precipitation suggest a general reduction of average discharge of the rivers; the reduction of permafrost, due to increase of temperature may cause an increase of slope deformations in terms of rock falls, sliding, toppling rapid debris flow in the area actually stable and covered by permafrost. In order to define the complex correlation between climate change and geological and hydrological hazard to better define the policy of adaptation the following strategies must to be adopted: implementing the knowledge on hazard and risk assessment, focusing on the role of rainfall, as main triggering mechanism of floods and landslides; understanding the meteorological trends in Italy in the last 200 years; analyzing hazard mapping in relationship to land use and triggering mechanisms; evaluating long term scenarios as input for potential modification of triggering mechanisms; understanding the impact of modification of future scenario to present day hazard map; delineate the main issues for an adaptation plan, suitable to minimise, from now, the adverse effects of Climate Change strengthening as well the resilience; better understanding of the anthropogenic system response and causative forcing to occurrence of disasters. In the field of territorial vulnerability to climate change: developing appropriate land use planning and management tools; establishing new legislation, public information and knowledge on climate; implementing more accurate monitoring system and early warning, as prevention measures against rapid onset of disasters.