

Adaptation strategies for improved flood management in the Mediterranean

Summary

Floods are the most common type of natural hazard in the Mediterranean region, after the earthquakes: only in the last decades all the Mediterranean countries had to defend from some massive flood and its associated catastrophic effects.

Two main categories of floods may be distinguished in the Mediterranean area, according to the present climatic conditions and catchments characteristics. The amount and types of damages are clearly influenced by these factors. When a flood occurs within a great river basin, affecting large sectors of alluvial plain, huge economic damages are expected to buildings and infrastructures. Nevertheless, frequently there is time to limit the loss of human lives. On the other hand, when a flood is triggered by an intense rainfall over small catchments in arid regions ("flashfloods"), the main cost is in terms of human lives, basically because its quickness do not allow alert procedures.

In the last years, the economic and social impact of floods is growing due to the increasing urbanization. In terms of flood risk, urbanization is amplifying enormously the vulnerability and causes also a tremendous change in the rainfall-runoff relations.

Flood management comprehends any human activity to prevent loss of lives, properties and production after a flood disaster. The level of protection selected is frequently based on costs, desire of the community, potential damage, environmental impact, and other factors. Sometime, communities choose a lower level of protection because of the initial financial cost.

Structural measures such as dams, reservoirs, channel and catchment modifications, levee-banks, if wisely applied can greatly reduce the impact of flooding. However, structural measures can be very expensive and disruptive to the environment. Non-structural measures are any procedure altering the exposure of lives and properties to floods, such as flood forecasting and warning, flood insurance, planning controls, public information and education. These measures do not avoid the occurrence and the effects of floods, but are aimed at limiting their social and economic cost.

An overview to the policies adopted by national countries in the Mediterranean area put in evidence that these are based on the integration of specific measures for flood prevention and measures for flood management during the emergency. However, there is not an univocal strategy to mitigate the flood risk, due to the different types of floods that induce different impacts on people and land. For this reason, in national programmes against flash floods, emergency responses must have a preferential role, while longer-term preparedness must be programmed in large alluvial plains in order to prevent high economic damages.

Concerning land use management, a basic point is the development of River Basin Plans (RBP) for all river basins. These plans must be elaborated at the river basin scale because each structural measure induces some changes in the river hydrology and, as a consequence, in the magnitude of erosional and sedimentary processes. Unfortunately, the elaboration of RBP needs a long period of time,

The picture in the cover page shows a house strongly damaged by a mud-flow occurred during the October 2000 flood that affected Dora Baltea River Basin (Northern Italy)

while land use is in fast evolution often without an institutional control due the dissemination of tasks and responsibilities among a complex hierarchy of national and local administrations.

Referring the project management of structural works, data input used in flood risk analyses for the elaboration of forecasting models are often not realistic: for example rainfall data could not make clear the occurrence of an extreme rainfall event in a small catchment. Moreover, sometimes the need to mitigate the effects of a flood disaster may require a political decision to realize some structures without enough time for a correct project management, inducing remarkable environmental problems. Moreover, it is evident the need of maintenance programmes for each structure to guarantee for a long time its functioning. Unfortunately, the lack of maintenance is increasing in the last decades due to the decline of agriculture mainly in mountainous areas.

Regarding non structural measures focusing on saving people before the occurrence of a catastrophic flood, all the Mediterranean countries have a specific legislation concerning emergency plans for flood disasters. In the last years, national surveys for the civil protection are improving these plans due to a significant contribute from new technologies (including mass-media, internet, etc.). However, the success of alert messages is still now uncertain, as well suggested by the main flood events occurred during the last years.

International cooperation in the Mediterranean area includes a large amount of programmes and initiatives concerning long-term preparedness and emergency mitigation. Integrated water management programmes for sustainable development are a crucial tool to identify the urgent action to be undertaken at the river basin scale in relation to the water as a resource to preserve, but also as a potential factor for triggering floods. The information exchange of hydrologic data between different countries is fundamental as well as the transfer of technologies. However, it is important to outline that a flood management model reliable for a country is not necessary good for all, and the exporting of measures and policies needs always a careful political and technical evaluation.

Multilateral agreements for mutual help during and immediately after a flood disaster are also very important tools. International research projects on flood risk analyses and mitigation are also very interesting and valid, but probably could furnish better results if connected directly with the real national strategies against floods.

A long-term perspective of flood management must consider also the variability of flood hazard in terms of magnitude and return periods induced by climate change. In fact, although the role of the human activities in the climate change is still an open debate, there is no doubt on the effects of climate change in altering the precipitation patterns in terms of distribution, intensity and duration of extreme rainfall events and a higher frequency of strong precipitations.

Regarding the Mediterranean area, climate change may have particularly serious consequences in some areas threatened by desertification. For these areas increasing rainfall during winter and spring may lead to some extreme events. As a consequence, torrential rain also in short time may trigger dangerous flash floods.

Mitigation action to stabilize atmospheric concentrations of greenhouse gases at lower levels would generate greater benefits in terms of less damage. Adaptation is a necessary strategy at all scales to complement mitigation actions to lessen climate change impacts. However, adaptation would entail costs and cannot prevent all damages.

Over the years, a wide range of adaptive techniques has been developed, largely in response to local needs. The optimum extent of adaptation can be characterised in terms of the benefits and costs of adaptation. The optimum level of adaptation minimises the combined costs of adaptation and residual negative effects, with the most cost-effective steps taken first.

Broad distinctions can be drawn among “supply-side” and “demand-side” adaptive techniques. Examples of supply-side adaptations include increasing flood defences, building weirs and locks to manage water levels for navigation, and modifying or extending infrastructure to collect and distribute water to consumers. Demand-side techniques include water demand management, changing water allocations and land-use controls. In order to reduce as soon as possible the effect of climate change, long-term adaptation strategies should be joined with least regret, low-cost, immediate measures.

Adaptation strategies taking into account the climate change, can reduce adverse effects of climate change and can often produce immediate benefits but they can't prevent all damages (IPCC, 2001). Moreover, it is important to outline that some changes in the climate system (i.e. melting of ice sheets) are effectively irreversible over a period of many human generations.