

Water-related disaster management

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The lecture explored the cause and the consequences of drought spells and flood events.

Drought is caused by atmospheric circulation pattern, rainfall deficiency, temperature, catchment storage and socio – economic forces (water storage and use). Examples of extreme drought events was reported (Sahel, Aral Sea Basin, and cotton field in USA). Drought has consequences in agriculture, industry and freshwater, ecology, nutrition, wildfire and water quality.

The causes of flood events are intense and/or long-lasting precipitation, snowmelt, sea level land surface, flow obstruction dam failure and storm surge. Floods have become more abundant and more destructive in many regions of the globe, Europe included. The Odra and Labe basin, where extreme floods occurred in 1997 and 2002, are two important examples.

Global changes, by changes in terrestrial systems, changes in socio-economic systems and changes in climate, have important impacts on flood risk and vulnerability.

Land-cover and land-use change (urbanization, deforestation, elimination of wetlands and floodplain, that were regularly inundated in the past, river regulation, i.e. channel straightening and embankments) have decreased the water storage capacity and reduced the time-to-peak of a flood triggered by a given precipitation.

The economic development of flood-prone areas has increased the flood hazard. Floodplain has been encroaching more and more by settlements around cities in developing countries.

The change in temperature has lead to an increased water holding capacity of the atmosphere, that causes increased intense precipitations. In a predicted warmer climate extreme precipitation could be more frequent than in the present, as drought events, especially in Southern Europe.

Under the increasing variability of climate and human pressure on water resources, water management options are crucial to control water availability and water demand.

Water storage (dams, reservoirs, underground retention, rainwater harvesting) became essential to control floods and droughts according to the principle *keep water where it falls*. Problems arise like the inundation of living places, ecosystems, and historic and cultural monuments, erosion and sedimentation, the resettlement at large-scale of thousands of people, the possibility for fish to move along river, the risk and reliability and, above all, the discrepancy between expectation and reality.

The preparedness to floods and drought passes through improving the short/long-term floods and drought forecasting and warning, the zoning of flood-prone area, and flood insurance.

The *Flood Action Plan* placed important aims to achieve to reduce risks of flood damage. It intends to restore the natural settings of floodplains and rivers, to promote extensive agricultural use and the afforestation of a large amount of areas, in addition to risk mapping, flood forecasting and alert systems.

Giovanbattista de Dato