

## TYOLOGY OF RIVER BANKS WITH EROSION HAZARD ON THE LOWER TISZA RIVER

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Keywords: bank erosion, alluvial sequence, tectonic influence, regulated river, water regime, Tisza, Hungary

**Abstract:** The heavily regulated Tisza River provides ample opportunities for the study of bank erosion, its circumstances, rates and types. Geomorphological conditions particularly favour various types of bank failure along the lower Hungarian section, between Csongrád and Mártély, where the present course of the river is partly determined by the tectonic environment, river regulation measures and geomorphic self-regulation (channel adjustments after channelization). The stability of the banks is fundamentally influenced by their sedimentology, but climate change has several indirect influences on riverbank slides and collapses. The impact of weather extremes on bank erosion, manifested in river regime, is also studied. With hydrometeorological extremes expected to intensify in the future, bank erosion is becoming a more and more severe hazard along some reaches. Its actual dimensions are estimated by the Bank Erosion Hazard Index (BEHI). Implications for flood defence and actual construction activities in towns built right on the river banks are also presented.

The paper aims at identifying the origin, mechanisms and types of mass movements along the riverbank and the role of geological (tectonic, sedimentological and geomorphological) and hydrological (river regime and groundwater dynamics) factors in their generation. General predictions of the future spatial and temporal distribution of bank erosion hazard and opportunities for mitigation are also covered in the paper.

## UNCONTROLLED URBANIZATION AND GEO-HYDROLOGICAL HAZARD IN THE LIGURIAN CATCHMENTS: A CASE STUDY FROM THE RAPALLO FLOODPLAIN

Authors: *Paola Giostrella\**, Irpi Cnr, Italy; *Francesco Faccini*, University of Genoa, Italy; *Lara Fiorentini*, Municipality of Genoa, Italy; *Massimo Melillo*; *Elisabetta Napolitano*; *Michele Santangelo*

Keywords: geo-hydrological risk, heavy rainfall, mediterranean area, Rapallo, urbanization

**Abstract:** The Ligurian Floodplains are historically subject to disastrous floods due to the weather and climate-related depression of the Gulf of Genoa, and also as a result of the geographical and physical conditions of their catchment areas, related to the slope and exposure, and use of soil. Changes in the rainfall patterns and the uncontrolled building in high, hazardous areas have contributed to increased risk of geo-hydrological conditions. The contribution covers the symbolic case study of Rapallo City: the term “rapallizzazione”, which has now entered the Italian vocabulary, is indicated in the fact that the phenomenon of uncontrolled urbanization. In 1861, there were 10,000 inhabitants, this number grew to 30,000 in 1981, the urbanized area has increased from 0.18 km<sup>2</sup> to 6 km<sup>2</sup>, resulting in a degradation of the landscape. The Rapallo plain, determined mainly by basin T. Boate (26 km<sup>2</sup>), and in the alternative to those of T. San Francesco (6 km<sup>2</sup>) and T. Thuja (3.4 km<sup>2</sup>), is historically prone to flooding; in the last hundred years there have been more than ten catastrophic floods documented. The geo-hydrological problems related to the Rapallo uncontrolled urban growth can be exemplified by four main geomorphological issues: modifications in land-use, changes from being predominantly agricultural to urbanized; variations in the flood channel width of the streams with narrowing of the useful discharge section; progradation of the coastal plain towards the sea with fills and embankments; total diversion of the natural riverbed and concentration of surface runoff in new more restricted areas.

### SLOT2

Chair: *Dénes Lóczy*

**Schedule: Tuesday, 1 September, 17:15–19:00**

## FLOODS IN THE BALKANS

Author: *Magdalena Latinovic\**, Serbia

Keywords: floods, Serbia

**Abstract:** The catastrophic floods, caused by the highest precipitation amounts recorded so far, created enormous damage in the Balkans.

Countries affected by this natural disaster were Serbia, Bosnia and Herzegovina and Croatia. The main cause of this excessive rainfall, which in some towns exceeded even one-third of annual amount, was moving of the strong cyclone across the Balkans. The rainfall contributed the increase of groundwater level which additionally caused the erosion of soil and activation of landslides. State of emergency was declared in all three countries and the damage was enormous. Unfortunately, frequent floods are becoming common, and they occur as a result of climate changes which are more and more evident year by year. Even though it is impossible for people to go against nature, they can still do their best to reduce the aftermath.

## ASSESSMENT OF FLOODPLAIN REHABILITATION ON THE DRAVA FLOODPLAIN

Author: *Dénes Lóczy\**, University of Pécs, Department of Physical and Environmental Geography, Hungary

Keywords: antropogenic landscape forming, landscapes, rural development plan, sustainability

**Abstract:** The Hungarian Drava floodplain has suffered large-scale landscape degradation in recent decades. Desiccation involved the decline of agriculture accompanied with social and employment problems. To counter deleterious processes, a comprehensive