



## Consequences of an unusual flood event: case study of a drainage canal breach on a fluvial plain in NE Slovenia

Ines Vidmar (1), Bojan Ambrožič (1), Barbara Debeljak (1), Erazem Dolžan (1), Špela Gregorin (1), Nina Grom (1), Polona Herman (1), Teja Keršmanc (1), Eva Mencin (1), Natalija Mernik (1), Astrid Švara (1), Ana Trobec (1), Anita Turnšek (1), Petra Vodeb (1), Anja Torkar (1), Mihael Brenčič (1,2)

(1) University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Geology, Ljubljana, Slovenia (mihael.bencic@ntf.uni-lj.si), (2) Geological Survey of Slovenia, Department of Hydrogeology, Ljubljana, Slovenia

On November 4-6 2012 heavy precipitation resulted in floods in the middle and lower course of Drava River in NE Slovenia causing damage to many properties in the flooded area. The meteorological situation that led to consequent floods was characterized by high precipitation, fast snowmelt, SW wind and relatively high air temperature. The weather event was part of a cyclone which was spreading over the area of North, West and Central Europe in the direction of Central Europe and carried with it the passing of a cold front through Slovenia on November 4 and 5.

The flood wave travelled on the Drava River from Austria to Slovenia past the 11 hydroelectric power plants after eventually moving over the Slovenian-Croatian border. The river discharge increased in the early morning of November 5 reaching 3165 m<sup>3</sup>/s.

This work focuses on a single event in the Ptujsko polje where among other damage caused by the flooding, the river broke through the drainage canal of the Formin hydroelectric power plant and changed its course. The Ptujsko polje contains two fluvial terraces. In the area of Formin HPP, the lower terrace is 1.5 km wide and the surface as well as the groundwater gradient shift from west to east with the groundwater flowing parallel to the river. These characteristics contributed to the flooding and consequential breach in the embankment of the drainage canal.

Several aspects of the recent floods are discussed including a critical reflection of data accessibility, possible causes and mechanisms behind it as well as the possibility of its forecasting. Synthesis of accessible data from open domain sources is performed with emphasis on geological conditions. Discharge and precipitation data from the data base of Slovenian Environment Agency are collected, reviewed and analyzed. The flood event itself is analyzed and described in detail. It is determined that the flood wave was different from the ones regulated by natural processes which points to an anthropogenic influence.

In the paper we are focusing not only on the characteristics of a single event but try to interpret it in the context of a broader time scale using sources of similar past events of high precipitation and discharge, recorded flood events in the past and general flood characteristics of a river environment.