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Late Pleistocene and Holocene climatic variability in the Carpathian-Balkan region. Abstracts volume



**Late Pleistocene and Holocene Climatic Variability
in the Carpathian-Balkan Region**

ABSTRACTS VOLUME



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Tree-ring records of the historic pollution along Novăț river, Maramureș Mountains, (Romania)

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Mining activities cause heavy metal pollution of the water, the soil and the air in the affected areas. Metal toxicity, acidic pH and changes in soil structure are supposed to induce a stress on the riparian forest. Coniferous trees affected by this type of human-induced environmental stress react by producing different anatomical changes, commonly the abrupt radial growth decrease and traumatic resin duct production. By analysing growth anomalies formed in tree-rings, it is therefore possible to reconstruct retrospectively the dynamics of forest under environmental polluted, conditions.

On the 10th of March 2000 an ecological disaster occurred in Maramureș Mountains, Romania. A tailing pond of the Baia Borșa mines (district Maramures) burst after heavy precipitations and thawing. About 20 000 t of heavy metal contaminated sludge flooded along Novăț and Vaser Valleys and then reached the rivers Vișeu and Tisa.

The 2000 event severely pollutes with heavy metals (As, Cd, Cr, Ni, Pb, Zn etc.) the soil and ground water in the riparian forest areas. Moreover, these trees were buried under toxic sediments left after the passage of the flood. Riparian forest stands along Novăț river are mainly composed by Norway spruce (*Picea abies* (L) Karst.) trees. This tree species is known to have a high susceptibility to soil pollution, because of the shallow growing roots within the upper part of the soil profile. It has therefore a high potential for dendrochronological studies. In this mining area, so far relations between pollution events and the growth response of Norway spruce have not been tested.

The main objective of this study is to assess the impact of a major pollution event occurred in 2000 along Novăț river on tree-growth patterns of riparian Norway spruce.

In such an attempt, two sampling sites including 31 affected trees were selected, first one located on the left border of the Novăț tailing pond, and the second downstream the dam next to the left and right river banks. Another 25 non-affected trees located several tens of meters upslope were sampled, in order to obtain a local reference chronology. Classical dendrochronological procedures include sample preparation (air-drying and sanding) and analysis (ring-width measurement, cross-dating and growth-anomalies identification).

Results clearly indicates that after 2000 event in the case of the majority of affected trees, the growth anomalies (abrupt growth reduction and traumatic resin duct formation) has been less than predicted from climatic factors. It suggests that the importance of soil and water pollution effect on tree-growth has increased after the well-known flood event.

The tree-ring analysis proves to be a useful tool to determine the well-known major pollution event occurred in 2000. Further dendrochronological studies are needed to be conducted in other mining areas, in order to identify similar or possibly different pollution-induced tree-growth changes.