



Dendrochronological and GIS methods in monitoring of linear erosion near Bábaapáti, South Hungary

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A new field of application of dendrochronological methods is the measuring of the gully head retreat in the areas severely influenced by short-term erosion hazard. The measured retreat rates can be integrated to a complex digital terrain model (DTM) including elevation data, land use and land cover in order to investigate the impact of land use change on the erosion rate.

The analysis of the tree-rings of tree roots is an applicable method to estimate the time of the exhumation of the root. Two types of observations can be applied to define the unearthing of the root: (1) Since the first ring of a root can only grow under the surface, the number of the tree rings of a living root defines the maximal age of the exhumation; (2) The uncovered roots can be damaged after they have been uncovered. The age of a damage of the cambium also can be measured by the counting the number of overgrown tree-rings, which defines the minimal age of exhumation.

The dendrochronological data limit the age of the section of the gully age. Collecting these data along the gully will reveal the evolution of the landform. An order of magnitude estimate can be given for the gully head retreat for those gullies where numerous observations exist.

The measurements have been carried out in two sub-catchment areas and on the banks near the mouth-area of the creek of Bábaapáti, South Hungary. Altogether 250 gullies were surveyed, of those 35 contained 103 exhumed roots at more than one locality. The measured ages range between 1 year (newly grown) and 17 years.

The measured data have been integrated with slope angle of the envelope surface of

the hillside. The percentage of land use/land cover types were calculated for each subcatchment. The rates have been evaluated in the light of the predominant land cover types.

The largest erosion rates were measured in partly reforested arable lands (vineyards and crop land areas), while the forested hillslopes are characterised by lower rates. In the ploughed areas 15-20 m/yr horizontal gully retreat were estimated.

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