NATURE CLOSE TORRENT CONTROL IN ORE MOUNTAINS

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Pavel Kovar, Frantisek Krovak,
Department of Land Use and Improvement, Faculty of Environmental Sciences,
Czech University of Life Sciences Prague

Introduction

Aren't torrent control measures in the Czech Republic over-dimensioned or even "superfluous"? This question has been raised by some of our colleagues. Recent flood events and their devastating effect on torrent catchments and the surrounding constructed area have however shown, that comprehensive flood control and erosion control measures are indeed necessary, while of course respecting nature. Altogether 54 hydralic structures (mostly step-pools) were placed in 1, 055 m route length of the Jindrichovicky Brook in the Ore Mountains

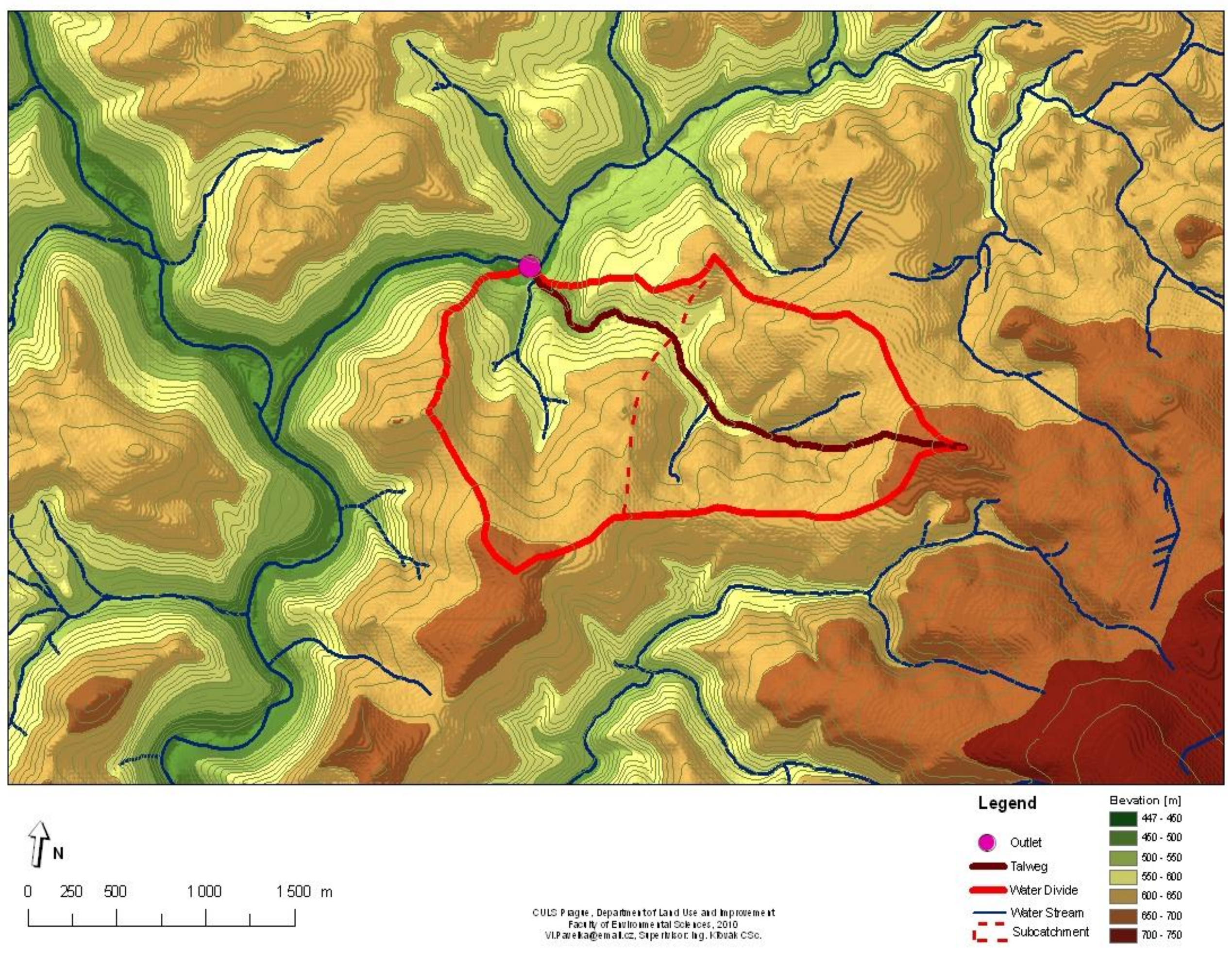

Fig. 1 Digital Elevation Model

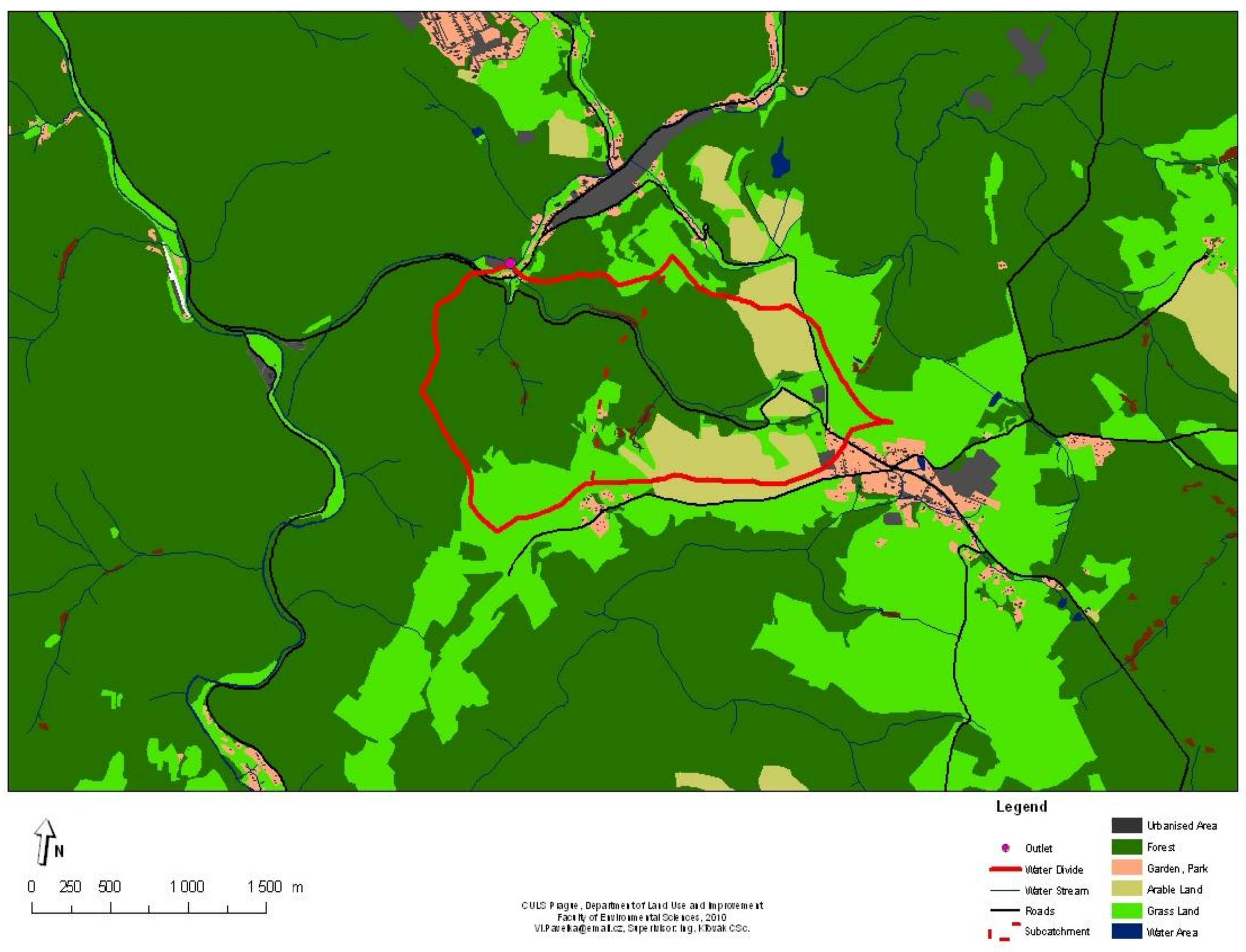

Fig. 2 Land Use

Fig. 3 High Step, Former Stream 1970's

Methods

This paper deals with hydraulic assessment of the torrent catchment bed and its inundation zone for various consolidation measures within the proposed discharge capacity, with a focus on selected hydraulic characteristics: torrent bed capacity, water volume, velocity and shear stress. Migration permeability is also taken into consideration. As a means for verification of these methods the mathematical model HEC-RAS was used. This model has been calibrated and validated for the Jindrichovicky Brook in the Ore Mountains (Western Bohemia).

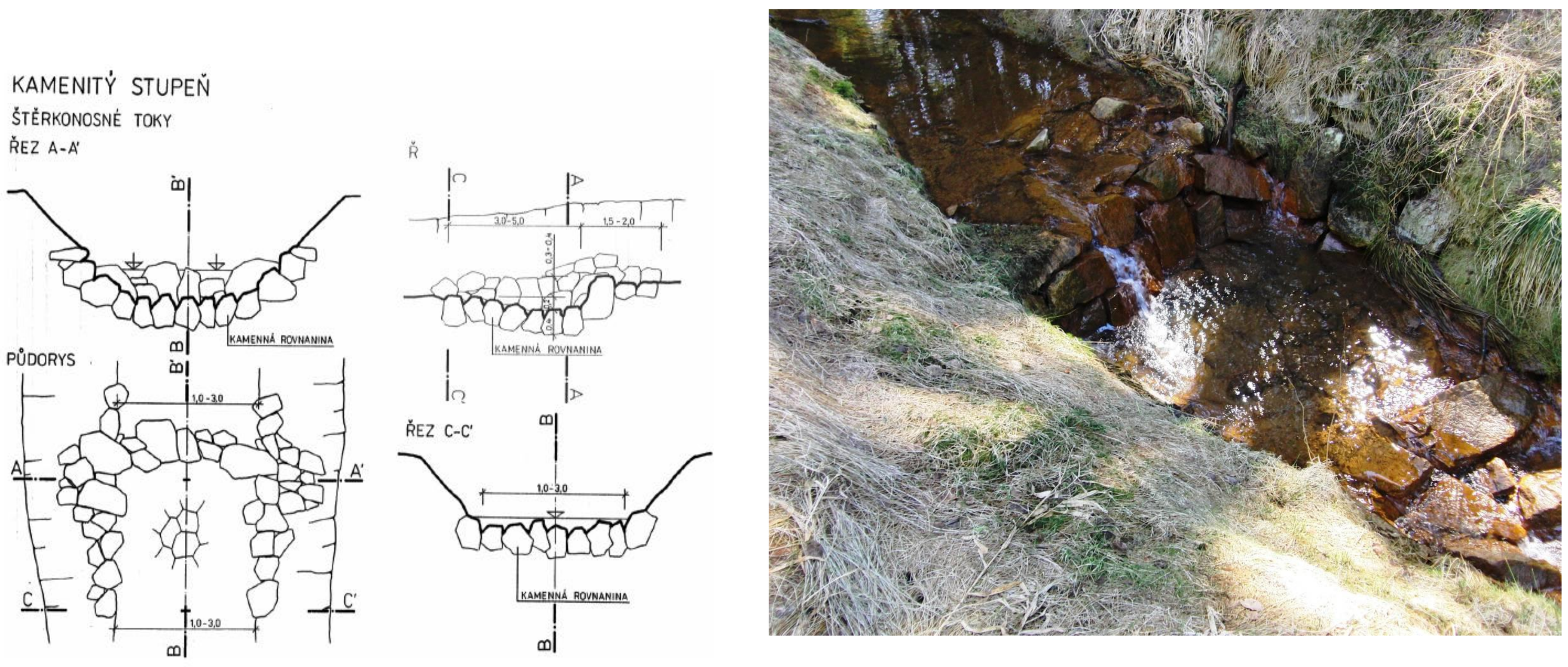

Fig. 4 Boulder Step,

Fig. 5 Pool, 2011

Fig. 6 Wooden sill with pool, 2008

Fig. 7 Boulder Chute, 2008

Fig. 8 Riparian Stands, 2011

Results

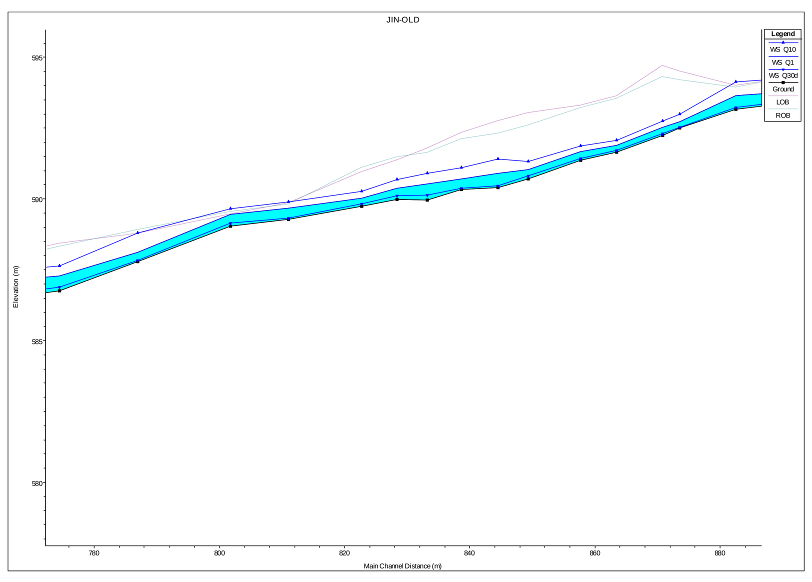

Fig. 9 Part of Longit.Profile, Former Stream, 2002

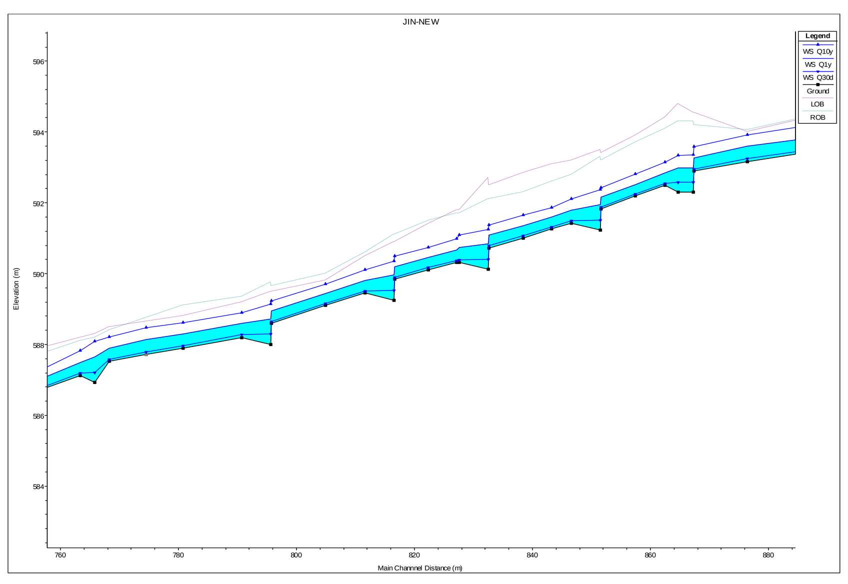

Fig. 10 Part of Longit.Profile, New Stream, 2008

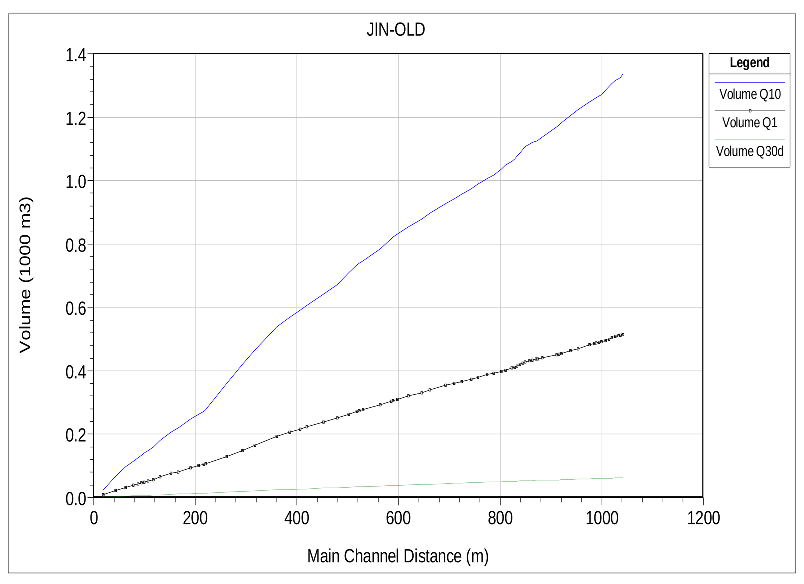

Fig. 11 Cumulative Volume, Former Stream 2002

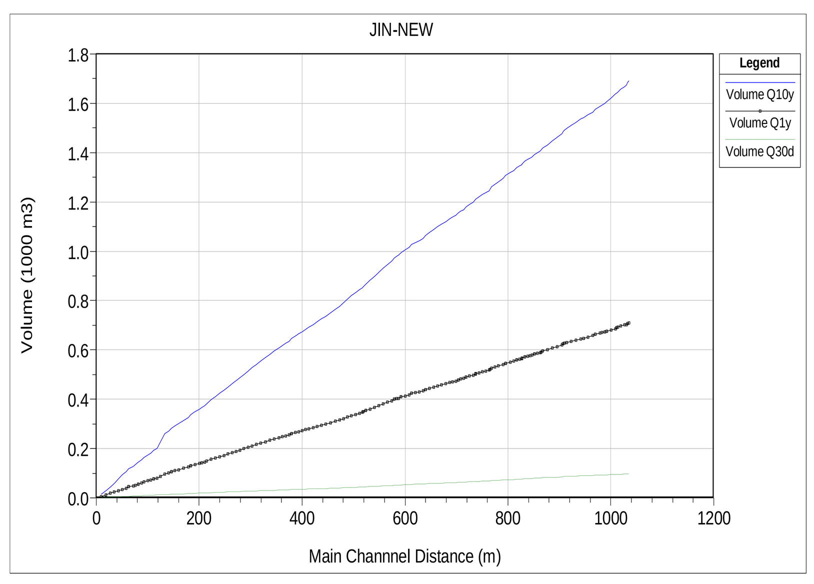

Fig. 11 Cumulative Volume, New Stream 2008

Selected Discharge	Depth (m)	Velocity (m/s)	Shear Stress (N/m2)	Volume (1000m³)	
Q_{30day}	[1]0,05 / [2]0,15	0,8 / 0,4	40 / 10	0,04 / 0,1	[1] OLD
Q_{1year}	0,25 / 0,35	2,5 / 1,5	140 / 40	0,5 / 0,7	[2] NEW
$Q_{10years}$	0,4 / 0,55	3,8 / 2,0	200 / 80	1,25 / 1,7	

Tab. 1 Comparison of the parameters for the former and new channel

Conclusions

Land use change (conversion of arable land to permanent grassland) mitigated peak discharges on the catchment as it was confirmed by the KINFIL model analyses.
Implementation of the hydraulic models has provided a good tool for the restoration criteria assessment: depth, velocity, shear stress values (SRH 2D better than HEC-RAS models).
New nature close hydraulic structures: the step-pool system provided good conditions for water self-purification and for a biota migration. Improvement in riparian vegetation fits better to natural sites. Positive impact on biodiversity. Future asessments and evaluations are planned.

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