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Comprehensive approach to investigation of braided and wandering river (the River Belá case study)

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Research of braided rivers in fluvial geomorphology, particularly the partial themes of interaction between the channel morphology, water flow-stage, sediment transport, bar evolution and vegetation in braided rivers are frequent in specialised literature. These issues can be successfully investigated by a suitable selection of methods for the comprehensive exploration of the multi-thread river patterns.
The River Belá has a gravel-bed braided and wandering planform situated in the north of Slovakia and characterized by a laterally unconfined setting and dynamic behaviour. Data evaluated by the aerial photos (1837 – 2009 in nine time horizons) for the comparable discharge conditions have been used for the analysis of the lateral channel activity and channel landform changes (evolution of bars and islands) in the ArcGIS. The present work concentrated on the evolution of the contemporary erodible corridor area, braiding index and node density changes of the flow divergence and convergence, heterogeneity of cross-section parameters, bar sediment and vegetation variability.
Erodible river corridor area, where the maximum and minimum values were observed in 1823 and 1992 respectively, was measured in the study river reach. A decreasing trend in nine time horizons was identified. Braiding index and node density defined as a number of flow convergences and divergences were computed for the same river reach.
Thirteen non-stable cross-sections were created for the whole study area. Attention was paid to the braidplain width, number of bars and channels and the bar and channel width. All minimum values were reached in 1973 what points to the stagnation of flood events.
Sediment sampling has been conducted across the lateral and longitudinal bar cross-section for a detailed analysis of this type of channel landform. Effects of the riparian vegetation succession phases on channel evolution were verified with mostly negative regressive reaction.
The question about the evolution trend in future remains open, but it should be expected that the River Belá would convert from a very wide braided channel to an incised sinuous channel. This comprehensive approach provides the opportunity for a much better understanding of the interaction between the dynamic of landform changes, processes, forms and evolution of the river system. A consistent research of the local behaviour and global features may enlighten the variability of the channel morphology in selected river reaches in the past and the present.

Keywords: braided river, erodible corridor, braiding index, cross-section parameters, riparian vegetation, the River Belá