

River Geosystems, River Landscape and Their Management

1. Fluvial geomorphology

- a) Fluvial geomorphology as a system: internal and external independent (controlling) and dependent variables, feedbacks and thresholds, complex response, levels of the river system – spatial (river system hierarchy), criteria, interpretation of relationships, and temporal (equilibrium states)
- b) Channel morphology – sandy and gravel-bed channels and bedrock environments; geomorphological units (steps, waterfalls, rapids, cascades, riffles, shallows, pools (scour holes), large woody debris (LWD), bars, bank-related geomorphological units)
- c) Behaviour of the river system – scales, evolutionary pathways, equilibrium states, threshold values, hydraulic geometry at-a-station and downstream
- d) Channel planform pattern – number of channels, sinuosity (degree and type), lateral stability (meander growth and migration), avulsion, braiding/anabranching (degree and character)

2. Hydrology and hydraulics

- a) Discharge – generation, bankfull stage, flood recurrence interval, frequency and magnitude
- b) Hydraulic fundamentals – discharge and its measurement, hydraulic radius, flow resistance, types of roughness, shear stress
- c) Stream power and discharge concepts – Hjulström diagram, Shields parameter, initiation and transport of bedload and suspended load, grain-size distribution

3. Channel sediments

- a) Sediment sources and storage, sediment connectivity, transfer, budget, lithofacies
- b) Stream power and discharge concepts – Hjulström diagram, initiation and transport of bedload and suspended load, grain-size distribution
- c) Floodplain forms and processes – landforms, floodplain classification, accretion, floodplain reworking
- d) Sediment stratigraphy

4. Dynamic processes within the channel

- a) Changes in river morphology – causes and consequences
- b) Bank morphology and processes – bank types, bank failures, bank erosion

5. River landscape and ecological functions

- a) River morphology and river landscape assessment – approaches and methods
- b) River landscape – character, concepts, restoration, flood and sediment management, environmental and effective discharge, implications for biota
- c) Ecosystem services and ecological functions of rivers

6. Methods of river system research

- a) Field surveys (geodetic methods, sampling, discharge measurement, sediments and lithofacies)
- b) Application of remote sensing methods (aerial imagery, satellite data, drones/UAVs, bathymetry)
- c) Palynological analyses, plant macrofossils, mollusc and pollen analyses
- d) Modelling of rainfall–runoff events

Sources for study *Basic*

CHARLTON, R. (2008). *Fundamentals Of Fluvial Geomorphology*. Routledge, 264 p. ISBN 9780415334549

BRIERLEY, G., FRYIRS, K. (2005). *Geomorphology and River Management*. Blackwell Publishing. 387 p.

LEHOTSKÝ, M., KIDOVÁ, A., RUSNÁK, M. (2015) Slovensko-anglické názvoslovie morfológie vodných tokov. *Geomorphologia Slovaca et Bohemica*, 15(1). 63 p.

LEHOTSKÝ, M. (2004). River morphology hierarchical classification (RMHC). *Acta Universitatis Carolinae, Geographica*, 39. Univerzita Karlova, Praha. 33-45

LEHOTSKÝ, M., GREŠKOVÁ, A. (2007). Fluvial geomorphological approach to river assessment – methodology and procedure. *Geografický časopis*, 59, 107-129.

LEHOTSKÝ, M., GREŠKOVÁ, A. (2004). Riverine landscape and geomorphology: ecological implications and river management strategy. *Ekológia (Bratislava)*, 23, Supplement, 1, 197-190.

LEHOTSKÝ, M., BOLTÍŽIAR, M. (2022). *Landscapes and Landforms of Slovakia*, Springer, 467 p.

Recommended

KNIGHTON, A. D. (2014). *Fluvial Forms and Processes*. A new perspective. Hodder Arnold. 400 p.

KONDOLF, M., PIÉGAY, H. (2003). *Tools in Fluvial Geomorphology*. Wiley. 560 p.

LEHOTSKÝ, M. (2005). Metodologické aspekty správania a zmien korytovo-nivných geosystémov. *Geomorphologia Slovaca*, 5, 34-50.

LEHOTSKÝ, M., GREŠKOVÁ, A. (2003). Geomorphology, fluvial geosystems and riverine landscape (methodological aspects). *Geomorphologia Slovaca*, 3, 46-59.

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LEHOTSKÝ, M., GREŠKOVÁ, A. (2007). Fluvial geomorphological approach to river assessment – methodology and procedure. *Geografický časopis*, 59, 107-129.

LEOPOLD, L., WOLMAN, M., MILLER, J. (1964). *Fluvial Processes in Geomorphology*. Freeman. 544 p.

THORP, J., THOMS, M., DELONG, M. (2008). *The Riverine Ecosystem Synthesis*. Elsevier. 232 p.