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Hydrologic characteristics and suspended sediment dynamics in the Gradaščica river basin

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Sediment transport in catchments is an important aspect of environmental research because of its role in the transport of sediment-associated nutrients, pesticides and other contaminants. High turbidity levels in water bodies affect stream morphology, aquatic organisms and their habitats, cause siltation of water reservoirs and have other side effects. For maintaining adequate water quality, reducing excessive soil erosion and proper estimation of the amount of transported material it is necessary to define and understand main factors that control sediment production and transport in rivers. Understanding the hydrological response of catchments on hydrometeorological phenomena and their influences on changes in suspended sediment concentrations require measurements of the processes at time scales that correspond to hydrological dynamics of a catchment.

Our research aims to investigate hydrological and seasonal controls over suspended sediment production and obtain an insight into a suspended sediment concentration dynamics and total loads in a forested catchment. For this purpose, we study several factors actively controlling suspended sediment mobilization and transport in a small experimental catchment in Polhov Gradec mountainous area in the central part of Slovenia, drained by the Gradaščica river. Steep slopes, relatively high altitudes and abundance of precipitation (average yearly sums between 1600 to 1700 mm) result in a quick rise in the water level and consequently, in torrential response of the Gradaščica river. The studied headwaters lay on dolomite and limestone with a mainly natural land cover. The area is a subject to erosion with debris sources in the dolomite and additional catchment characteristics that contribute to high sediment transport rates.

The main categories of factors that actively control sediment mobilization and transport from catchments, studied in our research, are hydrological and meteorological controls, physiographic factors and physical and biological processes. In order to define significance of each factor, monitoring of meteorological events, hydrological response, water chemistry and turbidity, suspended sediment concentration in studied water bodies and field catchment analysis need to be carried out at time scales that correspond to hydrological dynamics of a catchment. The research involves analyses of sediment sources, estimation of suspended sediment load, laboratory tests of suspended sediment samples for particle size classification and organic fraction determination. Turbidity and suspended sediment concentration measurements will be coupled with rainfall and streamflow records.