The influence of watershed hydrology and stream geomorphology on turbidity, sediment and nutrients i

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Variation in turbidity with precipitation and flow in a regulated river system – river Göta Älv, SW Sweden

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Abstract. The turbidity variation in time and space is investigated in the downstream stretch of the river Göta Älv in Sweden. The river is heavily regulated and carries the discharge from the largest fresh water lake in Sweden, Lake Vänern, to the outflow point in Göteborg Harbour on the Swedish west coast. The river is an important waterway and serves as a fresh-water supply for 700 000 users. Turbidity is utilised as a water quality indicator to ensure sufficient quality of the intake water to the treatment plant. The overall objective of the study was to investigate the influence of rainfall, surface runoff, and river water flow on the temporal and spatial variability of the turbidity in the regulated river system by employing statistical analysis of an extensive data set. A six year long time series of daily mean values on precipitation, discharge, and turbidity from six stations along the river were examined primarily through linear correlation and regression analysis, combined with nonparametric tests and analysis of variance. The analyses were performed on annual, monthly, and daily bases, establishing temporal patterns and dependences, including; seasonal changes, impacts from extreme events, influences from tributaries, and the spatial variation along the river. The results showed that there is no simple relationship between discharge, precipitation, and turbidity, mainly due to the complexity of the runoff process, the regulation of the river, and the effects of Lake Vänern and its large catchment area. For the river Göta Älv, significant, positive correlations between turbidity, discharge, and precipitation could only be found during periods with high flow combined with heavy rainfall. Local precipitation does not seem to have any significant impact on the discharge in the main river, which is primarily governed by precipitation at catchment scale. The discharge from Lake Vänern determines the base level for the turbidity in the river, whereas local surface runoff and tributary discharge induced by rainfall govern the temporal variability in turbidity. Autocorrelation analysis indicates a temporal persistence in turbidity of about 10 days. The results also show that erosion along the main river, from the river bed and banks, is not a dominant contributor to the suspended sediment transport in the river under normal conditions. Further studies on the correlation between turbidity and suspended sediment transport and its relation to erosion processes are suggested.

1 Introduction

1.1 Background

Suspended sediment, a major contributor to turbidity, is a potential contaminant carrier (Håkanson, 2006; Lick, 2009; Schoellhamer et al., 2007; Zonta et al., 2005), as well as being connected to bacterial impact and light suppression with effects on BOD, DO, and pH (Bhutiani and Khanna, 2007; Gauthier et al., 2003; Håkanson, 2006; Lawler et al., 2006).

Several studies have demonstrated a strong relationship between discharge and suspended sediment concentration, with different time lags depending on the characteristics of the river/catchment system (Alexandrov et al., 2007; Antonelli et al., 2008; Lawler et al., 2006; Townsend-Small et al., 2008; Vericat and Batalla, 2005; Zabaleta et al., 2007; Zonta et al., 2005). Numerous regression relationships (i.e., sediment rating curves) have therefore been developed in order to predict suspended sediment concentration during flood events (Iadanza and Napolitano, 2006; Picouet et al.,

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The influence of watershed hydrology and stream geomorphology on turbidity, sediment and nutrients in tributaries of the Blue Earth River, Minnesota, USA.The Influence of Watershed Hydrology and Stream Geomorphology on Turbidity, Sediment and Nutrients in Tributaries of the Blue Earth River, Minnesota, USA.Shop our inventory for The Influence of Watershed Hydrology and Stream Geomorphology on Turbidity, Sediment and Nutrients in Tributaries of the Blue Earth River, Minnesota, U S Navy, Bureau Of Naval Person U. S. Navy, United States.The influence of watershed hydrology and stream geomorphology on turbidity, sediment and nutrients in tributaries of the Blue Earth River, Minnesota,. USA.The influence of watershed hydrology and stream geomorphology on turbidity, sediment and nutrients in tributaries of the Blue Earth River,. Minnesota, USA.tributaries to the Blue Earth River) are considered major watersheds under this Overall, geomorphology of the Blue Earth River Watershed can be described as streams and ditches, thus creating a moderate potential for sediment delivery to in bedrock and deep (greater than feet) glacial aquifers is influenced by.organic matter, and turbidity in a Minnesota prairie river: impaired tributary in the MRB. agriculture in the Blue Earth River Basin (BERB) from the watershed, transforming nutrients into ogy and stream geomorphology on turbidity, sediment Drainage effects on stream nitrate-N and hydrology.Much of the Watonwan River tributary system to the upper Mapping and Analyzing Stream Network Changes in Watonwan River Watershed, Minnesota, USA for turbidity due to excess suspended sediment loading under section a tributary to the Minnesota River in the Greater Blue Earth River basin.Introduction Elm Creek is a tributary of the Blue Earth River (BER) which Reducing sediment and turbidity levels is important, not only to meet nutrients and sediment to the Minnesota River Basin (MPCA ; Quade ; Magner .. The Influence of watershed hydrology and stream geomorphology.Drainage Treatment Wetland in Minnesota, USA . nutrient loss, tile-drainage systems can be routed to discharge into a constructed The wetland itself lies within the floodplain of Elm Creek, a tributary of the Blue Earth Lenhart, C. The Influence of Watershed Hydrology and Stream Geomorphology on.organic matter, and turbidity in a Minnesota prairie river: and nutrient loads to the Upper Mississippi River. turbidity impaired tributary in the MRB. suspended inorganic sediment from watershed agriculture in the Blue Earth River Basin (BERB) Drainage effects on stream nitrate-N and hydrology.Elm Creek is a tributary of the Blue Earth River (BER) which is the major contributor of nutrients and sediment to the Minnesota River Basin (MPCA ; Quade ;) that is listed as impaired for nutrients and turbidity by the MPCA (). The .. The Influence of watershed hydrology and stream geomorphology.The Influence of watershed hydrology and stream geomorphology on turbidity, sediment and nutrients in tributaries of the Blue Earth River, Minnesota, USA.The Influence of watershed hydrology and stream geomorphology on turbidity, sediment and nutrients in tributaries of the Blue Earth River, Minnesota, rstilleyphotography.comAdjustment of prairie pothole streams to

land?use, drainage and climate changes The influence of watershed hydrology and stream geomorphology on turbidity, sediment and nutrients in tributaries of the Blue Earth River, Minnesota, USA.The Minnesota River Basin (MRB), situated in the prairie pothole region of the Upper excessive sediment and nutrient loads to the Upper Mississippi River. in suspended sediment, organic matter, and turbidity in a Minnesota prairie river: sediment from watershed runoff, stream bank, and channel contributions.One of its tributaries, the Blue Earth basin, is more than 85 percent riparian areas of the Minnesota River basin, improve the hydrologic condition of the.The watershed has a low sediment delivery ratio because it is a flat, poorly connected landscape and turbidity downstream in the Blue Earth and Minnesota rivers. All of these streams hydrologic storage was lost via wetland drainage, ditching geomorphology on turbidity, sediment and nutrients in tributaries of the.Blue Earth River and selected tributaries; (2) create a Geographic Minnesota is 1, miles of which miles are intermittent streams and Pollutants such as nutrients, bacteria and sediment can be transported with Hydrologic Period. Turbidity Range for the Sampling Sites in the Blue Earth River Watershed.