

GIS based spatial and temporal analysis of Runoff, Nutrients and physical Parameters in seven watersheds of the Northern German Lowland.

Master's Thesis

by

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Abstract:

Human economical and social activities in watershed extent regulate the water quality and quantity, the aquatic ecology, and energy flow within the system. A comprehensive GIS based analysis as well as statistical analysis was conducted on 7 watersheds in Northern German Lowland to investigate the distribution of runoff, physical and chemical parameters of the water quality and the dynamics with respect to the environmental predictors in space and time. Significant spatial variability of the water quality parameters was evident from west to east transect among the watersheds. While, seasonal variability was not sufficient for the overall change of the water quality indicators. It is found that there was uneven distribution of the chemical parameters through the watersheds and the pattern of the distribution of the chemical parameters was asymmetrical and also none of the watersheds have equal sample median.

Land use/ land cover across 7 watersheds were correlated to 12 water quality parameters and Arable land was strongly correlated to Nitrogen and Phosphorus concentration in the water. Forest is also correlated inversely to the chemical parameters, thus watersheds with high Forest cover could exhibited better water quality through the watersheds. Arable land combined with WWTP dominated regions were identified as a hot spot area. Anthropogenic sources were found to be the prominent sources of the contaminants and both diffuse and point sources were identified as the main path and entry of pollutants to the rivers. In contrast, soil type across the watersheds revealed no correlation to the water quality, suggesting other influential factors to be considered. The mean concentrations of TP, PO₄-P and NO₃-N during 1990 – 2010 were identified in different LAWA class and TP and NO₃-N concentration were above the threshold level of good ecological status in Hache and Hunte. An overall decreasing temporal trend of these parameters in Buckau, Ilmenau and Nuthe and also no temporal trend in Hache and Hunte was observed approximately for the past 21 years.

Key words:

Water quality, Spatial & temporal variation, Land use, Watershed, LAWA class

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