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Inferred effect of soil drainage on nitrate concentration in streams in the Zelivka basin, Czech Republic

Josef Hejzlar

Biology Centre AS CR, v.v.i., Institute of Hydrobiology, Na Sadkach 7, 370 05 Ceske Budejovice, Czech Republic, e-mail: hejzlar@hbu.cas.cz

An unintended, large-scale experiment on the effects of farming intensity on stream water quality has occurred in the East Europe since the change of economic conditions in the beginning of the 1990s. The Zelivka basin in an upland, crystalline region of the Czech Republic can serve an example of non-decreasing nitrate concentrations in surface water in spite of a ca 50% drop in nitrogen fertilisation. The analysis of historical changes in fertilisation, crops, drainage systems, and nitrate concentration in the runoff during the period from the 1950s till the present indicated that the major cause of nitrate concentration increase had to be the change of water regime that occurred due to the construction of tile drainages. Despite a relatively small proportion of tile drained areas from the whole farmland (20%), the effect on the stream pollution with nitrate was high because the drainage systems were mostly built at the originally water logged areas along streams and at the localities of springs on slopes that previously functioned as natural zones of nitrate elimination by denitrification and plant uptake. The results of this study indicate that measures to decrease nitrate concentrations in streams in this basin have to focus on the restoration of denitrification capacity of riparian zones along the streams and on the better control of soil mineralization processes at arable land that lead to nitrate production.