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Wetland restoration and nitrate reduction: the example of the peri-urban wetland of Vitoria-Gasteiz (Basque Country, North Spain)

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Abstract. Changes in land use and agricultural intensification caused wetlands on the quaternary aquifer of Vitoria-Gasteiz (Basque Country) to disappear some years ago and nitrate concentration in groundwaters increased very quickly. The Basque Government recently declared the East Sector of this aquifer a Vulnerable Zone according to the 91/676/CEE European Directive. Recently, the wetlands have been restored through the closure of the main drainage ditches, the consequent elevation of the water table and the abondonment of agricultural practices near the wetlands. This is the case of the Zurbano wetland. Restoration has allowed the recovery of its biogeochemical function, which has reduced nitrate concentrations in waters. Nitrate concentrations which exceed 50 mg l^{-1} in groundwaters entering into the wetland are less than 10 mg l^{-1} at the outlet. Conditions in the wetland are conducive to the loss of nitrates: organic matter rich wetted soils, clay presence allowing a local semiconfined flow and very low hydraulic gradient. Water quality monitoring at several points around the wetland showed the processes involved in nitrate loss, although some aspects still remain unresolved. However, during storm events, the wetland effectively reduces the nitrate concentration entering the Alegria River, the most important river on the quaternary aquifer.

Keywords: restored wetland functionality, nitrate losses, Basque Country

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