

Nitrogen-isotopes and multi-parameter sewage water test for identification of nitrate sources: Groundwater body Marchfeld E of Vienna

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The application of nitrogen and oxygen isotopes in nitrate allows, under favourable circumstances, to identify potential sources such as precipitation, chemical fertilisers and manure or sewage water. Without any additional tracers the source distinction of nitrate from manure or sewage water is still difficult (Kralik et al., 2008). Even the application of boron isotopes can in some cases not avoid ambiguous interpretation.

Therefore, the Environment Agency Austria developed a new multi parametrical indicator test to allow the identification and quantification of pollution by domestic sewage water. The test analyses 8 substances well known to occur in sewage water: Acesulfame and sucralose (two artificial, calorie-free sweeteners), benzotriazole and tolyltriazole (two industrial chemicals/corrosion inhibitors), metoprolol, sotalol, carbamazepine and the metabolite 10,11-Dihydro-10,11-dihydroxycarbamazepine (pharmaceuticals) (Humer et al., 2013). These substances are polar and degradation in the aquatic system by microbiological processes is not documented. These 8 Substances do not occur naturally which make them ideal tracers. The test can unveil 0.1 % of wastewater in the analysed water sample.

This ideal coupling of these analytic tests helps to identify the nitrogen sources in the groundwater body Marchfeld East of Vienna to a high confidence level. In addition, the results allow a reasonable quantification of nitrogen sources from different types of fertilizers as well as sewage water contributions close to villages and in wells recharged by bank filtration. Combined data indicate that the nitrogen input from mineral fertilizers increased from 2006 to 2013, but the contribution of sewage water to the Marchfeld groundwater is still present (Humer et al., 2015).

Literatur:

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