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Connection between the nitrate sensitivity and vulnerability of water and between the geological environment

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The aim of the study is to establish the conditions for developing environmentally conscious and competitive agricultural practice and technology for protecting groundwater against nitrate pollution, taking into account the expectations and legislation of the European Union, national legislation and the national systems of subsidies. Surface water vulnerability to nitrates is defined by the EU Nitrates Directive (91/676/EEC) and other legislation based on the 50 mg/l nitrates threshold (for drinking water more than 25 mg/l) and on the criteria that nitrates take part in eutrophication in still waters. Groundwaters containing more than 50 mg/l nitrates are also classified as vulnerable. The problem with the definition formulated by the Directive is that it refers to a Ďone moment measure" of the water quality for determining vulnerability, and the vulnerability defined by the geological environment is not taken into account. The fact that at different points of a water body (even in the same geological environment) very different nitrate levels can be measured both spatially and temporally, is also not considered. Another problem in the uniform adaptation is the lack of a standard EU-wide sampling method. In our definition, those territories are vulnerable to nitrate contamination from agricultural sources where nitrate originates from agricultural activity and gets to the surface or to the uppermost layer of the geological media, and from where nitrates are washed down or into the geological media with a transporting medium (usually water) polluting the surface- or groundwaters. Aggravating circumstances are if the surface water is eutrophicated or if the nitrate concentration of the uppermost zone of the groundwater is more than 50 mg/l beneath the significant part of the area of concern. In the case of washing down the subject of the research should be nitrate

contamination that possibly reaches the endangered surface water, and if so, in what quantity and how fast. In this case, factors influencing vulnerability are surface slope, lithology of the surface layers and the surface cover in the given area. The key element of nitrate leaching is if it reaches the surface or not. In this case, factors influencing the vulnerability are the permeability of the layers above the groundwater level, the depth of the groundwater, the organic matter content and the water management of the soil. Based on the above considerations, 1:100 000 scale maps were created for the assessment of potential nitrate leaching in soils in Hungary. Combining these information, a vulnerability map was derived showing the endangered areas. This map can be used to plan for the preventive actions against nitrate contamination.