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As in many European countries, eutrophication is the principal threat to surface water quality in Ireland. In some situations, groundwater represents a significant pathway for nutrient transport to surface water. Phosphorus is usually the limiting nutrient responsible for eutrophication in freshwater bodies, with nitrate generally being more important in estuarine and coastal waters. Although much research has been carried out internationally on nitrate contamination of groundwater, there is less recognition of phosphorus as a groundwater contaminant. This paper illustrates how phosphorus, as well as nitrate, can be responsible for groundwater bodies being classified as having poor status under the European Union Water Framework Directive (WFD).

In the interim water quality status assessments, carried out for the WFD in 2008, 43 per cent of river water bodies in Ireland were classified as having less than good status. A significant proportion of river water body monitoring points, 28 per cent, were classified as being less than good status due to phosphorus enrichment. In many instances phosphorus transfer to surface water is mainly via surface or near-surface pathways, but in some instances groundwater can be a significant contributor. The transfer of ecologically significant quantities of phosphorus has been established in the western Irish limestone lowlands, where generally only thin soils and subsoils overlie conduit-dominated karst aquifers, providing little opportunity for phosphorus attenuation. In addition, in this karst region, groundwater often provides the majority of surface water flow, and therefore the contribution of phosphorus to surface water can be important. In Ireland, 15% of groundwater bodies were classified as having poor chemical status, and in 93% of these (mainly in the limestone karst dominated geology of the west of Ireland) this classification was due to the potential deterioration of surface water quality by phosphorus from groundwater.

Very few Irish groundwater bodies (less than 1%) were classified as poor status due to exceedance of the drinking water threshold for nitrate, but 16% of groundwater bodies are at risk due to the potential deterioration of associated surface water quality by nitrate from groundwaters. 41% of Irish estuarine and coastal water bodies (12.8 per cent by area) were classified as having less than good status, as assessed using multiple biological elements for the WFD. Elevated nitrate concentrations in the southeast and southwest of Ireland provide significant nutrient loading from groundwater to some of these transitional and coastal waters.



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