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Ecosystem services provided by groundwater dependent wetlands in karst areas

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Turloughs are topographic depressions in karst, which are intermittently flooded on an annual cycle via groundwater sources and have substrate and/or ecological communities characteristic of wetlands. Turloughs are designated a Priority Habitat in Annex 1 of the EU Habitats Directive (92/43/EEC) as well as GWDTEs under the Water Framework Directive (WFD). Hydrology is the primary driver of these unique ecosystems and so a rigorous understanding of the flooding regime is required in order to assess their conservation and future sustainability.

This research aims to identify and quantify the ecosystem services associated with turloughs, particularly in relation to the need for habitat conservation in the face of external pressures associated with agriculture, road drainage schemes, water supply and wastewater disposal. The research focuses primarily on quantifying the ecosystem functions responsible for producing terrestrial hydrologic and climatic services, as well as intrinsic biodiversity services, and uses this context to lay out a blueprint for a more detailed ecosystem service assessment.

These services have been quantified in appropriate units (biophysical or otherwise), based on actual or potential sustainable use levels. Available data and field studies have been used to assess the hydrological conditions necessary to sustain the biodiversity of vegetation as well as to better understand the connections between hydrology and biogeochemical cycles. The benefits of the turlough services have then been analyzed and quantified in appropriate units (ecological, socio-cultural and economic indicators) as well as monetary values. This has been done using the inVEST tool. InVEST includes models for quantifying, mapping, and valuing the benefits provided by terrestrial, freshwater, and marine systems. In particular the Habitat Risk Assessment and the Nutrient Delivery Ratio modules have been used.