

# Assessing the Conservation Status of Turloughs

Turloughs are listed as EU priority habitats and Groundwater Dependent Terrestrial Ecosystems under the EU Habitats and Water Framework Directives respectively. A turlough can be defined as a topographic depression in karst which is intermittently inundated on an annual basis, mainly from groundwater, and which has a substrate and/or ecological communities characteristic of wetlands. Turloughs are recognised for their conservation importance in terms of both terrestrial wetland and fully aquatic communities. Their conservation value is of both national and international significance, and as a result there is an obligation to monitor the conservation status of this habitat. This requires a detailed understanding of the hydro-ecological processes of the turloughs, and their catchments. Such understanding will facilitate the development and implementation of an efficient and effective monitoring scheme.

The objective of this multidisciplinary project is to provide a robust scientific foundation and prescriptions for the conservation and management of turloughs. The work will be carried out at both catchment and turlough levels.

The project aims to:

1. Describe and classify the biological communities of turloughs
2. Elucidate the processes that determine the biological communities
3. Provide mechanisms to monitor and manage turloughs for nature conservation purposes in co-operation with traditional farming

This study will build upon the findings of other NPWS and the EPA funded research projects on turlough eco-hydrology and other available data.

The project will be to provide a quantitative description of the terrestrial vegetation communities, aquatic communities, hydrology, water chemistry and soil nutrient status, and the interactions between these factors and traditional farming practices for a selected group of 20 turloughs from a range of different catchments. These data will address the following issues:

## Hydrological & Hydrochemical

- The hydrological regime (including catchment boundaries and pathway susceptibility)
- The dynamics of the water flow regime
- The temporal and spatial variation in turlough hydrology and hydrochemistry
- The hydromorphological classification of turloughs

## Ecological

- The relationship between semi-quantitative vegetation data and previously described plant communities.
- The temporal and spatial variations in turlough algal communities and aquatic invertebrates.
- The interactions between morphology, hydrology (depth, duration, timing of flooding etc.), hydrochemistry, soil nutrient status (identifying critical parameters) and biological communities (plant species distributions, vegetation communities and aquatic communities)
- The sensitivities of biological elements/receptors to changes in hydrology and hydrochemistry
- The relationships between turlough management practices and biological communities
- The relationships between catchment land-uses and turlough ecology
- The biological classification of turloughs

## Conservation

- Management prescriptions for turloughs
- The current conservation status of the turloughs (including a first assessment of other SAC turloughs derived from available information)
- Quantification of the current and future threats and pressures at turlough and catchment levels
- Assessment of significant damage
- Development of models to predict the biological impact of pressures (i.e. the impacts of hydrological and water quality changes on the terrestrial and aquatic biota) and to support the WFD Programme of Measures

### Monitoring protocols

- The requirements for on-going monitoring of hydrology, water quality and conservation elements (terrestrial vegetation and aquatic communities, and other biological elements [e.g. terrestrial invertebrates etc.]), considering parameters to be recorded, operator input and field time
- The most appropriate monitoring protocols for determining the conservation status of turloughs
- The frequency of monitoring

## **Projected Tasks**

### Overall Tasks

1. Production of models of the relationships between hydrology and turlough biota. (The conceptual phase to be developed with steering group)
2. Production of a scientifically based system for assessing the conservation status of turloughs
3. Production of an appropriate programme to monitor the conservation status of turloughs

### Site Selection

1. Selection of 20 sites in agreement with the Steering group to cover the range of existing ecological conditions

### Hydrology

1. Measurement of relevant hydrological parameters (to include tracing and drilling)
2. Mapping of topography within turloughs
3. Acquisition of local climatic data.
4. Delineation of catchments of the study sites
5. Any other data needed to elucidate essential catchment-turlough interactions

### Water and Soil Chemistry

1. Sampling of floodwater fortnightly (where appropriate)
2. Analysis of water samples for nutrients, silicates, chlorophyll a, total dissolved organic C, conductivity, alkalinity, pH, turbidity, colour, suspended solids and all major anions and cations
3. Mapping of turlough soils along characteristic transects and over wider turlough areas, and characterise their nutrient dynamics, especially in the aquatic phase

### Vegetation

1. Collation of available data and semi-quantitative survey (along characteristic transects) of the vegetation communities
2. Mapping of the vegetation communities of the turloughs
3. Determination of the vegetation composition and architecture of selected submerged communities, in shallow littoral zones and immediately post flood recession
4. Relate vegetation to management factors

### Aquatic biota

1. Sampling of littoral and open water monthly to determine the species composition and spatial variation in aquatic invertebrate communities
2. Identification and determination of the biomass of phytoplankton and attached benthic algae
3. Relate aquatic biota to management factors

### Risk Assessment

1. Quantification (and mapping where appropriate) of any current or potential threats or pressures at both in-basin and catchment level, beginning with pressure and impact data available through the Water Framework Directive

### Outputs and Report Content

1. A conceptual model of the relationships between hydrology, nutrients (soil and water), vegetation and aquatic communities and management factors at both catchment and turlough level
2. A quantitative, predictive model of the relationships between hydrology, nutrients (soil and water), vegetation and aquatic communities and management factors at both catchment and turlough level

3. A conservation assessment of the selected sites, to include an assessment of current and future threats throughout the catchment
4. An extrapolated conservation assessment of other turloughs with sufficient ecological information
5. An evaluation of previous classifications of vegetation communities
6. A monitoring programme appropriate to service the requirements of the EU Habitats' and Water Framework Directive
7. A written description of each survey site with an assessment of the site quality, a map of the turlough catchment, vegetation communities, faunal assemblages and all associated soil, nutrient and hydrological information