

An ecohydrology database for floodplain meadow vegetation management in the UK

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Wet meadows form a transition between terrestrial and aquatic systems, where either the ground water-table is usually at or near the surface or the land is intermittently flooded from surrounding water bodies. Wet meadows are of high nature conservation value, supporting considerable biodiversity, including rare & threatened plant species, vegetation types, important bird populations and a range of invertebrates. However, over 97% of the UK's floodplains have lost biodiversity interest in the last century, due to urbanisation, drainage & agricultural intensification. For successful restoration and maintenance of these systems, a thorough understanding of the functioning of vegetation, water regime, fertility and management is necessary. The availability of detailed long term data on such elements is of immense value to implement sound management decisions. In this connection, the UK Floodplain Meadows Partnership (<http://www.floodplainmeadows.org.uk/>) has been able to integrate vast amount of available data from various sources in to a database.

The database accomplishes a number of functions. Firstly it is used a deposit for all available data categories (e.g. water levels, site details, plant observations, soil & climate) collected in from available floodplains. In this role, it has capability built to import new data, using set spreadsheet templates and facilitating database forms. Secondly, it is fully searchable by one or many data types/categories (e.g. year, location) using prepared database forms. Thirdly, it can be used to help calculate certain metrics (for e.g. hydrological indices) from other existing data types (for e.g. water levels) and display them as reports. Currently, the database encompasses data from 84 sites, >25,000 quadrats, >450,000 individual plant observations and >3.5 million water level measures collected over 20 years.

An example of useful output from the database is an index of hydrological niche preferences of species and vegetation communities. Using hydrological models built from inputs of water-table depth in the field, topographic variation, and soil characteristics, an index of water regime called Sum Exceedance Value is calculated. The index is helpful to account the levels of stress plants are able to tolerate and hence enables to determine species water preferences (i.e. hydrological niche). An understanding of niche breadth of species is useful in assessing species (and also the sites they occur in) for their vulnerability to change. It also helps in the development of adaptive strategies for scenarios that involve hydrological change.

In this paper, we will share challenges encountered and lessons learned in building and running such an extensive ecohydrological database. Technical challenges such as database design; data challenges such as quality assurance and acquisition; as well as institutional challenges such as capability to monitor and curate will be elaborated. The data is set to be shared on national and regional databases and with mutual understanding among interested partners both in the UK, Europe and internationally. It is hoped the findings will broaden scientific understanding to support conservation efforts.