

Wetlands - overview

WHAT ARE WETLANDS?

Wetland is the umbrella name used to describe areas of land where water is the primary factor controlling the environment and the associated plant and animal life. Fens, reedbeds, marsh, bogs and peatland are all types of wetland. They occur where the water table is at, or near, the surface of the land or where the land is covered by shallow water, either permanently, seasonally or at different tidal states. Salt water wetlands include areas of marine water, the depth of which at low tide does not exceed six metres. The water in a wetland may be fresh, brackish or salt depending on its location. A wetland may be natural or artificial, permanent or temporary.

The image below shows Thorpe Meadows LNR, Peterborough, Cambridgeshire - Nene-ride wetland.

*Photographed by Peter Wakely
(English Nature)*

Man's activities can create artificial wetlands such as at the margins of fish ponds, farm ponds, reservoirs, gravel pits and canals. The characteristics of wetlands have also been harnessed through the creation of *constructed wetlands* for wastewater treatment.



WHY CONSERVE WETLANDS?

PRESSURES AND IMPACTS

Chemicals

Water abstraction

Wetlands are among the world's most productive and biologically diverse environments, providing the water and primary productivity upon which innumerable species of plants and animals depend for survival. They support high concentrations of birds, mammals, reptiles, amphibians, fish and invertebrate species. Wetlands are also important locations of genetic plant material.

Wetlands are a source of significant economic benefit, for example water supply, fisheries and agriculture, through their maintenance of water tables and retention of nutrients in flood plains. They are also widely used for recreation and tourism. Unfortunately, and in spite of important progress made in recent decades, wetlands continue to be among the world's most threatened ecosystems, owing mainly to ongoing drainage, pollution and over-exploitation of their resources.

Wetlands have a high capacity to tolerate chemical inputs such as fertilisers and pesticides from farming and oil and other hydrocarbons from roads and urban areas. However, persistent or extreme incidents of pollution will cause a deterioration in water quality, the development of algae and favour some plant species over others, such that the natural balance of the wetland habitat is damaged. This can be particularly persistent where phosphorus is transported into the wetland in soil eroded from farmland. Phosphorus is only slowly removed from sediment particles so its effects will be evident for a long period of time. When the source of the pollution is stopped, the wetland can usually recover over time.

Many wetlands are formed by groundwater. An increase in the use of groundwater for public water supply over the last 50 years has caused a fall in the water table in many wetland areas which have subsequently dried out and been adopted for agricultural use or forestry. The two types of groundwater-fed wetlands which occur in the UK are turloughs and meres. The change in water table level is much more rapid in turloughs than in meres. Turloughs flood in winter and dry up in summer and are found over carboniferous limestone in Northern Ireland and Wales. Meres do not have a regular rhythm of water level change and may remain in the same condition for periods of several years.

UK Biodiversity Action Plan

<http://www.ukbap.org.uk/UKPlans.aspx?ID=24>

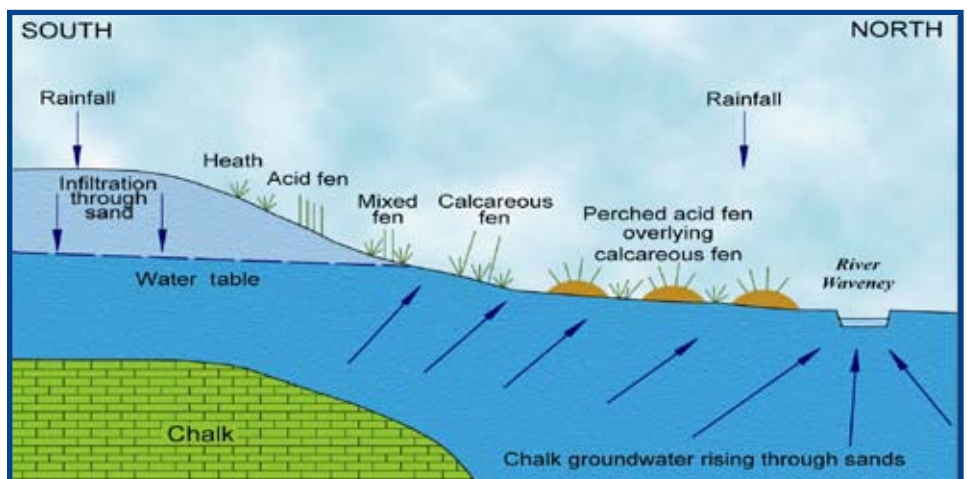
Redgrave and Lopham Fen

<http://www.wildlifetrust.org.uk/suffolk/nr/sites/redg.htm>

This is an area where groundwater abstraction had seriously impacted on the quality of the wetland habitat. Co-operation between the Environment Agency, Essex and Suffolk Water, English Nature and the Suffolk Wildlife Trust has brought about a rebalancing of abstraction for water supply with the need to conserve an important habitat. The diagram illustrates the flow of water in the fen, which is spring fed, when not impacted by groundwater abstraction.

Picture courtesy of the Groundwater Forum (www.groundwateruk.org)

http://www.groundwateruk.org/archive/low_river_flows_and_wetlands.pdf



Wetlands are also impacted by the abstraction of water from rivers. Areas of wetland-type habitat often occur along the banks of rivers and where rivers enter lakes or the sea. When the level of water in the river rises and falls rapidly due to pumped water abstraction, the wetland is subject to rapid drying and rewetting cycles which stresses plants and can cause bank erosion to occur. Equally, the creation of a dam and reservoir for water supply or power generation purposes can negatively impact wetland areas where too little water is left in a river after it has been abstracted upstream. When this base flow of the river is very low insufficient water is fed to wetlands associated with the river causing them to dry and become invaded by non-wetland plant species, resulting in a degrading of the wetland habitat.

Land drainage

Wetland soils are fertile, flat and have a ready water supply, the level of which can be controlled by the digging of drainage ditches, pumping and building embankments. This makes them attractive as agricultural land. Very large areas of wetland have been drained or partially drained in the past to provide both arable and grazing farmland, for example the Fens of East Anglia and the Somerset Levels. Areas drained for grazing can still be valuable wetland habitats since the level of drainage is generally less severe than for arable and management inputs such as fertiliser and pesticides are fewer. However, the type of wetland habitat has nevertheless been changed from its natural form. Many wetlands have also disappeared as a result of peat extraction for use in the horticultural industry.

WETLANDS AND FLOODING

Wetlands can regulate floods, sustain flows during dry periods and recharge groundwater. The role of wetlands in relation to water flow can be likened to that of a sponge in that they are able to absorb significant volumes of water. That water is then released slowly, reducing peak flow levels in water courses fed by the wetland. This slow release of water tends to reduce the likelihood of flooding lower down the river catchment. Equally, where there has been no rain the wetland continues to release its stored water, maintaining flow levels in streams and rivers. The wetland 'sponge' drains into groundwater in the same way as it does into surface waters.

The drainage of upland areas to improve grazing quality or for forestry planting has been attributed with increasing the flashiness of some upland river basins. This is because the drains remove water from the land more rapidly, resulting in all the water from a rain storm running off the land in a short period of time. This can be detrimental to the river network in a number of ways. Greater bank erosion occurs when water is flowing quickly and the resulting sediment in the river reduces water quality. River levels rise and fall rapidly, causing stress in the aquatic ecosystem, compared with a steady flow level. The incidence of flooding downstream may increase in rivers where the catchment drains water from rainfall events rapidly, since all the rain from across the catchment arrives downstream at the same time. Hence, proper management of upland wetlands can help reduce the occurrence of flooding at source and without the need for expensive flood defence structures.

WETLANDS AND ARCHAEOLOGY

Wetlands are a significant asset to archaeology because certain materials are preserved for considerably longer within a wetland than if they were open to the air or buried in soil. These materials include wood, leather, cloth and bone. Wetland areas were heavily used in former times, for example for fishing, to supply building materials such as reed thatch and peat for fuel, and in times of strife, for shelter. Hence, they can contain significant relics of previous human habitation. In 1984, a two thousand year old body was discovered in a bog from which peat was being extracted in Lindow Moss, Cheshire. Lindow Man or Pete Marsh, as he is known, was so well preserved that a post mortem examination was possible.

English Heritage has commissioned a considerable amount of research and survey work to establish the extent of the archaeological component of England's major wetlands, with a view to developing a conservation strategy. This work has concluded that over 50% of England's lowland

CONSTRUCTED WETLANDS AND REEDBEDS

peatland has been lost in the last 50 years and along with it an estimated 2,930 monuments destroyed. Relevant information can be found at:

- **Monuments at Risk in England's Wetlands**
(<http://www.ex.ac.uk/marew/>)
- **Humber Wetland Project**
(<http://www.hull.ac.uk/wetlands/hwp.htm>)
- **North West Wetland Survey**
(<http://www.lancs.ac.uk/users/archaeo/pages/services/nwws1.htm>)

It is the view of English Heritage that, even where there is no visible sign, it should be assumed that a wetland area has archaeological value because of the heavy use of this type of landscape in the past. Such sites cannot be preserved in isolation as 'monumental islands' but rather their associated hydrology must also be considered in order that their waterlogged nature is preserved. This type of consideration fits neatly with the approach taken within the Water Framework Directive.

English Heritage's Wetland Strategy

(http://www.english-heritage.org.uk/filestore/archaeology/pdf/wetlands_strategy.pdf).

Constructed wetlands and reedbeds are systems used to treat wastewater. They can be used as a final polish for water which has already undergone treatment or may be used as a complete and stand-alone system. They are widely used for industrial wastewaters, acid mine drainage, road run-off and landfill leachate and for domestic sewage for small communities. The terms reedbed and constructed wetland tend to be used interchangeably.

There are a wide range of ways in which constructed wetlands may be designed depending on their location and the strength of the wastewater that is to be treated. Water may travel vertically or horizontally through the medium which may be sand, gravel or soil. Horizontal flow may be over the surface or subsurface. The plants most commonly used are reeds (*Phragmites Australis*) and bulrushes (*Schoenoplectus*). They may be highly engineered or closely emulate a natural wetland. The man-made reedbeds remove sediment and chemicals from wastewater by the same processes by which natural wetlands remove sediment and chemicals from polluted drainage or river water. Read more about reedbeds on the following web pages:

- **Constructed wetlands for farm effluent – a review of literature**
(<http://www.afsni.ac.uk/gru/PDFs/CW%20Report%20Final.pdf>)
- **Constructed treatment wetlands**
(<http://www.epa.gov/owow/wetlands/pdf/ConstructedW.pdf>)
- **Constructed wetlands for wastewater treatment**
(<http://www.fujitaresearch.com/reports/wetlands.html>)
- **Constructed reedbed wetlands**
(<http://www.arches.uga.edu/~pgoforth/index.html>)

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