South Yorkshire Fens Past, Present and Future: Ecology and Economics as Drivers for Re-wilding and Restoration?

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Introduction and Approach

Oliver Rackham suggested "about a quarter of the British Isles is, or has been, some kind of wetland". Chris Smout stated: "There are many thousands of hectares of what is now prime arable land, especially in northern England, that were in the 17th century, fen and mire" and "it is surprising how...Yorkshire...fenlands have evaporated from general memory". Here we consider this further and reconstruct the historic wetlands. This generates new observations and conclusions about the wetlands and the scale of anthropogenic change.

By the early 1900s one of England’s biggest fenlands, over 100,000 hectares in South Yorkshire and counties adjacent was virtually gone. It suffered long-term impacts of drainage by the Dutch engineers followed by intensive farming. Potential increased revenue was the incentive, especially the Crown, was a driver, along with the suppression of political unrest. In 1600 AD Parliament passed ‘An Act for the recovery and inning of drowned and surrounded grounds and the draining of watery marshes, fens, bogs, moors and other grounds of like nature’. The idea developed with James I, was implemented by Charles I. The impact on Hatfield Chase is discussed by Van de Noort and by Dinnin. Before drainage 36,420 hectares of the Humberhead Levels was ‘…… A continual lake and a ronderezvous of ye waters of ye rivers ….’ (De La Pryme).

Our research involved the mapping and ‘virtual’ re-construction of the former wetlands across the study region. Fieldwork and archival research generated GIS computer maps of the wetlands from pre-Roman to the present day. A range of sources was accessed to suggest the variety and abundance of likely fauna of these wetlands. Whilst still in its infancy this is still revealing. Area-based case studies identified the key political and economic drivers for change, and the consequences and impacts are discussed. Mapping began with reference to key maps by earlier researchers.

In 1933 Wilcox produced two maps indicating the prehistoric marsh, moss, and fen; one based on geological, topography and climate, the other on early literature. Produced nationally they considered only the major lowland floodplains as historically wetland sites; but the approach was similar to ours.
Map 1. The Prehistoric wetlands of the region from Wilcox⁵
Darby and Maxwell⁶ made a major contribution to this research field for the Domesday Geography series. They mapped the region with wetlands and related features such as peat and alluvium, fisheries, and mills. This starts to create an image of the once extensive wetland.

Map 2. The extent of wetlands from Darby and Maxwell⁶
The research outcomes will inform proposals to reconstruct the wetlands in the post-industrial and post-agricultural landscapes. With interest in farm diversification to wetter conditions, tourism and recreation may become providers of local employment. Such changes are justified by a matrix of drivers and factors. Critical issues include water management (both flood and drought), and a desire by decision-makers and agencies to encourage rural economies through farm extensification. In particular, water-related leisure and tourism offer important opportunities to rejuvenate local economies and encourage a wetter landscape. Compliance with the EU Water Framework Directive is an important driver and parallels moves to halt and reverse regional declines in biodiversity. Along with water management carbon sequestration through wetland creation is important. With UK Government policy on climate change and regional developments such as the new international airport at Finningley this becomes urgent.

The region has been surveyed in incredible detail. Van de Noort and Davies\textsuperscript{7} (1993), and Van de Noort and Ellis\textsuperscript{8} (1997) for example are major reports on archaeological studies across the Levels. Dinnin\textsuperscript{9} has described the drainage of the Humberhead Levels in great detail. Buckland, Whitehouse \textit{et al.} (e.g. Whitehouse \textit{et al.}\textsuperscript{9}, Buckland\textsuperscript{10}) have undertaken major and ground-breaking studies of the palaeo-ecology of the region. Meticulous research and recording by entomologists and others at Doncaster Museum (Howes, Limbert, and Skidmore; for example Skidmore \textit{et al.}\textsuperscript{11}), and a series of articles on the area are published as the \textit{Thorne and Hatfield Moors Papers}. The result is a unique depth of understanding of the ecological resource now and past. Additionally a recent five-year programme of the Countryside Agency called ‘\textit{Value in Wetness}’, promoted and co-funded detailed studies of land use, economics, soil water potential, hydrology, and potential carbon sequestration through re-wetting.

However, so far there has been no attempt to join up the very intensive and focused work in the lowlands, to the wider area, or to re-construct the landscape and ecological history of
the region. In particular relationships between the lowland fens, bogs and heaths, the mid-
ground of Coal Measures rivers and wooded valleys, and the extensive upper catchment of
the south Pennines moors have been neglected. Furthermore, there has been no holistic
attempt to draw information together to interpret the historic landscape ecology. These
omissions make attempts at re-wilding difficult to place in context. Barriers to change,
issues of short-term approaches, and a lack of corporate vision are discussed against this
backcloth.

Methodologies

A starting point for research was early maps and accounts. In order to re-construct the
wetlands across the Humber region, it was then necessary to map evidence from
topographic, geological, and pedological, sources, and from earlier maps. This is similar to
Wilcox\textsuperscript{5} and of Darby and Maxwell\textsuperscript{6}, but applies contemporary tools such as air
photographs, remote sensing and \textit{MapInfo Geographical Information System}
to create layers of landscape history. These were constructed to show key changes in wetlands and
demonstrate possible re-construction potential.

Rivers were from \textit{Ordnance Survey Geological Maps} of Drift (Ordnance Survey 1949-
1969\textsuperscript{18}), and maps of the sixteenth to nineteenth centuries (Saxton, 1577\textsuperscript{12}; Saxton and
Goodman, 1616\textsuperscript{13}; Vermuyden, 1626\textsuperscript{14}; Burdett, 1767\textsuperscript{15}; Jeffrys, 1772\textsuperscript{16}; Colbeck, 1782\textsuperscript{17};
Ordnance Survey First Edition\textsuperscript{29}). Alluvium was taken to imply original wetland over
100,000 hectares (over 1,000 sq. km). Preliminary results were discussed with interested
researchers and where appropriate the findings modified.

Obvious anthropogenic change through construction of watermills, drainage for agriculture,
urban expansion and industrial development, dumping of mine spoil, building of reservoirs,
and transport systems, were incorporated. For a selection of specific areas, detailed case
studies were chosen with contrasting topographies and drivers of change (identified from
the historic review). The re-construction of former wetlands was then attempted, producing
time-sliced maps. The final overview map covered the lowland and upland wet landscapes
as one; the Humber fens united through Coal Measures valleys, with the south Pennine
upland mires. This demonstrates both the extent and the desired connectivity for any
genuine attempts at re-wilding.

Early accounts, itineraries and other sources such as feast menus and game books gave
insight into ecology and use; a glimpse into the historic wilderness.

On-going research supported by the Countryside Agency scoped and assessed the
potential for wetland-based nature- or heritage-tourism and recreation. This was to guide
transition to a wetter landscape through the engagement of farmers and landowners in
policy-driven, but economically-facilitated diversification.

Results

The study generated computer maps of original River Don and Went watercourses before
the Roman Turnbridge Dyke (Buckland\textsuperscript{19}); the first major anthropogenic change to the
rivers. Capturing the Went it diverted part of the Don into the River Aire. The locations of
Thorne Mere and two satellite meres were mapped; other smaller, now forgotten lakes, meres, and carrs were ignored. In the wider landscape, extensive wetlands were suggested
by maps of alluvial deposits and peat and imposed onto maps of watercourses. The rivers
and wetlands were shown in 1600, before the drainage by Vermuyden and colleagues. A summary map is presented in Map 4 showing indicative linkage between lowland peatlands and upland mires. A study of the uplands revealed extensive wetland and massive medieval and later drainage (Rotherham et al.\textsuperscript{20, 21}).

Map 4. A summary map to display the research findings

Through the Dutch Drainage schemes, Thorne Mere was lost and the earlier course of the River Don changed, diverting a number of major watercourses across the region (Taylor\textsuperscript{22}). The main driver for this was agricultural improvement and consequent capital from land sales. There may have been other political motives in terms of subduing unrest and non-conformism. The extensive fens were refuges of independence and those outside the law.

By 1800 the Turnbridge Dyke north of the Dutch River had gone (Jeffrys\textsuperscript{16}, Ordnance Survey First Edition), with Potteric Carr, south of Doncaster in the late eighteenth century (Colbeck\textsuperscript{17}). Nineteenth century drainage removed almost all the wetlands apart from remnants of peat on Thorne and Hatfield Moors. In the wider landscape intensive mostly arable farming further desiccated the already dry lands. With agro-industrial farming relying on groundwater abstraction for irrigation in a climatically dry region, and extensive land drainage to remove surplus water from this flatland, this is not sustainable.

A former wetland lost from memory

Anecdotal evidence from a wide variety of sources suggests abundant wildlife, with hundreds of thousands of birds, and mammals. However, human impact took a major toll. Human predation was massive and peaked in the eighteenth and nineteenth centuries. In the earlier periods, in spite of the huge available resource, the impacts were limited by available technologies for hunting in open, wet landscapes. The advent of Dutch Decoys and effective fowling pieces changed that. Hunting impacts declined through the nineteenth
century, through almost total loss of wild stock and widespread habitat destruction. Improved availability of imported food was also a factor, with commercial wild harvests uneconomical, and subsistence use less worthwhile. However, despite the fall in commercial and sporting hunting, landscape change prevented recovery. Around 98% of the historic wetland was destroyed; the remaining 2% altered beyond recognition.

Cornish described the south-west Doncaster carrs as outliers of the great fen originally extending north to the River Humber, east to the Trent lowlands, and south to Nottinghamshire, including the Isle of Axholme, Thorne Waste, Marshland and Hatfield Chase fen. Eagle Clarke noted Pottrick Carr (1,600 hectares) with vast numbers of duck, bittern, ruff and reeve, black-tailed godwit, marsh harrier, great crested grebe and water rail breeding commonly up until Smeaton’s drainage in the late 1700s. Vermuyden’s drainage of Thorne Moor and Hatfield Chase in the 1600s is the best known. It is well-documented and with anecdotal evidence of a huge wetland resource Taylor suggested the pre-Vermuyden landscape rivalled today’s Coto Doñana in its rich birdlife. Chris Firth stated: “the destruction of the wetland habitats (here) would, by today’s standards, be regarded as an ecological disaster of enormous proportions..... (that) could be argued as equal in proportion to the present day destruction of rainforests". Drainage of the mile-wide Thorne Mere and Hatfield Chase was only part of the wetland destruction across the region. South of the of the Ouse-Trent confluence, 28,000 hectares of Hatfield Chase were constantly inundated before Vermuyden and the undertakers commenced drainage in 1626.

Records and memories of the region’s wildlife give some impression of a long-vanished landscape. Smout noted bitterns sufficiently common for a vernacular name and to feature in local folk-rhymes: ‘When on Potteric Carr the Butter Bumps cry, the women of Bulby say summer is nigh’. In the early 1900s older people around Beverley recalled hearing bitterns. But for over two hundred years the pressure was for taming wilderness and ‘improving’ the land. Cobbett described the reclaimed areas as the richest and most fertile he had seen in all England outside the Cambridgeshire Fens. The ‘improvers’ increased land value at Hatfield Chase from 6d per acre to 10s. However, this value to farmer and landowner doesn’t reflect the full worth to the community living and working in and around the wetlands, before and after so-called ‘improvement’.

A productive landscape

This was a productive landscape for communities living in and around it, and accounts provide insight to its ecology. These wetlands provided fish, reed and rushes (for thatching, flooring and candles), peat fuel, brushwood from the carrs for fuel and light constructional work, and pasture for cattle. Smout noted that wetlands across northern Britain had economic value for people. Contrary to the views of many landowners and politicians at the times of improvement, these were rich and productive landscapes; reflected in evidence of land use and productivity from diverse sources. These were important hunting lands from early times, possibly evidenced by features in Conisbrough Castle park (South Yorkshire) dating from around 600-700 AD and which may be associated with the deer park (Colin Merrony pers. comm.); hunting rights presumably held by an Anglo-Saxon Earl. From shortly after the Norman Conquest 70,000 low-lying and often inundated acres of Hatfield Chase were the private forest of the de Warennes of Conisbrough. In 1347 the Chase reverted to the Crown.

In 1607, the area held around a thousand Deer (Red and Fallow), once as common ‘as sheep upon the hills’, and ‘so unruly that they almost ruined the country’. At the last major
hunt in 1609 the royal party in a hundred boats pursued 500 deer across Thorne Mere (Jones[27]). Hatfield Chase famous for fisheries and swans was disforested (1629) and drained (1600s). John Leland (Henry VIII’s antiquary) described the feast for the enthronement of George Neville, Archbishop of York, in 1466. This may exaggerate, and some of the food would be from the Derwent Washlands (south of York). However, this gives an insight into likely wildlife, domesticated, and semi-domesticated stock in the South Yorkshire and Humber fens:

‘Oxen 104; Wild Bull 6; Muttons 1,000; Veales 304; Porkes 304; Piggs 3,000; Kidds 204; Conyes 4,000; Staggs, Bucks and Roes 504; Pasties of venison cold 103; Pasties of venison hot 1,500; Swans 400; Geese 5,000; Capons 7,000; Mallard and Teal 4,000; Plovers 400; Quails 100 dozen; Fowles called Rayes 200 dozen; Peacocks 400; Cranes 204; Bytternes 200; Chickens 3,000; Pigeons 4,000; Hernshawes (young herons) 400; Ruff 200; Woodcock 400; Curlews 100; Pheasants 200; Partridges 500; and Egritts 1,000.’

Other household accounts confirm cranes, herons, snipe, bittern, quail, larks, dotterel, and bustards for the table (1526), peacocks, cranes, and bitterns (1530), and twelve spoonbills at 1s each, and ten bitterns at 13s and 4d (1528). Many are wetland birds and mammals from forest or chase, confirming these extensive and productive landscapes. Little bittern, night heron, and purple heron probably survived in English wetlands until the 1600s, with breeding cranes and spoonbills extinct in England for around 300 years. Ruff bred at Hatfield Chase until the 1820s; Thomas Pennant in 1766 describing the taking of ruff in nets, their fattening in captivity, and selling for the table for 2s each.

Before modern guns, new techniques in wildfowling were important for people in these wet landscapes. The Dutch Duck Decoy came in the 1600s, presumably with the Dutch engineers, making commercial exploitation effective and efficient. Thousands of wildfowl were captured annually from the South Yorkshire fens, Doncaster Corporation having a duck decoy as an investment or for upkeep of the poor. Construction of the decoy and a special three-quarter mile access embankment, ‘Decoy Bank’, cost £160. The circular decoy pond was 6½ acres of water with six ‘pipes’ to collect the ducks. Let in 1662 for twenty-one years annual rental of £15, this fell in 1707 to only £3 per year; maybe reflecting drainage impacts and wetland contraction. In 1707 the lessee specialised in pochards, a good duck for the table. Settling on the water, they were captured by nets raised with pulleys on poles. The duck pipes were still there in 1778, the last decoy man dying in 1794. By the late 1800s the Great Northern Railway ran straight through the site.

Value in Wetness

This is the regional Integrated Land Management Project, one of twelve across England. Research outcomes from targeted, funded studies are to inform proposals to reconstruct wetland and wetter landscapes post-industrial / post-agricultural scenarios. The idea is diversification of the farming landscape and economy to favour wetter conditions and sustainability. Water-related tourism and recreation are potential economic drivers supporting local employment and business; so local people and business can ‘buy in’ to re-wetting.

The changes are influenced by a matrix of drivers and factors, and an historic perspective allows longer-term appraisal of likely outcomes. Current issues include water management and both flood and drought. Compliance with the EU Water Framework Directive is important alongside reversing regional biodiversity declines and with the desire by decision-
makers to encourage rural economic diversification. Along with water management is the potential of addressing carbon sequestration through wetland creation and wetter landscapes. Regionally with UK Government climate change policy and developments such as the new international airport this has become more urgent.

There is much meticulous research. Most recent is the five-year ‘Value in Wetness’ programme, promoting detailed studies of land-use, economics, soil water potential, hydrology, and potential carbon sequestration through re-wetting. This draws together earlier studies and provides an integrated vision for land-use change. Surprisingly English Nature’s plans for major wetland conservation assets (Thorne and Hatfield Moors) have no tourism input; even more remarkable as they visitor facilities. There is a serious lack of communication, common language, or purpose, between conservation managers and those in tourism or regional economic development. Similarly problems occur around the major coastal managed-retreat areas of the Humber Estuary including 400ha at Alkeborough. With opportunities to embed major re-wilding in the local economy through local provenance foods and through tourism at a wildlife spectacular there seems little prospect of this happening. Joined-up thinking is absent, and unsustainable, over-intensive farming will prevail.

Despite all these efforts it remains surprising that there is no bigger restoration vision to join-up the intensive, focused lowland studies to wider areas, or to re-construct regional landscape and ecological histories. Disappointingly from all these efforts there is no effective, integrated approach applied regionally to address critical issues. There is localised habitat creation but vision genuine, larger-scale re-wilding to reflect the lost landscapes.

Conclusions

With integrated approaches and an emerging awareness of historic drivers, the barriers to change and effective responses to two thousand years of human disruption can be assessed. The research approach is valid and informative, demonstrating the former ecological richness of the region. However, issues arising from short-term policy approaches and lack of corporate vision are highlighted. The study draws on and acknowledges the work of others; confirming the scale of regional wetland loss. It presents evidence for the former wetlands and wet landscapes across the study area. It demonstrates wetland continuity throughout the catchment; spatially with lowlands linking through river valleys to upland blanket mires, and temporally at individual sites. Drivers for change are noted and briefly discussed. For anthropogenic wetland loss, has been partially redressed in the middle and upper catchment, through remnant millponds, later reservoirs, and recent wetland nature reserves. There are subsidence flashes, flood management washlands, and purpose-built sites. Large wetlands are being developed across parts of the study area with RSPB Dearne Valley and YWT Potteric Carr Nature Reserve. But all these areas represent tiny fractions of the once-extensive and varied wetland. There is no evidence of a wider approach or any vision of the scale of historic loss, and the enormity of the task ahead.

This study included work on potential tourism, farm- and landscape-diversification. The multi-agency-sponsored research on the future of these wet landscapes specifically ignored the Water Framework Directive, and implications of on-going flood alleviation strategies; both having significant policy and economic implications for future management. It seems
strange that in addressing complex economic and political drivers of deeply-embedded problems, some of the main forces are overlooked, undermining positive action.

History suggests that concerns about floods, droughts and water-shortages, are politically short-lived. Similarly, UK rural policies following Foot-and-Mouth disease seem very short-term. Crises punctuate the socio-economic and political landscapes, shaping environmental resources and resulting in flurries of funded, directed research and policies. These gather significant information and promote modest achievement on the ground. However, with ‘Value in Wetness’ it is likely that the major projects would have happened anyway, and are isolated beacons in unchanged landscapes of decline. There is little sign of landscape-scale change necessary to avert further, serious, long-term declines in the resource. Furthermore, there is no indication from politicians or leading bodies such as Development Agencies that they understand or wish to address the challenges. It is generally ‘business as usual’, short-term economic focus, and jobs. There is passing reference to ‘sustainable development’ and ‘quality of life’; the latter acceptable if they don’t affect the former!

This does not give cause for optimism with global climate change and atmospheric carbon dioxide identified as a major causal agent. Massive wetland and wet landscape drainage must be a factor as a major contributor to past carbon release with a legacy of hugely modified hydrology today. Hogan and Maltby\(^29\) considered the potential for carbon sequestration in the Humberhead wetlands, noting carbon sequestration as effective in a range of measures to decrease atmospheric carbon dioxide. They suggested strategic wetland conservation and management can be effective, approaches delivering social, economic, and environmental benefits. For strategic planning, they advocated that the freshwater restoration across key parts of the area could make the biggest contribution to carbon sequestration; coastal inundation being relatively ineffective. They highlighted the need for a broad, strategic response to carbon issues, especially in relation to air travel increases etc.; particularly pertinent for this region. During the study, the new **Robin Hood International Airport** opened at Finningley, yet so far there has been no attempt to mitigate or moderate adverse environmental impacts by positive action at any level, political, or strategic. There are Environment Agency Integrated Catchment Management Plans, and Catchment Abstraction Management Plans, but these are not multi-disciplinary, ignore initiatives such as **Value in Wetness**, and are not whole-catchment strategies. Upland zones above supply / balancing reservoirs and landscape history are omitted from models.

A more holistic approach should be informed by knowledge of landscape-scale change over the last two millennia (Rotherham\(^30\)). This broader vision is necessary to effectively addressed future challenges, failure to do so meaning continued under-achievement. There will be rhetoric but little action on environmental remediation at the scale required. Clearly much contemporary, intensive farming in the lowland region is environmentally unsustainable. To resolve deep-seated issues of centuries drainage and ‘improvements’, requires farmers to ‘buy in’ to new approaches. Without their co-operation progress will be slow. Future visions need to incorporate bold, large-scale reversion to wetlands, and wider landscape conversion to wetter farmland. Farming diversification and tourism combined can provide economic drivers, but if tourists and recreational visitors are to become economic consumers in these newly wetter landscapes, there needs to be strategic vision with effective funding. Above all, it needs to actually happen rather than just being talked about.

Finally, there remain critical questions of scale and potential of remediation. Does the region offer potential for re-wilding and how might this balance nature and culture as drivers
through history? These can be academic issues, removed from the practical achievement of sustainable landscapes, but arguments presented suggest this is not so. Decisions about potential and options need to be made more fully in the light of ecological and cultural histories of this region. Economic drivers through history encouraged water removal and wetland destruction; to remediate the losses the drivers must change.

References


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   **Sheet 77 Huddersfield, Drift, 3rd Series, 1949**
   **Sheet 78 Wakefield, Drift, 3rd Series, 1962**
   **Sheet 79 Goole, Drift, 7th Series, 1967**
   **Sheet 86 Glossop, Drift, 3rd Series, 1951**
   **Sheet 87 Barnsley, Solid With Drift, 3rd Series, 1951**
   **Sheet 88 Doncaster, Drift, 7th Series, 1969**
   **Sheet 99 Chapel-en-le-Frith, Drift, 7th Series, 1967**
   **Sheet 100 Sheffield, Solid And Drift 1956, 6th Series**
   **Sheet 101 East Retford, Solid And Drift, 1967, 7th Series**


