

Floated Water-Meadows in Norfolk: A Misplaced Innovation

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Abstract

While the importance of irrigated meadows in Wessex and the West Country has long been appreciated, their development outside this area has received little attention. This article shows that water-meadows were almost unknown in eastern England before the late eighteenth century. A number of extensive systems were then established, mainly by men associated with improving aristocratic landlords like Thomas William Coke. Most of these systems were, however, abandoned at a relatively early date. The reasons why the technique of floating was adopted in this late and limited way outside its western heartland are discussed, together with some of the implications this has for our understanding of the spread of innovations during the period of the 'Agricultural Revolution'.

THE importance of artificially irrigated or 'floated' meadows in the history of English agriculture was first emphasized in the 1960s by Eric Kerridge, who devoted an entire chapter to them in his book *The Agricultural Revolution*.² He went so far as to assert that much of the success of his 'Agricultural Revolution' of the seventeenth century depended on the widespread adoption of the technique. He quoted examples from the West Country, the chalklands of Wessex, and Herefordshire. Later studies by, among others, Bettey and Bowie have thrown further light on the development of floating in these areas.³

In Wessex, the irrigation of meadows on a large scale began in the early seven-

teenth century. Most of the principal river valleys in Wiltshire, Hampshire and Dorset contained extensive areas of water-meadows by the end of the century, and although further additions to these systems were made in the eighteenth century, the main phase of construction was over by 1750.⁴ The artificial inundation of riverside meadows during the winter with continually flowing water raised the ground temperature, and stimulated an early growth of grass, so that an 'early bite' could be provided for sheep. After the flock had been moved on to summer pastures, the meadows would again be irrigated and substantial crops of hay taken in June or July. The increase in feed produced by the technique ensured that larger flocks could be kept and, as a result, more manure was available for the arable land. In Wessex and the West Country floated meadows thus fulfilled, in the seventeenth century, the same role as turnips in East Anglia in the early eighteenth century: that is, they increased the number of stock which could be maintained, and thus the quantity of manure produced within an arable farming system.

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² E. Kerridge, *The Agricultural Revolution*, 1967, pp. 251–67; *idem*, 'The floating of the Wiltshire water meadows', *Wiltshire Archaeol. Natural Hist. Mag.*, LV, 1953, pp. 105–18; *idem*, 'The sheepfold in Wiltshire and the floating of the water-meadows', *Eton Hist. Rev.*, Second Series, VI, 1954, pp. 282–89.

³ J. H. Bettey, 'The development of water meadows in Dorset during the seventeenth century', *Ag. Hist. Rev.*, 25, 1977, pp. 37–43; G. G. S. Bowie, 'Watermeadows in Wessex: a re-evaluation for the period 1640–1850', *Ag. Hist. Rev.*, 35, 1987, pp. 151–58.

⁴ G. G. S. Bowie, 'Northern wolds and Wessex downlands: contrasts in sheep husbandry and farming practices, 1770–1850', *Ag. Hist. Rev.*, 38, 1990, pp. 117–26; *idem*, 'Watermeadows in Wessex', pp. 154–55.

There were two basic forms of irrigation. The simpler was 'catchwork' floating, in which channels were cut along the contours of the valley's side, the uppermost being fed from a leat taken off the river at a higher level, or from nearby springs.⁵ The water simply flowed down the natural slope of the valley side from one ditch to the next. This system was most suited to steep-sided valleys, and was, therefore, most widely used in Somerset and Devon, although many examples could also be found in the Wessex chalklands. More expensive and more difficult to construct were 'bedwork' systems, which were used where valley floors were wide and flat and where, in consequence, water could not otherwise be induced to flow continuously, as the method required. In this system, a leat fed water into channels ('carriers' or 'carriages') which ran along the top of parallel ridges, superficially resembling the 'ridge and furrow' of former arable fields. It flowed smoothly down the sides of these and into drains (located in the 'furrows') which directly or indirectly returned the water to the river. Movement of the water into different parts of such a system would be controlled by an often very complex system of sluices (or 'hatches') and carriers.

The seventeenth-century meadows were constructed quietly, almost as a matter of course, and generated little in the way of written instructions or other literature, with the exception of Vaughan's treatise of 1610.⁶ Indeed, George Boswell was able to claim, with some justification, that his *Treatise on Watering Meadows* published in 1779 was the first book to contain a full description of the technique. He described his chapter on how to plan a meadow as 'perfectly new in print', and noted that 'It may appear strange that none of the writers on husbandry have given proper attention to the...subject'.⁷

In fact, Boswell's treatise was the first of a number of books, pamphlets and articles on the subject of water-meadows published in the late eighteenth and early nineteenth centuries, a period which — not coincidentally — saw the practice of floating spread for the first time into new areas, outside Wessex and the West. This article briefly discusses the development of water-meadows in one of these areas — the county of Norfolk — and the light that this throws on the more general history of floating outside its original western heartlands.

I

Water-meadows unquestionably came late to Norfolk. In 1804, Young was able to assert that floating was 'Of very late standing in Norfolk: the experiments made are few, but they are interesting enough to promise a speedy extension'.⁸ Young in fact lists only five places where floating had so far been undertaken. Moreover, whereas in Wessex and the West water-meadows were a basic element of the sheep-corn husbandry system, created by large and small landowners alike (in some instances, by groups of yeomen), in Norfolk their social context was very different. Here, the individuals responsible for the construction of irrigated meadows were, almost without exception, members of a limited 'improving' clique; a group which formed a ready market for a small number of professional floaters and propagandists.

Most of the irrigated meadows in Norfolk described by Young in his *General View of the Agriculture of Norfolk* of 1804 were in the south-west of the county, in Breckland, an area of acid sands and gravels dissected by a number of wide river valleys. At Riddlesworth, in the valley of the river Waveney, Sylvanus Bevan had begun floating in 1792; by 1804, there were 46

⁵ Kerridge, 'The sheepfold in Wiltshire'.

⁶ R. Vaughan, *Most Approved and Long Experienced Water Works*, 1610.

⁷ George Boswell, *A Treatise on Watering Meadows*, 1779.

⁸ Arthur Young, *General View of the Agriculture of Norfolk*, 1804, p. 395.

acres (c 19 ha) of floated meadows here, and a further 14 acres (c 6 ha) were under construction.⁹ Bevan was no ordinary landowner. He was a noted improver whose activities in the marginal environment of Breckland are referred to on a number of occasions by Young. He spent £7000 on transforming the landscape in Riddlesworth and the adjacent parishes, presiding over large-scale enclosures, land improvement and tree-planting schemes (he planted over a million trees on his estate). The floated meadows represented a relatively minor part of a massive scheme of ostentatious improvement.

According to Young, Bevan had trouble with his meadows as these were originally laid out: 'And having the favour of a visit from the Rev. Mr. WRIGHT, he employed Mr BROOKS to form new works, by altering the direction of the beds, and reducing them from ten and twelve yards to seven'.¹⁰ This 'Rev Wright' was almost certainly Thomas Wright, rector of Ould in Northamptonshire and author of *An Account of the Advantages of Watering Meadows by Art, as Practised in the County of Gloucestershire*, published in 1792.¹¹ Brooks himself cannot be identified but, as we shall see, was involved in the construction of a number of other meadows in the county.

The second Breckland floater mentioned by Young, Payne Galway, had irrigated 20 acres (c 8 ha) of meadow at West Tofts, some ten miles north-west of Riddlesworth. We do not know when he carried out this work, but it must have been after the publication of Wright's treatise, if we accept Young's statement that it was this which had inspired him to the endeavour. He subsequently 'made application to that gentleman, who procured for him a man (Mr BROOKS) well skilled

in the Gloucestershire method'.¹² Although not so noted an improver as Bevan, Galway was at this time working with other local landowners — notably the Petre family at nearby Buckenham Tofts, and the Nelthorpes in the adjacent parish of Lynford — to transform the local landscape, establishing plantations and radically altering the local road network. Nathan Lucas, the third in Young's list of floaters, succeeded the Nelthorpes at Lynford Hall in 1804;¹³ Young reported in 1804 that he had 'recently' floated 8 acres (c 3 ha) here.¹⁴

The two other irrigators noted in Young's *General View* were based in the north of the county: both were tenants of the Holkham estate who had floated meadows in the valley of the river Stiffkey. At Wighton, John Reeve had created 20 acres (c 8 ha) after taking the lease on the farm here in 1802. At nearby Houghton St Giles, Thomas Purdey of Egmere (whose name is incorrectly rendered 'Purdis' by Young) showed the writer 8 acres (c 3 ha) 'which he had very lately renewed'.¹⁵ Thomas Purdey was no average farmer. He worked — as a tenant of the Holkham estate — over 1000 acres (400 ha), one of the largest agricultural enterprises in the county. Young frequently refers to him as an exemplar of the best that the tenants of this most progressive of estates could achieve, under the benevolent eye of Thomas William Coke: it is not very surprising to learn that Purdey employed, yet again, 'Mr BROOKS, from Gloucestershire' to water his 8 acres (c 3 ha).¹⁶ John Reeve was likewise a noted improver, as well as being Purdey's immediate neighbour.

It is noteworthy that Purdey's meadows are the only ones in the county for which

⁹ *Ibid.*, p 396.

¹⁰ *Ibid.*

¹¹ Thomas Wright, *An Account of the Advantages of Watering Meadows by Art, as Practised in the County of Gloucestershire*, 1792.

¹² Young, *Norfolk*, p 396.

¹³ Norfolk Record Office [hereafter NRO], MC 110/19, 110/20.

¹⁴ Young, *Norfolk*, p 396.

¹⁵ *Ibid.*, pp 24–25, 398–99.

¹⁶ *Ibid.*, p 399.

Young suggests an earlier history of irrigation.

Upon examining the spot where it would be proper to fix the sluice for throwing the water of the river into the main carrier, the foundations of an old sluice were found, in a sound state; and the whole immediately renewed; on further examination, the carriers and drains in the meadow were all traced, opened afresh, and thus an irrigation formed upon very nearly the plan of old works, which had been utterly neglected for at least eighty years; upon further enquiry, it was found that this former irrigation was obscurely known to have existed...¹⁷

In the *Annals of Agriculture* he provides a more detailed explanation of why these earlier works were abandoned: 'The cause is to be imputed to a quarrel between the occupiers of that and the adjacent meadow...resulting in neither of them being prepared to repair the works'.¹⁸ It is impossible now to assess the validity of Young's archaeological or historical reasoning, but if he was correct then Wighton would appear to be a rather exceptional case. Certainly, only one other possible example of an early floated meadow is known from Norfolk. An undated, untitled and somewhat ambiguous early seventeenth-century map from the Le Strange archives shows what may or may not be an area of catchwork floating in Sedgeford in the west of the county.¹⁹ No other evidence for floating here has been traced and if a meadow was created it must have disappeared at an early date. One or two early attempts at floating may, therefore, have been made in Norfolk during the seventeenth and early eighteenth centuries, but they were rare and apparently short-lived experiments, and even in 1804 there were very few operating meadows in the county.

Young, however, notes in the *General View* two further places where farmers or landowners were actively contemplating floating in 1804, and it is noteworthy that

these follow the established pattern, of links either with Coke and Holkham, or with the ubiquitous Brooks. At Billingford 'Mr BLOMEFIELD, on the recommendation of his landlord Mr COKE, has irrigation in contemplation'.²⁰ And, noting the good potential for irrigation at Heacham in the west of the county, Young records that 'Mr STYLEMAN has engaged Mr BROOKS to make a trial'.²¹ There is no firm evidence that the former meadow was ever, in fact, created; but the latter seems to have been established by 1812, when 'ten acres of water meadow grass' were mown here.²² The earthworks of the system, in the form of bedworks covering an area of around 10 acres (4 ha), still survive.

Yet 'Mr Brooks' was not the only water-meadow engineer working the circuit of improving tenants and landlords in Norfolk. It was not he who laid out John Reeve's meadows at Wighton, but one William Smith. Smith later gained fame as 'Strata Smith', the first geologist to enunciate the principles of stratigraphy. Born at Churchill in Oxfordshire, Smith lived much of his early life at Stow-on-the-Wold (a Gloucestershire connection again) where he was assistant to the surveyor Edward Webb. In 1793 he was entrusted with surveying the course of a canal through the Somerset coalfield, and was engaged on canal work here and elsewhere until 1799, living for much of the time at High Littleton (Gloucestershire) and Bath. By 1800 he was working in north-east Norfolk, now involved in sea-defence work.²³ He was sporadically employed on this until 1809, but had already, in 1803, laid out Reeve's meadows at Wighton. To judge from Young's account, which does not specifically name him, he was probably brought in at a relatively late stage to rectify

¹⁷ *Ibid.*

¹⁸ *Annals of Agriculture*, XL1, 1804, p 559.

¹⁹ NRO, Le Strange OA3.

²⁰ Young, *Norfolk*, p 398.

²¹ *Ibid.*, p 401.

²² NRO, Le Strange Supplementary Box 2.

²³ *Dictionary of National Biography*, Oxford, pp 559-61.

problems in a system created by someone else, perhaps Reeve himself.²⁴ Smith was not, however, called in by Reeve. The initiative here was apparently taken by Thomas Coke. As Young reported in the *Annals of Agriculture*, he 'Brought out of Somersetshire a person [Mr Smith] at very high wages, for making an experiment on watering and not having land in his own occupation adapted to it, he made the first works on the farm of a tenant, a Mr Reeve at Wighton'.²⁵

Coke's enthusiasm for irrigation had, by this time, found another expression. In 1803 he began, through the Norfolk Agricultural Society, to offer an annual prize, 'A piece of plate to the value of 5 guineas to such person as shall convert the greatest area of waste or unimproved meadows into water meadows in the most complete manner'.²⁶ To qualify, the applicant had to give notice to Coke 'of the intended irrigation in order that the land may be inspected before and after the improvement'. It comes as no surprise to learn that the prizes mostly went to Holkham tenants, starting — needless to say — with John Reeve in 1803. Indeed, the only exception was in the second year, when the prize was awarded to Sylvanus Bevan for his meadows at Riddlesworth.²⁷

William Smith's arrival in the county, together with the new prize, are evidence of an increasing enthusiasm for floating, and between 1803 and 1806 one of the largest and most successful of the Norfolk systems was laid out on the farm of John Beck, another Holkham tenant, at West Lexham. This was designed by Smith, and is described in some detail in his treatise on floating, published in Norwich in 1806, *Observations on the Utility, Form and Management of Water Meadows* (a book clearly aimed at a Norfolk audience, and

dedicated to Coke himself). Beck did not receive the Norfolk prize for these meadows, presumably because he held his extensive farm (two farms, in fact; some 1100 acres (445 ha)) on a yearly renewable tenancy, and it was the Holkham estate which organized and paid for the work. As a result, no allowances for the cost of this work appear in the Holkham audit books. Instead, an additional £50 per year was added to Beck's rent in 1807 'for improvements by irrigation', a sum increased to £100 in 1808, and maintained at that level (as a separate item in the accounts) until Beck's death in 1822.²⁸ Thomas William Coke thus instigated and paid for the project himself and, in consequence, received the gold medal from the Board of Agriculture on 12 March 1806 for floating the meadows here.²⁹ Their construction is commemorated on the monument erected to Coke's memory in Holkham Park after his death in 1842.

The West Lexham meadows seem to have begun something of a vogue for floating down the valley of the Nar, a chalk stream in the centre-west of the county. A large system of meadows at Castle Acre, just downstream from West Lexham, was constructed shortly after 1808 when Thomas Purdey took over the Holkham farm here: this was the same Thomas Purdey who had earlier irrigated land at Houghton St Giles. The precise chronology of the Castle Acre meadows is slightly unclear, for in this case it was the tenant, rather than the estate itself, who was responsible for the works. Reimbursements made for a range of improvements on this farm are recorded in the Holkham audit books, and these include allowances for bricks in some quantities: their use is unspecified, and we can only speculate that some may have been destined for the weirs and sluices which,

²⁴ Young, *Norfolk*, p. 398.

²⁵ *Annals of Agriculture*, XXXVII, 1802, pp. 510–11.

²⁶ *Annals of Agriculture*, XXXIX, 1803, p. 322.

²⁷ *Annals of Agriculture*, XLII, 1804, p. 538.

²⁸ Holkham Hall archive, audit books, A/Au 71.

²⁹ William Smith, *Observations on the Utility, Form, and Management of Water Meadows*, Norwich, 1806, p. iv.

as we shall see, constituted an important element of the floating system. There is, unfortunately, only one specific reference to the meadows, in 1812, when Purdey was allowed £17 15s 'for lime for use of water meadows'.³⁰ The meadows must, however, have been largely completed by 1810, when Purdey was awarded a silver teapot, basin and cream ewer at the Holkham Sheep Shearing for irrigating 30 acres (12 ha).³¹

R N Bacon, writing in 1844, refers to a further area of water-meadows higher up the river Nar, at Kempstone. These he tells us were created by 'the late General Fitzroy', who was a Holkham tenant here from 1808 until 1838, and a prominent agriculturalist.³² These are mentioned in the Holkham estate survey of 1851, but nothing more is known of them. Bacon unfortunately fails completely to mention the elaborate bedwork system at East Lexham, also in the Nar valley, traces of which survived until at least 1946. This was not on a Holkham farm, but on a separate estate, sandwiched between West Lexham and Kempstone. There are no surviving estate accounts which can provide a date for the system's construction. All that can be said with certainty is that it was in existence by 1841, when its main carrier was shown on the East Lexham tithe award map.³³ It was probably laid out by F W Keppel, who bought the estate in 1806. As we shall see, the system lay close to his mansion, within his park.

Bacon refers to a fifth set of water-meadows constructed along the Nar, close to its source at Mileham. These he describes as two catchworks, 'reclaimed from a bog' in 1816 by one William Beck (probably the son of William Beck of Lexham).³⁴ This land, along the southern

boundary of Grenstein Farm and adjoining a small common, was the subject of some controversy in 1851, when H Keary described in his survey of the Holkham estate farms how

It must have been brought into its present productive state at a great cost to Mr Beck who is fairly entitled to considerate compensation should sanitary reasons compel its abandonment on the grounds that the sluice gate which is occasionally used for draining the water was the cause of the cholera epidemic amongst the cottages of Mileham by flooding the common near the village.³⁵

The outcome of this dispute is unknown, but there is no archaeological trace of the system in the landscape today, and none can be discerned on the 1946 RAF aerial photographs.

Outside the valleys of the Nar and Stiffkey rivers, and Breckland, there are only a few places in the county where floating seems to have been attempted. William Smith mentions three in his *Observations*. He refers to meadows created by Thomas Branthwayt of Taverham Hall (six miles north-west of Norwich), which were presumably situated in the neighbouring Wensum valley; and he notes that at Beechamwell, near Swaffham in the west of the county, 'Mr Motteux's tenants' were 'busily employed in the same pursuit'.³⁶ Whether either scheme ever came to anything is unclear: certainly, neither seems to have left any very obvious archaeological traces. Smith also mentions one Money Hill, who 'will soon become a competitor, upon lands belonging to his brother'.³⁷ Nothing more is known of this, but Hill — who was a prominent Holkham tenant — appears to have created some kind of irrigated meadow on his own farm at Waterden, for which he received the Norfolk prize in 1808.³⁸ In addition to these, Bacon in the 1840s mentions one 'Mr Foster', of Easton, as one of the

³⁰ Holkham Hall archives, audit book, A/Au 26.

³¹ *Norfolk Chronicle*, 30 June 1810.

³² R N Bacon, *The Report on the Agriculture of Norfolk*, 1844, p 91.

³³ NRO, East Lexham tithe award map, no. 440.

³⁴ Bacon, *Norfolk*, pp 290–91.

³⁵ H Keary, *Survey of Holkham*: Holkham Hall archives, E/G 11.

³⁶ Smith, *Observations*, p iii.

³⁷ *Ibid.*

³⁸ *Annals of Agriculture*, XLV 1808, p 96.

county's limited band of irrigators, although once again there is no obvious trace of his efforts in the modern landscape.³⁹ No other floated meadows are referred to in nineteenth-century printed sources, and there are only a few other places where the 1946 RAF aerial photographs may possibly indicate relatively small-scale attempts at floating, most notably at South Raynham, in the valley of a tributary of the Wensum. There is, in addition, a slightly garbled reference in a local newspaper article of 1978 to the flooding of grassland at Denver, on the edge of the Fens in the west of the county. Here a network of small dykes, 'grips' or 'grups', was reportedly used to flood a small area of land 'in late autumn to catch the frosts so that the grass would be under ice. When the spring thaw came this early flush of grass would afford an early bite for milking cows kept on the holding'.⁴⁰ This is presumably a description of a small-scale floating system, but we have discovered no other references to it, nor to any similar systems using dyke water in this way around the Fen edge.

Other floated meadows may once have existed in the county, of course. Catchwork systems, lacking the distinctive 'ridge-and-furrow' earthworks of bedworks, are difficult to detect archaeologically. Moreover, some bedworks have been obliterated by subsequent changes in land use, by re-seeding, by the dumping of material dredged from adjacent water-courses, or by deliberate levelling. Nevertheless, while further research might add a few more sites to the (somewhat meagre) collection shown on Figure 1, there can be little doubt that the practice of floating never really caught on in the county: by the middle of the nineteenth century, according to Bacon, irrigation had been 'but very partially introduced'.⁴¹

Floating not only came later to Norfolk than to Wessex, it was also abandoned earlier. In Wessex, many water-meadows were still being floated in the 1920s and '30s: but in Norfolk the practice seems to have come to an end before the 1914-18 War. This was certainly the case at Castle Acre, according to Mr Devas Everington, who (like his grandfather and father before him) once farmed the land here. The Holkham audit books record allowances for repairs to the meadows as late as 1905, but Mr Everington's father seems to have abandoned floating around 1910, although he continued to worry that the estate might penalize him for failing to keep the works in order, which suggests that the reinstatement of the system was still considered a viable proposition. No other meadows in the county appear to have been floated within living memory, and most were probably abandoned before the end of the nineteenth century, and perhaps at the start of the agricultural depression in the 1870s. Some may have disappeared much earlier. None of the three meadows in Breckland mentioned by Young seems to be referred to by any later source, such as Bacon's *Report on the Agriculture of Norfolk* of 1844. The same book fails to mention the meadows at Waterden and Houghton, as — more significantly — does the detailed account of the relevant farms in H Keary's 1851 survey of the Holkham estate. The meadows at Heacham cannot be traced after 1812, and the possible systems mentioned by Smith in 1806 at Taverham and Beechamwell are never referred to again.

While the chronology of the Norfolk water-meadows may have been different from that of those in Wessex, there is no doubt that their management was broadly the same. They were intended both to supply an early 'bite', and to produce an increased summer hay crop. If Young's descriptions of the meadows at Houghton and Riddlesworth, or Smith's at Lexham, can be believed, the latter amounted to

³⁹ Bacon, *Norfolk*, p 91.

⁴⁰ *Eastern Daily Press*, 5 January 1978.

⁴¹ Bacon, *Norfolk*, p 91.

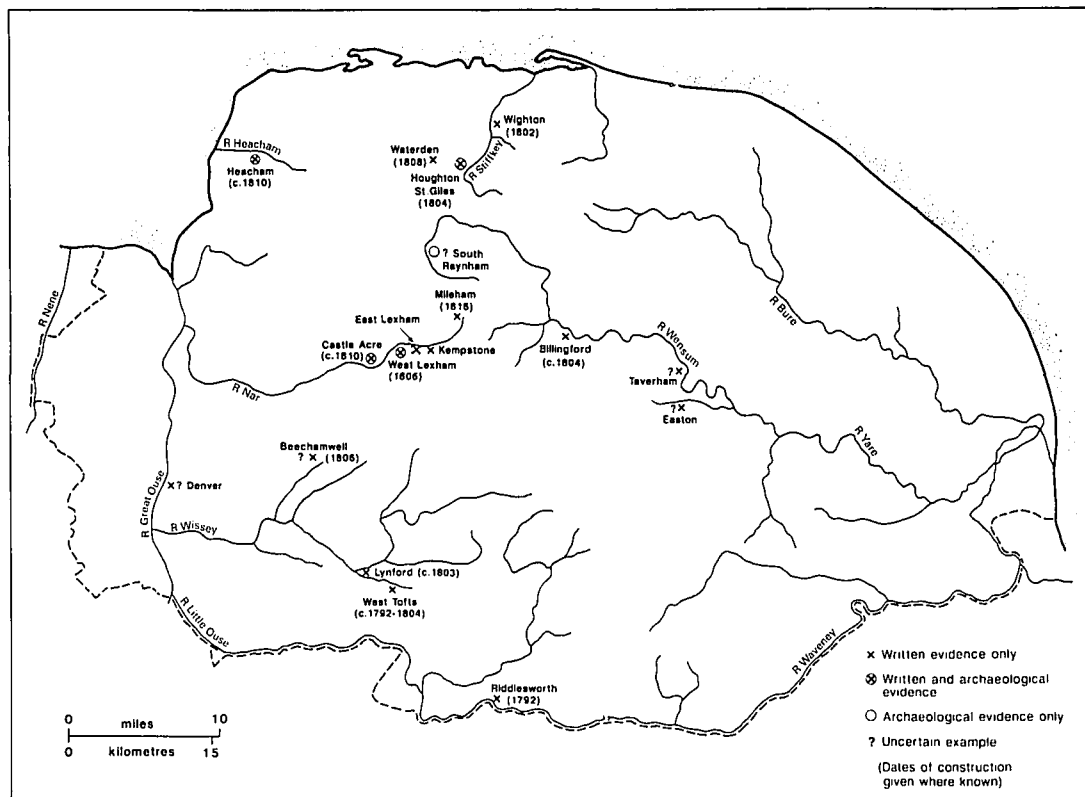


FIGURE I
The distribution of floated water-meadows in Norfolk

around 2 tons per acre — comparable to the yields reported from meadows in Wessex, Oxfordshire, and Nottinghamshire in the same period, which were generally considered to be around double those produced by non-irrigated meadows.⁴² In Norfolk, as in Wessex, floating began in late October and continued until early March. After a short drying-out period, ewes and lambs (or occasionally cattle) were put on to feed until early May. They were then taken off, the grass was watered again and allowed to grow, and a hay crop taken in mid-late June.⁴³

Most of the Norfolk water-meadows were thus created between 1795 and 1815,

when grain prices were particularly high, and farmers and landowners optimistic about future prospects. Floating was a practice essentially alien to the county, introduced by a small band of improvers, themselves influenced by a yet smaller number of propagandists and professional floaters. It was practised on a comparatively limited scale and for a relatively short period of time.

II

Only in the Nar valley do extensive remains of floated meadows still survive in the county. The largest and best-preserved are those created around 1810 for Thomas Purdey at Castle Acre, and it is worth discussing these in some detail. The meadows here received some attention a

⁴² Smith, *Observations*, p 116; Young, *Norfolk*, p 401; J Denison, 'On the Duke of Portland's water meadows at Clipstone Park', *JRASE*, I, 1840, pp 359-70; P Pusey, 'On the theory and practice of water meadows', *JRASE*, X, 1849, pp 462-79.

⁴³ Smith, *Observations*, pp 112-16; Young, *Norfolk*, pp 39;-400.

decade earlier: the Holkham audit books record allowances made in 1799 and 1800 to Abel Ward, a previous tenant, for 'Tiles, Bricks and Lime new Arches for draining meadows'.⁴⁴ Such works, if they still survive, cannot be distinguished archaeologically from those associated with Purdey's irrigation scheme.

Purdey's meadows (Fig 2) cover an area of nearly 30 acres (12 ha). They are similar in most respects to the better-known bedwork systems of Wessex, in that their most conspicuous feature are the blocks of ridges ('beds' or 'panes'), each c 8 m wide and anything up to 80 m in length. However, unlike the Wessex systems, the hatches here are constructed of brick, rather than wood. The main sluices are particularly massive structures, directing the water along different channels through barrel drain-like tunnels (the use of masonry for the construction of hatches and sluices being strongly advocated by Smith⁴⁵). Most of these structures have been badly damaged but their sites can still usually be located, as concentrations of brick rubble. In contrast to the high visibility of the sluices, however, is the very *low* visibility of the carriers, a feature shared by other Norfolk systems. The principal channels are, for the most part, evident enough, but the lesser carriers serving separate blocks of beds are usually invisible on the ground, and this is invariably the case with the individual feeders running along the top of each ridge. Even on the 1946 RAF aerial photographs, the latter can be picked out, if at all, only with the eye of faith. This is in marked contrast to the Wessex examples, where even the minor carriers or feeders are often apparent on the ground, and on aerial photographs. The reason for this difference is not entirely clear. The carriers may originally have been more diminutive features than in the

Wessex meadows. More probably, the difference is due to the nature of the local land, and to patterns of later land use. As noted above, the Norfolk meadows went out of use rather earlier than the Wessex examples. They also, for the most part, occupy ground which is marshy and peaty, and on which, when drainage is poor, tussocky grass rapidly establishes itself, blurring the outlines of minor channels. Moreover, the meadows — at Castle Acre in particular, but also more generally — have mainly been used during the course of this century as grazing for cattle, the treading of which has a notorious effect on the finer details of earthworks. Whatever the explanation, the positions of the minor carriers can often only be inferred from the position of drains and sluices; such inferred carriers are clearly distinguished on Figure 2.

The Castle Acre system was complex and intricate. Water was taken out of the river Nar some 400 m north of the start of the first block of beds; the traces of the sluices here can still be seen in the bed of the river. The water was conducted in an unlined culvert along the side of the flood plain and under the Castle Acre-Newton road to two substantial brick-built sluices (at A on Fig 2). These allowed water to be channelled in three directions: straight ahead (i.e., southwards), along the principal carrier; eastwards, along a ditch close to the field edge, which watered block 1; or westwards, watering blocks 2 and 3. Flowing southwards along the main high-level carrier, the water came next to a complex brick-built sluice (B). From here it could be directed straight on, down a secondary carrier, to provide the water for block number 4; or eastwards across an aqueduct spanning the river to water blocks 5, 6, 7, 8, and — via more aqueducts — blocks 9, 10 and 11. The main high-level carrier, however, ran westwards and then southwards on a prominent raised bank, to hatches which controlled the flow of water

⁴⁴ Holkham Hall archives, audit books, A/Au 60.

⁴⁵ Smith, *Observations*, p 78.

on to blocks 12, 13 and 14. It then crossed the river on an aqueduct, flanked by substantial sluices which allowed water to be diverted eastwards, down into carriers which also, rather surprisingly, received water from their other ends (Fig 2). Crossing over another aqueduct (bridging a main drain), another hatch (C) allowed water to be directed on to a small block of beds, number 16; and also into a long subsidiary carrier which, via a number of small aqueducts, took water to blocks 17, 18, 19, and 20. After this the main carrier begins, somewhat unexpectedly, to run *uphill*, hugging the valley side, to point (a), beyond which it cannot be traced. It is here c 1.75 m higher than at its lowest level, that is, where it crossed the river on the aqueduct. This southern section of the main carrier clearly cannot have been fed from the river and must have utilized water from springs which, due to the substantial changes in the local water table, no longer flow at this high level. It may also have tapped into neighbouring field ditches. Water from these sources was thus used to supplement that coming from the river, and explains why provision was made for certain carriers to receive water from their southern and western, as well as their eastern and northern, ends, via the hatches flanking the main aqueduct. But the water coming from this direction was also apparently used in another way. The area lying immediately downslope from the southern section of the main carrier is occupied by a complex pattern of faint linear indentations (Fig 3). These appear to represent slight, spade-dug channels which run in roughly zig-zag patterns. The slope of the valley side is fairly steep here, so that it was not necessary to construct beds in order to keep the water in motion. Instead, some form of catchwork floating seems to have been practised. Presumably the hatch at D was closed and the water allowed to fill and over-top the edges of the main carrier, so that it flowed down the side of

the gentle hill here, being caught and redistributed by the minor channels.

No other system in the Nar valley is as well preserved as that at Castle Acre, although most seem to have shared its principal features. Thus the West Lexham meadows, designed by William Smith, covered an area of over 50 acres (20 ha). Their western section is now buried beneath undergrowth, and all that can be said with confidence is that here, as at Castle Acre, the beds were around 8 m wide, and that there were large numbers of masonry sluices. The central and eastern sections of the West Lexham meadows are, however, more accessible, although much smoothed and obliterated by the dredging of the adjacent lake and river, and perhaps by re-seeding. The beds here are narrower, no more than 5 m wide in many cases, and much of the area seems to have been operated as a catchwork, taking water not only from the river but — as at Castle Acre — from springs, and from the run-off from field ditches. Here, too, masonry hatches were used, and aqueducts. One of these still functions, taking the water of a substantial carrier — the 'New River' — over that of the 'Old River', in order to bring water into an ornamental lake. This is locally referred to as the 'moat', because it runs around the front of the large, early nineteenth-century farmhouse. In spite of its name, this is not an old feature: it does not appear on a map of the area made in 1771,⁴⁶ nor on William Faden's map of Norfolk, published in 1797 but surveyed around 1794–5.⁴⁷ It was almost certainly created at the same time as the water-meadows: its outfall fed directly into the main carrier serving the central section of the meadows, clearly suggesting that the lake's main purpose was to provide a head of water for the system. In other words, it combined — in Humphry Repton's oft-

⁴⁶ Holkham Hall archives, Map Room, 4/5: map of West Lexham, 1771.

⁴⁷ William Faden, *A Map of the County of Norfolk*, 1797.

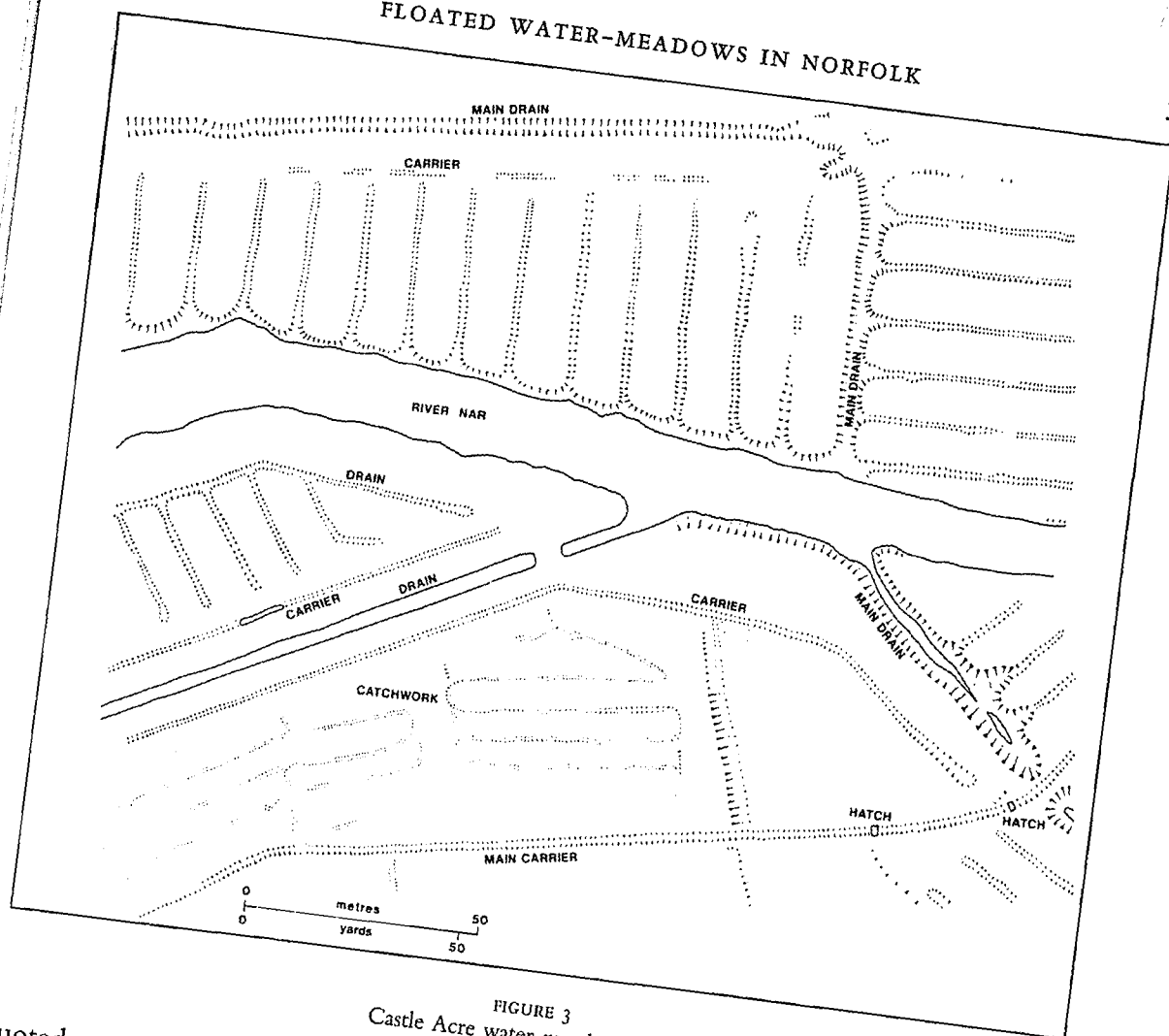


FIGURE 3
Castle Acre water-meadows: detail

quoted words — 'beauty and utility', and in a particularly striking way. The Lexham meadows seem to have been one part of a more general programme of improvements carried out on the farm between 1808 and 1811, which included modernizing the house and rebuilding the farm buildings, at a total cost to the estate of £4000.⁴⁸

Moving eastwards, further up the river Nar, the 1946 aerial photographs show a number of small areas of possible bedwork in East and West Lexham, none of which survives on the ground today. Much more extensive, however, was the system within East Lexham Park. Here, water from a

carrier taken off the river some 750 m upstream fed two large blocks of beds and a catchwork. The beds drained directly into a long thin lake in the centre of the park, the Long Water, thus providing another and — given the parkland setting — even more impressive combination of 'beauty and utility'. East Lexham was a separate estate, not part of the Holkham demesne, and there are no documentary references to this striking arrangement.

The elaborate works at Castle Acre and West Lexham cost, according to Bacon, between £10 and £40 an acre.⁴⁹ In other words, the total cost of the former must

⁴⁸ Holkham Hall archives, audit books, A/Au 71-73.

⁴⁹ Bacon, *Norfolk*, p 290.

have been between £300 and £1200: that of the latter between £500 and £2000. These were large sums, rather more than the figures quoted for contemporary meadows in the west of England,⁵⁰ and comparable to the sums spent on major farm rebuilding schemes. Not all Norfolk bedworks were as expensive as this, however. According to Arthur Young, those at Riddlesworth cost only £5 10s per acre, those at Tofts £4 4s per acre, prices more in line with those current in Wessex. Yet it is noteworthy that Young reported problems with these comparatively cheap systems. At Riddlesworth, as we have seen, Bevan had to call in 'Mr Brooks' to alter the layout and the width of the beds; while at Tofts, Young had 'great doubts of the method followed. I think the beds or panes too flat'.⁵¹ This was because the main carrier was insufficiently elevated above the level of the river — i.e., the leat was too short — and the meadows at Lynford suffered from the same problem. At Wighton, too, the carrier was insufficiently elevated when the meadows were first constructed, at a cost of around £5 per acre. The modifications designed by Smith involved more earth-moving, and 'by filling up holes, taking up turf, and laying it down again, &c., some of the latter part cost him, it is said, about £20 per acre'.⁵² What is interesting is that it was the expensive and elaborate systems which continued to function well into the nineteenth century. The cheaper examples seem to have had a short life. Thus Bacon, writing in the 1840s, describes the meadows in the Nar valley, and those at Wighton, but completely ignores those in the Breckland with which Young found problems. Not too much should be made of this negative evidence, perhaps, but it is suggestive.

The Nar valley systems, together with the meadows at Wighton, seem to have

been at least moderately successful. Bacon describes the Lexham and Acre meadows as presenting a 'healthy and luxuriant appearance' in February 1844, and the Lexham meadows were much praised in an article in the *Journal of the Royal Agricultural Society of England* by P Pusey in 1849.⁵³ A more detailed account is given by H Keary in 1851. At Castle Acre, he describes 'a useful water meadow which grows a great bulk of grass', while at Lexham

Those [meadows] on the east are the best and grow the best description of herbage; nearer to the commons its peaty soil is observed in the meadow lands and they are consequently not so sound or productive. The pastures are however invaluable to the Lexham farm, furnishing an immense quantity of early Spring feed.⁵⁴

At Kempstone, the meadow was also variable, but was deemed 'on the whole a very valuable field supplying early feed for sheep in spring and a heavy crop of excellent hay afterwards'; while at Wighton 'The water meadow is sound and healthy, grows grass of very fair quality and is invaluable in early spring affording keep at a time when it is always most scarce and valuable'.

These large and complex systems may have made a useful contribution to their respective farms, but their real financial viability is not entirely clear-cut. At West Lexham, as we have seen, the creation of the water-meadows increased the annual rent of the farm by £100, not a bad return on an investment of, perhaps, £1500. But the latter was, nevertheless, a very substantial sum, and it is hardly surprising that most, if not all, of these meadows were created during the 'boom years' of the Napoleonic Wars: nor that by the middle decades of the nineteenth century Bacon was able to assert that floating had only been introduced in the county 'at so great

⁵⁰ Bowie, 'Watermeadows in Wessex', p 155.

⁵¹ Young, *Norfolk*, p 396.

⁵² *Ibid.*, pp 398-99.

⁵³ Pusey, 'On the theory and practice of water meadows', pp 462-79.

⁵⁴ Keary, *Survey of Holkham*: Holkham Hall archives, E/G 11, pp 218, 243-44.

an expense as to prevent it being carried out to any considerable extent'.⁵⁵

III

The late and limited adoption of water-meadows was not something confined to Norfolk. Rather, it was a characteristic shared with other counties on the eastern side of England. Young, writing in the *Annals of Agriculture* in 1786, thought that Babraham in Cambridgeshire had 'the only watered meadow of any consequence on this side of the kingdom', and Smith in 1806 believed that until very recent times floating had been unknown in the eastern counties.⁵⁶ The various *General Views* similarly make it clear that floating had made very little headway in the east. In 1813, the Babraham meadows were still the only example of irrigation to be found in Cambridgeshire; there was only a single floated meadow in Lincolnshire; in Buckinghamshire there was 'but one instance of irrigation worthy of record', at Chenies, in 1813; while in Suffolk in 1813 there was 'not a well-watered meadow in the county'.⁵⁷ In Hertfordshire, there were rather more examples, although even here largely restricted to the valley of the river Lea, and that of the Colne around Rickmansworth.⁵⁸ In Kent, however, it was reported that 'the practise has yet very few friends', while in Middlesex, 'irrigation makes no part of the practice of a Middlesex farmer'.⁵⁹ In Huntingdonshire in 1803 the story was the same; 'Irrigation or artificial watering of meadows or other

low lands is in a very backward state'. The writer went on: 'What a pity that some nobleman or gentleman would not cause this improvement to be adopted in a few parishes, and then the example would cause farmers and others to adopt the same plan in similar situations, for their own advantage'.⁶⁰

Where, in the early years of the nineteenth century, floating was adopted on any scale in the east of England, it was indeed — as in Norfolk — usually through the intervention of aristocratic or, at least, fanatical improvers. Thus in Lincolnshire the single example of floating recorded in 1813, at Osbornby, was the work of one Mr Hoyte, 'that very spirited improver'.⁶¹ In Bedfordshire, irrigation 'was introduced into the county by the late Duke of Bedford', and was limited to the parishes around the estate centre at Woburn.⁶² In Leicestershire, floating was restricted to the north-east of the county, and was largely associated with Robert Bakewell and his improving circle.⁶³ As was the case with the more successful Norfolk meadows, these works often involved substantial investment and, perhaps, a touch of flamboyance. Bakewell's meadows were irrigated by an elaborate canal, while the duke of Bedford's were located within his park, and were almost a part of the landscape design, fed from 'the Temple reservoir': a grander version of the kind of thing we have already seen at Lexham.

Aristocratic enthusiasm for encouraging the spread of floating into new areas in this period is clearly reflected in the decision, in 1802, by the Board of Agriculture to offer an irrigation premium to 'The person who shall in a county where irrigation is not generally in practice, water the greatest number of acres in the completest manner'.

⁵⁵ Bacon, *Norfolk*, p 91.

⁵⁶ *Annals of Agriculture*, XVI, 1796, p 177; Smith, *Observations*, pp 1-12.

⁵⁷ Rev A St J Priest, *General View of the Agriculture of Buckinghamshire*, 1813, pp 281-82; A Young, *General View of the Agriculture of Suffolk*, 1813, p 196; A Young, *General View of the Agriculture of Lincolnshire*, 1813, pp 312-14; W Gooch, *General View of the Agriculture of Cambridgeshire*, 1813, pp 258-62.

⁵⁸ Arthur Young, *General View of the Agriculture of Hertfordshire*, 1804, p 179.

⁵⁹ J Boys, *General View of the Agriculture of Kent*, 1813, p 164; J Middleton, *General View of the Agriculture of Middlesex*, 1813, pp 398-99.

⁶⁰ R Parkinson, *General View of the Agriculture of Huntingdon*, 1813.

⁶¹ Young, *Lincolnshire*, p 313.

⁶² T Batchelor, *General View of the Agriculture of Bedfordshire*, 1813, pp 484-93.

⁶³ W Pitt, *General View of the Agriculture of Leicestershire*, 1813, pp 201-12.

To claim the premium the applicant had to provide 'An account of the old and new state of the land, and its value, and of the method, expense and produce, verified by certificate, to be laid before the board by the third Tuesday in January'.⁶⁴ Both gold and silver medals were offered for several years: this was the prize which Coke won in 1808 for the Lexham meadows, and which Beck and Purdey were awarded in 1810 for their work at West Lexham and Castle Acre respectively (which Sir John Sinclair, chairman of the Board, described as 'one of the first of improvements').⁶⁵ The Board's example was followed by the duke of Bedford and (as we have seen) by Thomas Coke: both awarded prizes for floating at their respective sheep shearings.

We hear no more of the Norfolk prize after 1812, presumably because investment in new meadows in the county was coming to an end as agricultural fortunes declined at the end of the Napoleonic Wars. Nevertheless, in other areas of the country interest in the practice of floating continued strong among certain improvers, and it was maintained in the discourse of agricultural improvement until the 1850s. There was, in particular, a rash of papers in the early volumes of the *Journal of the Royal Agricultural Society*. Philip Pusey, the chairman of the journal committee, was a particularly enthusiastic supporter, who described the water-meadow as

The triumph of agricultural art: changing as it does the very seasons...A slight film of water trickling over the surface rouses the sleeping grass, tinges it with living green amidst snows and frosts, and brings forth a luxuriant crop in early spring, just when it is most wanted...⁶⁶

Pusey himself succeeded to the family estates in Berkshire (now Oxfordshire) in 1828, where he installed a system of meadows which enabled him to quadruple his stock of sheep: one 20-acre meadow kept,

he claimed, 400 sheep in feed for five months.⁶⁷ This was close to the traditional heartland of floating: but a number of other systems, in more remote parts of England, are also described in the *Journal*. Thus 300 acres (120 ha) of the duke of Portland's estate between Mansfield and Ollerton in Sherwood Forest were irrigated in the 1820s: 'The contrast between the wild beauties of nature and the finished works of cultivation and art, thus placed side by side, is very striking and remarkable'.⁶⁸ Meadows were also established in upland areas: a system 1000 ft up in the Brendon Hills and another on a Scottish sheep farm are both discussed in the pages of the *Journal* in the 1840s.⁶⁹

Individual improvers might continue to establish floated meadows in all kinds of weird and wonderful places well into the nineteenth century, but the spread of the practice into new areas made little real headway after the Napoleonic Wars. For all the enthusiasm of writers like Pusey, Copland's *Agriculture Ancient and Modern* of 1866 estimated that there were not more than 10,000 acres (c 4000 ha) of water-meadows in Britain: in Wiltshire, Gloucestershire and Devon they had been used 'time out of mind', but 'want of knowledge' had prevented them being more widely adopted.⁷⁰

This last comment was fairly typical. Agricultural writers in the late eighteenth and early nineteenth centuries expressed continual amazement that the practice of floating was not more widespread, blaming ignorance, laziness, lack of enclosure, or the opposition of mill-owners. Yet even their own accounts make it clear that many of the floated meadows established outside the traditional heartlands were not very successful. It was not only in Norfolk, at

⁶⁴ *Annals of Agriculture*, XXXVII, 1802, p 68.

⁶⁵ *Norfolk Chronicle*, 30 June 1810.

⁶⁶ Pusey, 'On the theory and practice of water meadows', pp 462-79.

⁶⁷ J Caird, *English Agriculture 1850-51*, p 112.

⁶⁸ Denison, 'Water meadows at Clipstone', pp 359-70.

⁶⁹ J Road, 'On the converting of mossy hillside to catch meadows', *JRASE*, VI, 1846, pp 518-22.

⁷⁰ S Copland, *Agriculture Ancient and Modern*, 1866, p 762.

Riddlesworth, Wighton, Lynford, and Tofts, that problems are recorded in the *General Views*. In Hertfordshire, for example, 40 or 50 acres at Watton were 'ill-planned and badly executed' and 'in the greatest state of neglect'; while at Bushey, one 'Mr Wayford' had floated a meadow, but 'nothing is done at present'.⁷¹ More significant, however, is the fact that some of the irrigated meadows in this particular county were not used to gain an early bite at all, but simply to produce an increased hay crop in the summer: thus the extensive meadows between Cassiobridge and Watford, and at Uxbridge, were mown twice each year, but only the aftergrass was fed.⁷²

The descriptions of the Babraham meadows in Cambridgeshire, provided by Smith and Young, are particularly interesting in this context. These meadows were created much earlier than any of the examples so far discussed: they were laid out between 1652 and 1654 by Thomas Bennet, the lord of the manor.⁷³ But they do not seem to have been true 'floated' meadows, as that term is normally understood. Indeed, both Smith and Young were perplexed by the system. In Young's view, 'There does not seem to be the least intelligence or knowledge of the husbandry of water. No other art is exerted, but that merely of opening in the bank of the river small cuts for letting the water flow on to the meadows'.⁷⁴ And Smith believed that 'The form of the works seem to prove, that they were not designed by any person from Wiltshire, and that the possessors are totally unacquainted with the management and utility of water meadows'.⁷⁵ Like some of the Hertfordshire meadows, they were not designed to provide early spring feed, but only a summer hay crop, and in conse-

quence irrigation began on Easter Monday 'and never sooner than two weeks before': all, in Young's words, amounting to 'circumstances...not easy to understand'.⁷⁶

IV

Yet the explanation is, in fact, probably quite simple. Irrigated meadows as constructed and managed in Wessex and the west were here (to use a biological analogy) at the very edge of their range. Two factors militated against their successful development in the eastern counties. Topography was one. The gentle gradient of most valleys — especially in Norfolk, Cambridgeshire, and much of Suffolk — not only precluded the institution of cheap catchwork systems but also made the creation of successful bedworks dependent on the construction of long, elaborate leats. Without these, the fall of water would be insufficient for successful floating, and the kinds of problems recorded by Young at Riddlesworth or Wighton would be encountered. As Bowie has pointed out, the sharp gradient of the Wessex valleys was the 'critical factor' in the widespread adoption of the system there and, by implication, elsewhere in the west.⁷⁷ The problem in the east of England was not just the high cost of constructing very long leats. As Smith emphasized, there was also the difficulty of other lands intervening 'between those to be flooded and the place where the water must be taken out of the river': the greater the length of the principal carrier, fairly obviously, the more likely that it would need to cross the land of several proprietors, and also to interfere with the water supply to mills.⁷⁸ Topography may have been important in another way. Wide flat valleys with gentle gradients tended to contain soils which were rather more peaty and acid than those

⁷¹ Young, *Hertfordshire*, p. 178.

⁷² *Ibid.*, p. 179.

⁷³ Adrienne Rosen, 'Babraham' in the *Victoria County History of Cambridgeshire*, vol. VI, p. 25.

⁷⁴ *Annals of Agriculture*, XVI, 1797 p. 177.

⁷⁵ Smith, *Observations*, pp. 116-17.

⁷⁶ *Annals of Agriculture*, XVI, 1797, p. 177.

⁷⁷ Bowie, 'Watermeadows in Wessex', p. 152.

⁷⁸ Smith, *Observations*, p. 120.

found in the valleys of the west, and even when irrigated tended to produce a rather coarse herbage: something which presumably explains the frequent complaints that water-meadows in the east were badly infested with rushes.

However, topography cannot have been the only reason why water-meadows remained rare in the east of England, for moderately steep valleys can be found in parts of the region, especially in Hertfordshire and Lincolnshire. An equally significant factor was probably the climate. Irrigated meadows are known from many parts of Europe, including Poland, Yugoslavia, Portugal, Spain, southern France, Sweden and Denmark.⁷⁹ The reasons for irrigation varied, however, from region to region. In western Europe, in areas with an Atlantic climate and mild winters, the main purpose was to expand the growing period, by raising the ground temperature and thus encouraging an early growth of spring grass. The increased production of hay in the summer which these systems could also bring was a useful, but secondary, benefit. In areas with a more continental climate, in contrast — Poland, Yugoslavia, and Scandinavia — hay production was the main objective. The severity and lateness of frosts here was such that floating was insufficient to stimulate a significant early growth, at least on a regular basis, and it was rarely carried out for this purpose.⁸⁰

Lowland England may, as far as floating is concerned, be considered as Europe in miniature. In the west of the country, mild winters and early springs made the early forcing of grass feasible on a regular basis. In the more continental east, however, sharp and often late frosts, sometimes continuing for long periods of time, made the early 'bite' less dependable. As Pusey noted

in 1849, the practice of floating was less well suited to the drier and colder areas of the country.⁸¹ Even as ardent an advocate as William Smith acknowledged the problems encountered in the second year of floating at Lexham, when 'The water was applied every night, but, from the coldness of the season, produced but little effect'.⁸² The improved hay crop which could be gained from floating *was* dependable in such situations; but in England, unlike some other areas of Europe, most landowners clearly considered the benefits to be derived from this insufficient to warrant the expenses of construction and maintenance. A few such hay-production systems were established in England, but as part of grandiose reclamation schemes in *highland* areas, as on Exmoor by the Knights in the 1840s, or on the Brendon Hills in the 1820s (where it was claimed that floating between March and May doubled the hay crop).⁸³ Such systems were always rare, however, and they were virtually unknown in lowland areas: in part no doubt because here the more muted terrain made their construction particularly difficult and expensive.

This might seem a rather obvious conclusion, but it is nevertheless one with important implications. To begin with, it suggests that, in this matter at least, Young and most other eighteenth- and nineteenth-century writers on agriculture had a less than perfect grasp of the essential practicalities of farming. The failure of the practice of floating to diffuse from western into eastern England was *not* due to the laziness or ignorance of farmers and landowners. Rather, it was the result of sound judgments made on the basis of economic, and ecological, realities. Moreover, the history of floating in Norfolk and elsewhere serves to highlight an important aspect of the

⁷⁹ Urban Emanuelsson and Jens Möller, 'Flooding in Scania: a method to overcome the deficiency of nutrients in agriculture in the nineteenth century', *Ag Hist Rev*, 38, 1990, p 136.

⁸⁰ *Ibid.*

⁸¹ Pusey, 'On the theory and practice of water meadows', p 477.

⁸² Smith, *Observations*, p 115.

⁸³ Road, 'Converting of mossy hillside', pp 518–22.

'Agricultural Revolution' of the late eighteenth and early nineteenth centuries, one which deserves more emphasis. These later water-meadows were, for the most part, somewhat flamboyant schemes of improvement imposed on environments to which, in reality, they were not very well suited. Their creation was, of course, encouraged by the peculiarly favourable economic conditions of the late eighteenth and early nineteenth centuries. But in the final analysis, the meadows were largely the product of fashion, of the hype and salesmanship of men like 'Mr Brooks' and William

Smith. Lastly, and perhaps most importantly, this study raises questions about the way in which quite subtle environmental factors could engender profound regional variations in eighteenth-century farming systems. For it is worth speculating on whether the 'Norfolk four-course system' — providing as it did an alternative source of winter and early spring feed in the form of a root crop — would have developed when it did, and where, if the advantages gained from floating meadows had been as great in the east of the country, as they evidently proved to be in the west.

Notes on Contributors

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