Storms and their impact upon human use of an English coastal wetland:  
The Thames Estuary c.1250-1550

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This study of the marshlands bordering the Thames Estuary in south-east England derives from a research project carried out at the Institute of Historical Research (IHR) in the University of London, and an earlier pilot study based at the UK’s National Maritime Museum in Greenwich. Its deeper roots, however, lie in the series of projects undertaken at the IHR’s Centre for Metropolitan History in the 1990s, exploring the agrarian hinterland of medieval London, and the networks of trade in agrarian and other produce within which that city played a central role. That research identified profound influences which the city exerted on patterns of production and marketing in the decades around 1300 when, with perhaps 80,000 or more people, London constituted one of the greatest cities of northern Europe. In the later fourteenth century that influence changed, with the decline of some agricultural and marketing specialisms and the rise of others, within an overall process of de-intensification. Both before and after the Black Death, however, the corridor of the Thames valley, and its estuary opening towards continental Europe, formed the core of the London hinterland, characterised by the highest levels of price integration and the densest economic interaction. When, more recently I came to consider the intertwined economic and environmental history of the Thames Estuary between the 13th and 16th centuries, it was, therefore, with the belief that this history must be viewed in the broader context of change within a medieval metropolitan region.

The banks of the tidal River Thames and the shores of its broad funnel-shaped estuary are fringed by strips of alluvial soils, of varying width, but rarely extending more than a few kilometres inland (Figure 1 & PowerPoint slide). Before the construction of river and sea-walls, these were regularly overflowed by the highest tides and thus exposed to salt-water – of high salinity in the outer estuary, of low but fluctuating salinity along the tidal river. The salt marsh and reed-bed plants which colonised these soils, and the creeks which bisected the marshes, were exploited by human beings for millennia before the marshes were embanked and cut off from tidal influence, - for grazing, fishing and fowling and the cutting of reeds and rushes for thatch and flooring – while mudflats around the outer estuary were home to a seasonal salt-making industry.

1 The Thames Estuary is here defined broadly to include both the tidal stretch of the river Thames from London Bridge to Gravesend (‘the tidal river’) and ‘the outer estuary’ from Gravesend to the open sea. Recent work on the medieval tidal regime is summarised in Milne (2003).
2 Funded by ESRC from 2008-2010, award no RES-000-22-2693. For a fuller description of these projects and some preliminary findings see Galloway and Potts (2007) and Galloway (2009).
3 Collaborative projects involving (in various combinations) Professors Derek Keene and Bruce Campbell, Dr. Margaret Murphy and myself. A major output was Campbell et al. (1993), and many other project publications are referenced in Galloway (2001).
The process of embanking the Thames marshes seems to have been largely accomplished in the 12th and 13th centuries. Domesday Book, compiled in the late 11th century, gives no indication that any of the marshes had at that time been embanked; the marshes feature as pasture for sheep, and the assumption is that this represents grazing on salt marsh, the rights to which were sometimes shared by inland parishes. Deeds from the 12th century begin to mention walls and ditches in the marshes, however, and by the later thirteenth century detailed manorial extents and accounts show many of the Thames marshes to have been embanked and used for intensive agriculture. The most thoroughly embanked marshes appear to have been those along the tidal river, between London and Gravesend. To the east of this, around the outer estuary, the picture is more mixed. Extensive areas of unembanked salt marsh appear to have remained on Canvey Island in Essex, and in some of the neighbouring districts. Across the estuary, tracts of salt marsh also remained on Sheppey and the Hoo peninsula, but there they co-existed with extensive ‘innings’, while the marshes around the mouth of the River Medway had been in large part embanked and drained. The south-eastern Essex marshes of Foulness, and the other marshes lying between the Crouch and the Thames, were also mostly reclaimed by the 13th century, and put into intensive agricultural production. Londoners were actively involved in the processes of reclamation, both as landlords and as tenants of marshland holdings. Some London citizens used these properties for direct supply of their households with foodstuffs, while others exploited the burgeoning metropolitan market for all types of agrarian produce. In both cases, the ease of water transport enhanced the utility and value of the riverside and estuarine lands.

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4 Professor Stephen Rippon may wish to comment on this. He has discussed the Essex marshes in various places, including his major overview of wetland archaeology and history published in 2000.
The Thames marshes were of only limited inland extent compared to some of the larger English coastal wetlands like Romney Marsh and the Fenlands, and were dwarfed by the extensive wetlands of the Low Countries. This meant that they were comparatively expensive to reclaim per unit of area, as sea and river-frontage might only be protecting a kilometre or two wide strip of marshland. There needed, therefore, to be a significant economic inducement to undertake the costly business of building and maintaining the network of walls and ditches necessary to protect the marshes from the tides and to drain them of fresh water. The valuations of land in extents of the late thirteenth and early fourteenth century indicate how significant those inducements could sometimes be. On average arable land on reclaimed marsh was valued twice as highly as non-marsh or ‘upland’ arable, and in some areas the differential could be greater, with marsh arable valued four or five times higher than arable outside the marsh. The biggest differentials were found along the tidal river Thames, close to the city of London and its vast market for grain. Here some marsh arable achieved net annual values of 24d or 36d per acre, bearing comparison with the most fertile and productive areas of medieval. For comparison, the average arable valuation for the ten counties around London was just over 4d per acre. In addition to the influence of the London market, we must acknowledge that some of the ‘upland’ soils adjacent to the marshes were relatively poor and unproductive, and that the high marshland valuations therefore also reflect a local scarcity of good arable land. In some cases, as at East Ham in 1275, land outside the marsh was described as *terra susana*, ‘worn-out land’, suggestive of over-exploitation.

Further east, around the outer estuary, a larger proportion of the reclaimed lands were used as pasture and meadow, providing improved grazing for both sheep and cattle, and often also for horses, but arable cultivation was also found on these marshes, especially those on Foulness and in the marshes around the mouth of the river Medway. John de Rochford’s manor of Rochford in south-east Essex was entirely marshland in 1309, including 300 acres of arable and an unspecified acreage of pasture. At least some of this manor’s lands were in Foulness.

The sea- and river-walls which protected the reclaimed or ‘inned’ lands were built using locally available materials, principally marsh earth or clay, timber and brushwood or rushes. The earth was heaped up, either free-standing or around a timber framework. The resulting bank was then faced or thatched with faggots made of brushwood or rushes, to give some added resistance to erosion by waves, spray and rainfall. Stone does not appear to have been widely used as a building or facing material for sea-walls in the medieval period, due to the high cost of transport. However, at Greenwich the remains of a probable medieval river-wall had ragstone blocks on the river side, and the wall was infilled with chalk rubble. In addition to the principal sea- or river-walls, marshes were commonly subdivided by counter-walls, which helped to restrict the extent of any flood damage. Medieval Foulness, on the Essex shore of the outer Estuary, was divided up by counter-walls into as many as 13 marshes, each independently protected against the sea.

The primary initiative for defence against flooding in the medieval period lay with local landholders and communities. Local custom or ‘law’ obliged all those enjoying the protection of walls and drainage ditches to contribute to the cost of their maintenance. Commonly a standard ‘per acre’ levy or local tax was raised from marshland holdings, and used for the upkeep of ditches, walls and sluices. These arrangements had presumably been in operation from the time of the first embanking and drainage of particular pieces of marshland and must initially have
worked adequately. From the mid- to later-thirteenth century onwards, however, increasing numbers of problems arose, many of them directly attributable to storm flooding, which brought the Crown into the picture to investigate, arbitrate and enforce cooperation among landholders.

A glance at the first edition Ordnance Survey maps of the early nineteenth century, or at other early detailed maps and plans, reveals traces of historic flooding all around the tidal River Thames and the Estuary (Figure 2 & PP slide). Characteristic horse-shoe shaped ‘set-backs’ reveal where sea or river walls had been breached, and the line of the wall set back around the deep scour hole which had resulted from the movement of water in and out through the narrow gap. These breaches, and the resulting flooding of reclaimed marshland, could have a variety of contributory causes, including poor wall maintenance, or subsidence resulting from the building of a wall over an old salt-marsh creek. However, the immediate cause of most of the documented examples of breaching was exceptional storms, or extreme high tides associated with North Sea storm surges. Some of these breaches could result in the formation of a permanent or semi-permanent lake, others to a new broad channel – often referred to as a gut or gulf – connecting to the river or the coast. There is reason to believe that some docks and basins in the London area may owe their origin to such flood-engendered features. It has recently been suggested that a large pond connected to the Thames in the Deptford Strand area, which is referred to in 1293 and which was probably the result of an earlier breach in the Thames bank, may later have been adapted to form the basin of the Royal Dockyard. ²

Figure 2: ‘Horseshoe’ river wall repairs around historic breaches near Barking and Erith (OS 1st Series map)

² Divers et al. (2004). Some other physical effects of flooding are discussed in Gardiner (2005).
The impact of storm surges and other storm-related marine floods in the Thames area can be reconstructed from a variety of documentary sources, including royal writs and commissions, manorial accounts, and the records of the City of London. Flooding around London is recorded in the 1230s, but the Thames area seems to have escaped the worst effects of the mid-thirteenth-century storms. Another episode of widespread surge-related flooding in the years 1286–88 did, however, have a serious impact along the river and estuary and in adjacent areas of east Kent and the decades around 1300 witnessed a number of serious inundations affecting London’s southern suburbs. Some river frontage appears to have been eroded away, and tidal mills were damaged by extreme tides.

The later 1320s and the mid-1330s saw major surge-related floods around the shores of the estuary, and along the tidal river, causing serious livestock losses, damage to arable land and pasture, and the destruction of fishing structures and mills. At Stepney a sequence of damaging floods began on New Year’s Eve 1323, with ‘a mighty flood, proceeding from the tempestuousness of the sea, which overflowed all the banks’. As the waters ebbed they tore a great breach in the wall, allowing subsequent tides to flow across the land, including much of the reclaimed Walmmarsh, which had been exploited as open-field arable since c.1200. Floods in the winter of 1334 appear to have been particularly severe and many manors around the outer estuary reported sea-wall breaches and livestock losses. The widespread nature of the damage impressed several contemporary and later chroniclers. On the night of St Clement, (23 November), writes the author of the Annales Paulini, a great inundation of the sea occurred throughout England, ‘and most of all in the Thames’; sea-walls were broken, countless animals drowned, and fertile land was ruined by salt. Like many of the major storm floods affecting the Thames Estuary, this November 1334 event can be correlated with a storm surge affecting the Low Countries, from Flanders to North Holland.6 A significant difference, however, is that Thames area floods did not normally cause major loss of human life, as most settlements here were established on adjacent higher ground rather than in the marshlands themselves.

It is clear that major storm events wrought much short-term havoc in the Thames marshlands. In the pre-Black Death period, however, they seem only rarely to have caused irreversible damage or long-term loss of land. It was the radical changes in economy and society wrought by the repeated visitations of plague from 1348-9 onwards that ushered in a new era for the marshes - one which in essence lasted for 200 years - in which long-term flooding and reversion to inter-tidal conditions became common. The 1370s appear to have been particularly calamitous, and may be seen to represent a turning point. Efforts to repair sea and river defences surged after 1350 and reached a peak in the 1370s as reflected in the issuing of royal commissions de wallis et fossatis, the mechanism by which the English crown intervened in riparian and coastal matters (Figure 3 and PP slide). After the late 1370s the number of commissions fell away sharply, with some minor reversals in the first and middle decades of the fifteenth century. These trends reflect, I would argue, thirty years of frantic efforts to deal with deterioration in the marshlands in the face of social and economic dislocation, followed by a sharp decline in activity reflecting a more pragmatic adaptation to economic and environmental change.

It was in the 1370s that agricultural prices, which had remained generally buoyant since 1349, began a long-term downward trend. Concentrated demand for bread grains was collapsing along with London’s population, which by 1377 had fallen to perhaps 40,000. At the same time wages were pushing ever upwards, a trend most pronounced in the London region. Rising costs of labour and falling prices for agricultural produce had serious implications for the economies of the riverine and estuarine marshlands, especially when they were hit by storm flooding and faced with major works to repair walls, ditches and sluices. A locally serious episode of flooding affected the Thames-side marshes in late winter 1373–74, and was closely followed by storm surges in the autumns of 1374 and 1375. Major expenditure was committed to the defence of estuarine marshlands around the mouth of the River Medway, including the exposed manor of Sharpness where we hear in an account of 1374 of ‘the destruction of the marsh after the feast of St. Dionysius [9 October] by the great flood-tide’. This was clearly the same surge which struck Zeeland and South Holland at this date. At Barking, 15km east of London, the surges breached the river walls and flooded extensive areas of marshland belonging to Barking Abbey. Large sums of money were expended by the Abbess over the following years and decades, and numerous grants of aid were made by the Crown. Special commissions with powers to impress labour were established in order to repair the breach and drain the marsh where, it was reported, ‘a lake had formed on land once arable.' Gradually, however, the efforts faded away, the marsh remained subject to the tides, and serious efforts to recover it do not appear to have resumed for nearly a century and a half.

The consequences of this flooding were profound, and sometimes unexpected. The channel of the Thames opposite was said in 1380 to be partially blocked by ‘logs, stones and sand drawn down from the said lake by the ebb, to the peril of ships’. It was also claimed that the overflowing of the marshlands at Barking was causing the tide to rise less than formerly. In 1386...
an enquiry was set up by the Mayor of London to discover why fish stocks had become so depleted ‘that scarcely a seasonable fish could be found’ in the Thames. One major cause identified by the enquiry was the placing of weirs or ‘engines’ in the marsh creeks at the flooded Barking marsh – fish moved on to the marsh at high tide and were trapped when they tried to return to the river at the ebb, even the smallest fry being included in the catch. These weirs were said to have been licensed by the Abbess of Barking and neighbouring landlords, suggesting that they had had to accept that the marsh was not going to be recovered soon, and had sought to make what income they could from the marsh in its tidal, periodically inundated state. Instead of collecting rent from tenant farmers, now the best that could be got was payment from fishermen for their right to fish in and on the marsh. The proximity of the London market created a major demand for fresh fish and no doubt added a further stimulus to these developments in the marshes. Indeed, London’s demand for fresh rather than preserved fish may have been rising in absolute terms after 1349 despite population decline, due to rising living standards and related changes in diet.

We may assume that some of the fishermen were marshland tenants who had had to change their livelihoods, but otherwise we have no knowledge of what happened to the latter in the absence of court rolls or rentals from this period at Barking. Comparison with other Thames marshlands suggests that many of the tenants would have held acres in the marshland as part of a wider property holding, rather than being solely marshland farmers, and so they may not have been totally ruined by the inundation. Moreover, most would probably have lived in the town of Barking or other upland settlements, so few would have been directly made homeless as a result of the flooding of the marsh. The partial loss of livelihood, together with the repeated attempts to coerce labour to work on the riverside defences, must have caused widespread discontent, however, and perhaps it is not surprising to find that people from Barking and neighbouring Thames-side communities were prominent in the early phases of the great uprising of the English peasantry that began in May 1381.

Examples of long-term abandonment of reclaimed marshlands in the Thames area could be multiplied. Along the north Kent shores of the Estuary, and around the mouth of the Medway, major losses took place in the early fifteenth century. Sharpness manor, already badly damaged by the surges of the 1370s, seems to have finally succumbed to the recurrent flooding in the first quarter of the fifteenth century; the final straw may have been the storm surge of November 1421 - the second ‘St Elizabeth Day flood’. Close to London, Wapping marsh was recovered in the 1540s by the Fleming Cornelius Wanderdelf, after being, in the words of an Act of Parliament, ‘longe tyme surrounded and over flowen with water.’ The Isle of Dogs was flooded by a major river-wall breach in the mid-fifteenth century, which led to the abandonment of a small settlement belonging to Pomfret manor and its chapel - a rare example of a wholly marshland settlement within the Thames area. Fishing, fowling and reed-cutting replaced agriculture as sources of landlord income and peasant livelihood there.

That the economic and environmental changes occurring in these marshes were characteristic of a more general process is suggested by legislation from the late fifteenth century. In 1489, parliament presented a petition to the crown, at the request of the citizens of London, concerning the state and custody of the River Thames. It relates how ‘tempests of weather and great abundance of water’ had caused many breaches and had drowned ‘pastures, meadows and
grounds’. In these ‘drowned lands’ and their creeks most of the tidal river’s fish fry (immature fish) were tending to congregate, where they were trapped by ‘unlawful engines and nets’, and used as bait or as pig-food. It was feared that this would cause the ‘utter destruction’ of fish stocks. By this date Londoners’ main concern regarding flooding was thus its impact on fisheries, and the increasing use of fishing weirs both within and alongside the Thames – a threat to navigation as well as to fish stocks. Salt marsh creeks are recognised today as important fish nurseries, so the impact on fish stocks of these activities may have been real enough. The paradox is that an increase in the extent of brackish-water habitats in the later middle ages seems to have been associated with a diminution of fish-stocks.

Piecemeal recovery of parts of the ‘drowned marshes’ was underway by c.1500, at Barking, Stepney, East Ham, Wennington and other locations on the north bank of the Thames. However, on the south bank institutional changes allied to storm surge activity combined to bring about a new phase of flooding on parts of the tidal river, which left some marshes subject to the tides for much of the sixteenth century. The dissolution of the monastic orders in England, and the disposal of their estates, seems in some locations to have seriously interfered with the management of the marshlands. The transfer of church lands into royal and then into lay ownership, often passing through several hands within a decade or two, must have made it hard to sustain the traditional mechanisms for inspecting and carrying out repairs to walls, ditches and sluices, and for raising local taxes to pay for necessary works.

![Figure 4: Detail from 1588 Map, showing breaches in the Thames marshes near Erith, Kent (British Library).](image)

This problem is exemplified in the marshland peninsula which lay between the towns of Woolwich and Erith. Here some 1300 hectares of reclaimed marsh had been used as intensive and highly valued arable and pasture in the fourteenth century, and were retained largely intact throughout the fifteenth century, although the balance of use swung to the pastoral at that time. Royal, lay and ecclesiastical lands lay intermixed in the marshes, the major landlords including Lesnes Priory and St Augustine’s Abbey (Canterbury). The central parts of the marsh, dominated by Lesnes Priory, were seized on behalf of Henry VIII’s minister Cardinal Wolsey in 1525, to fund the foundation of a new college in Oxford. Almost immediately, in 1526, a river-wall breach occurred, which was patched up, only for a worse one to follow in 1529. ‘I have been at
Lesnes,’ wrote Wolsey’s secretary Thomas Cromwell, ‘where I saw one of the most piteous and grievous sights that ever I saw... concerning the breach out of the Thames into the marshes...which be all overflowen and drowned’. This seems to have been the ‘little breach’ shown on a map of 1588 (Figure 4 & PP slide. Note: south is at the top). Further damage resulted from the major storm surge of November 1530, which created or perhaps greatly enlarged an existing breach to the east, shown as the Great Breach in 1588.

Institutional disruption, resultant funding difficulties and further storm floods meant that despite Acts of Parliament and other measures these breaches remained open throughout the 16th century. The Great Breach developed into the lagoon-like feature with tributary creek network shown in the map. In the 1560s it was reported that attempted repairs were being harmed by fishing boats passing to and fro through the breach. These fishermen were said, perhaps significantly, to be from Barking, and from Picardy. Barking was emerging as a major fishing port and the early phases of this rise seem to owe much to the expertise of its fishermen in exploiting flooded marshlands – a process which had begun with the flooding of Barking marsh itself in the 1370s.

Conclusion

During the later middle ages shifting economic parameters – collapsing urban and regional populations, with falling prices and rapidly rising wages - allied to recurring damage from storm flooding, effected significant change in the wetlands bordering the outer estuary and the tidal river Thames. Although many reclaimed marshes continued to be used as agricultural land, defended against the tides, others reverted to inter-tidal conditions and their fisheries and other natural resources came to assume greater importance. Changes in the structure of demand from the London market – including a decline in the bulk grain trade and rising demand for fresh fish as living standards rose - impacted upon the productive but vulnerable Thames marshes more intensely than elsewhere. The 1370s appears to represent a turning point in the history of the Thames marshes, after which the rapid repair of storm damaged sea- and river-defences was less likely to be the automatic response of marshland lords and communities. These conditions substantially persisted through the fifteenth century. This chronology may have resonance for other north-west European coastal wetlands, as the work of Adriaan de Kraker, Tim Soens, Petra van Dam and others suggests. In England the sixteenth century dissolution of the monastic orders added institutional disruption to the mix, and acted to prolong instances of flooding at some Thames-side locations.

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7 ‘Reversing’ the map to place north at the top shows that the ‘Great Breach’ corresponds with the horsehoe repair shown on the right of Figure 2 above
References

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