**Of Time and Timing:**

**Internal Drainage Boards and water level management in the River Hull Valley**

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**Abstract:** This article applies a path-dependency approach to better understand the potentialities and limitations of non-main rivers in England. Using the River Hull Valley of the East Riding as an example, the study explores the underlying historical dynamics at work throughout the greater internal drainage board (IDB) network in terms of infrastructural and institutional lock-in that makes any substantial alteration to the system prohibitively difficult and expensive to realize. Over the centuries, the accreted nature of the decisions made by these local water boards, influenced as much by what had already been done as by the demands of present exigencies, has shaped both the form and practice of the specific lowland landscape that characterizes certain parts of England. Adopting a methodology that combines archival research and oral history with interviews, focus group discussions, and transects of the local landscape in the company of knowledgeable resource persons, the research shows how the infrastructural lock-in of non-main local drainage systems only serves to reinforce the institutional lock-in – and vice versa. The article concludes by returning to the broader question of the successive role IDBs have played in the making of the English Lowlands and suggests that, in a time of increasing climatic uncertainty, they represent more an obstacle to change than an agency of transformation.

**[End of Abstract]**

In a June 1940 report to the Cottingham Internal Drainage Board (IDB) on the “bottlenecking” in one of their principal culverts, the engineer traced the root of the problem to the fact that the culvert had not been “constructed as a whole, but piecemeal over a considerable number of years, and by different parties, so that it is not of uniform section and construction throughout.”[[1]](#endnote-1) This otherwise mundane explanation of the difficulties posed in resolving a routine problem epitomizes the drainage history of the River Hull Valley in the East Riding of Yorkshire, and stands as an exemplar for the problematic development of non-main watercourses in much of lowland England over the centuries.

 No one set out to comprehensively plan the drainage of the River Hull Valley, a series of marshlands that seasonally flooded, and there was no “master” plan for the area, though several were mooted at various times. Rather, over a period of nine hundred years, a network of dikes and drains, of sluices and spillways, of penstocks and pumps expanded piecemeal into the system that exists today. Nor did the authors of this expansion share a common purpose in what they were doing: to some it was about facilitating transport, to most it was about improving drainage, and to still others it was about flood mitigation. Each faction had its own priorities and what served for one was not necessarily in the best interests of the others. The nature of this infrastructure, however, the time in labor and money to dig the drains, raise the dikes, and build the bridges, meant that decisions once made were costly to alter and the range of practical alternatives limited. Moreover, once entrenched, the people and institutions that ran these networks had vested interests in maintaining the existing system and had little stomach for radical change that might affect their own positions negatively. The historical sequence in which contingent events sets in motion institutional patterns or chains of events that have deterministic properties can best be described as path-dependent, and the resultant system is one characterized by “lock-in,” in which the positive feedbacks produced by the prevalent structural or institutional pattern make it extremely difficult to modify or abolish what is already there.[[2]](#endnote-2) The history of drainage in the River Hull Valley and the challenges that it and other lowland regions of England currently face can only fully be understood in these terms.

 The history of the River Hull Valley has been largely sketched out in the last eighty years. It forms part of a wider genre of drainage history, touched upon by landscape historians, that mainly precedes the emergence of environmental history as a sub-discipline.[[3]](#endnote-3) The script for this narrative mainly follows a familiar trope, one that includes a persistent struggle in the face of environmental problems and human mismanagement that is ultimately rewarded by success as formally uncultivated “wastelands” are transformed into highly productive landscapes. [[4]](#endnote-4) What is usually missing from the storyline is any analysis of how the past lives on in the inherited physical and social infrastructure of the present. The options available to today’s decision-makers about tomorrow’s future are largely circumscribed by the decisions taken by local landowners in the past for reasons that may have little to do with current realities. Though this relationship may seem obvious and those largely making current decisions recognize the importance of historical circumstances, the deterministic properties that a chain of events sets in motion are rarely understood.

 The institution that oversaw the drainage of the River Hull Valley, the IDB and its predecessors, was entirely local in both composition and reach. Its history is not well known; indeed, most people in England today have never heard of IDBs.[[5]](#endnote-5) For an institution that has played such a central role in land drainage and flood risk management, IDBs are rarely discussed outside of those who own agricultural lands liable for the drainage rate. Even people who pay the special levy imposed on non-farming households within an IDB district are seldom aware of what they do or even that they contribute to their upkeep. Yet, such local water boards are one of the oldest, quite possibly *the* oldest, form of representative local governance in England.[[6]](#endnote-6) In one form or another, for the last eight or nine centuries, local landowners and farmers have been charged with the organization and maintenance of an expanding network of embankments and channels (known more prosaically in the past as drains and sewers) that drain approximately 10 percent of the total land area of England. Convening first as ad hoc temporary appointees or Commissioners of the Crown, then, after the 1531 Statute of Sewers, sitting as temporarily appointed courts adjudicating drainage areas, and, finally, beginning in the late eighteenth century, operating under various statutes of Parliament as self-constituting independent bodies, local landholders oversaw water level management in areas of special drainage need.[[7]](#endnote-7)

 As with much of local government in England, land drainage remains a patchwork of often ambiguously delimited responsibilities that reflect topography and tradition.[[8]](#endnote-8) The Land Drainage Act 1930, under which most of today’s IDBs were established, involved the repeal of sixteen prior acts, the oldest dating from 1531. The 112 IDBs operating in England today cover 1.2 million hectares of land, run five hundred pumping stations, and maintain 22,000 kilometers of non-main river watercourses. These areas now include not only some of the country’s most fertile Grade-1 agricultural land but also extensive residential areas (including 900,000 homes) as well as oil refineries, power stations, major industrial premises, and critical infrastructure such as motorways and the rail network.[[9]](#endnote-9) Today each IDB operates within a defined area in which it has permissive powers (but not duties) under the Land Drainage Act 1991 and the Flood and Water Management Act 2010 to undertake water level management and flood defense works, other than on main rivers. The extent of the areas which may be brought within the limits of drainage districts and therefore upon which a special levy can be raised was clarified in 1933 by Alban Dobson, a high-ranking civil servant in MAF (Ministry of Agriculture and Fisheries), as “those which will derive benefit or avoid danger as the result of drainage operations.” This so-called Medway Letter effectively defined the area of benefit as the highest-known flood or spring tide level in urban areas and eight feet above the highest non-tidal flood (five feet above the ordinary spring tide) in rural ones.[[10]](#endnote-10)

 Water history is inordinately focused on rivers and national policymakers and, with few exceptions, pays only passing attention to mid- and local-level bureaucracies that are viewed more as implementing agencies.[[11]](#endnote-11) Accordingly, the role that IDBs and their predecessors have played, in contrast to their continental counterparts, has gone largely unacknowledged and unrecorded.[[12]](#endnote-12) Even the father of English landscape history, William Hoskins, has virtually nothing to say of their activities and largely attributes land drainage and reclamation to the good offices of monastic houses, feudal magnates, whole villages, or individual peasants.[[13]](#endnote-13) And yet, over the centuries, the cumulative nature of the decisions made by the local landowners on these boards, influenced as much by what had already been done as by the demands of current exigencies, has shaped both the form and practice of the specific lowland landscape that characterizes certain parts of England today. IDBs remain important players where their role, if anything, has broadened to encompass not only land drainage and agricultural productivity but the water level management of increasingly flood-prone urbanized areas.[[14]](#endnote-14) In the decades to come, too, they may have a significant role to play in ensuring freshwater security through a river catchment or river basin approach that mitigates the effects of both drought and flood.[[15]](#endnote-15)

 Thus, what follows is not simply a history of the River Hull Valley. Instead, through an examination of this one specific lowland area in the East Riding of Yorkshire and the activities of a single IDB that of Beverley and North Holderness, and its predecessors, it explores the underlying dynamics at work throughout the greater IDB network that largely defines the English Lowlands (Figure 1). [[16]](#endnote-16) Indeed, the all-encompassing nature of the systemic lock-in uncovered by recounting this local history is characteristic of water level management over much of the IDB network in England today. The path dependence by which it was fashioned was as much institutional as it was physical and made any substantial alteration to the system difficult and prohibitively expensive to realize – suggesting that, as presently constituted, they represent more of an obstacle to change than an agency of transformation in a time of political and climatic uncertainty.

**<<Figure 1 about here>>**

**Making the River Hull Valley**

The River Hull Valley has been marsh for much of its history, forming the easternmost outlier of the Northern Fen, the third-largest stretch of wetland in England.[[17]](#endnote-17) Its upper half consisted of an extensive freshwater swamp fed by upland streams from which water was often unable to drain away quickly enough. The consequent floodwaters expanded or contracted with the seasons, at their highest in winter when water depths might reach 1.8 meters, and less extensive in summer. The lower third of the valley was saltwater marsh subject to flooding by tidal waters flowing up the River Hull and other watercourses, with here and there a few pockets of higher ground raised above the level of the flood tide.[[18]](#endnote-18) Even today, the landscape appears rather dull to the casual passerby, a seemingly flat expanse of fertile agricultural land stretching from the Wolds in the west to the North Sea in the east. The Holderness Heights, the higher ground closer to the coast, are barely perceptible to the naked eye and rise little more than five meters above sea level at their lowest point. Down the western half of the valley flows the River Hull, by no stretch of the imagination a mighty waterway and now more of a canal with straightened banks running down to its outlet at the Humber estuary, a gradient of only ten meters from its upper reaches near Driffield to its confluence.[[19]](#endnote-19) Yet first impressions are deceptive, and beneath this rather ordinary and unremarkable facade lies one of the most intricate pieces of hydraulic engineering in the country.[[20]](#endnote-20)

 Even more surprising, the River Hull Valley was never planned in its entirety. It developed piecemeal, section by section, as times dictated or circumstances allowed, with local landowners building on to but also bounded by what had gone before. The purpose for which its numerous ditches, drains, cuts, dikes, sluices, sewers, and passageways were constructed varied with the centuries. Attempts to rationalize the system, especially in the second half of the eighteenth century, were either foiled or never fully implemented. The valley, therefore, is like a palimpsest upon which can be read both the aspirations and the frustrations of past endeavors—one in which not only are the former lines still visible but where they continue to shape present possibilities.

 Though evidence of agriculture in the valley dates from the Iron Age and expanded under the Romans, the wetland environment remained largely unaltered until the establishment of extensive landholdings in the wake of the Norman Conquest of 1066.[[21]](#endnote-21) During the twelfth and thirteenth centuries the Cistercian monastery at Meaux undertook the first recorded “improvements” in the River Hull Valley and the marshlands of South Holderness.[[22]](#endnote-22) Whether it did so to improve transportation between scattered landholdings or to facilitate drainage remains uncertain. Many of these watercourses like Eschdike and Monkdike are still integral parts of the drainage system today.[[23]](#endnote-23) Already by the early fourteenth century, a network of banks and drains had begun to change the aspects of the lower valley, opening up new areas to settlement and cultivation. To be sure, the risk of flooding remained high, with extensive flooding reported in 1253 and again in 1265 when water from the Humber reached as far inland as Cottingham.[[24]](#endnote-24) Regular breaches in the ensuing decades made it necessary for the Crown to appoint special commissioners (1311 and 1313) charged with the inspection and repair of banks, dikes and sluices in the region.[[25]](#endnote-25) Some of these efforts succeeded in draining water from the carrs, a type of waterlogged wooded terrain, but the peat swamps of the middle and upper valley remained little affected because of the difficulties and costs inherent in draining them.

 There was little new investment in embanking or draining schemes before 1600 and, in places, maintenance abated after settlements were abandoned. Robert Van de Noort attributes the reduced viability of arable farming in low-lying areas of northern Europe between the thirteen and fifteenth centuries to rising sea levels and the growing vulnerability of fragile coastlands.[[26]](#endnote-26) Similar phenomena are noted in the Thames estuary after 1370, in the Netherlands until 1600, and in late-medieval Flanders.[[27]](#endnote-27) A notable achievement of this second phase of development in the Hull River Valley, however, was the establishment of a standing authority charged with the maintenance and repair of the existing drains and banks. These Courts of Sewers established under the 1531 Act and its amendments formed part of a wider attempt by the Tudor monarchy to create a more unified machinery of administration.[[28]](#endnote-28) As a result, two courts were made for the East Riding: one for the East Part responsible for all the drains and embankments in the lowlands of Holderness and the River Hull Valley, and the other for Hullshire, an area encompassing the southwest of the valley between the city of Hull and the Wolds.[[29]](#endnote-29) The evident neglect of the existing network of drains and embankments and the regularity with which commissioners had to be appointed “for the prevention of further damage” underlay the necessity for such a reform.[[30]](#endnote-30)

 Over time, a system of appointing active juries to make presentments gave way to one of standing juries taking a more managerial role. However, the authority of the commissioners always remained curtailed by their inability to carry out improvement without the specific authority of an act of Parliament.[[31]](#endnote-31) Still, it did encourage a return to reclamation projects and by the mid-seventeenth century, the saltmarshes in the lower valley were reasonably well-drained, though still subject to major inundation from time to time.[[32]](#endnote-32)

 The carr-dominated landscape of the upper valley, on the other hand, remained largely unchanged. Improvements were mainly confined to increasing the rate of discharge down the River Hull and removing the obstacles that impeded its flow. The geographer June Sheppard concluded that, though these measures may have slightly reduced flooding in the northern and western carrs of the valley, “they were insufficient to alter the general character of the land.”[[33]](#endnote-33) In his *A Six Months' Tour through the North of England* published in 1768, the agriculturalist Arthur Young described the deplorable condition in which he found the land in the upper valley, how fields were “over-run with rushes, and other aquatic weeds, and are in many places so wet, as to poach with the tread of cattle, even at this season; what therefore must they do in winter?”[[34]](#endnote-34) He was no less scathing about the attitude of local farmers, adding that, though aware of what needed to be done to improve their land, they “have not the spirit, or at least the money to practice it.”[[35]](#endnote-35) While the costs of improvement were high and the technical problems challenging, the reason for neglect of the upper valley may have been that landowners lower down actually benefited from the carrs remaining waterlogged as they absorbed much of the floodwaters.[[36]](#endnote-36)

 In the event, Young arrived at the beginning of the great age in the making of the River Hull Valley, which stretched from the 1760s to the Drainage Act of 1880. He was hardly alone at the time in recognizing the shortcomings of the existing system. A few years earlier, noted engineers John Grundy and John Smeaton had noted the “great defects” existing in the incremental construction of the drainage system, which had regularly caused the valley to be “drowned, and thereby rendered not only obnoxious to the health and comfort of the adjoining inhabitants, but … useless and unprofitable.”[[37]](#endnote-37) According to Grundy, it was imperative that something was done as “the low grounds and carrs within this Level are in all wet season overflowed with water, and rendered totally useless; and even in moderate seasons are rendered so wet, soft and spungy [sic], as not to admit of proper cultivation, and are in their present, state of very little value to the owners or occupiers thereof.”[[38]](#endnote-38) Commissioned in 1763 and 1764, respectively, to draw up plans for the improvement of drainage in both the southern and northern cars, Grundy and Smeaton were the first to envisage the valley as a single drainage area and to link its component parts together through the construction of connecting channels and a new outlet to the Humber at Marfleet. S.G.E. Lythe attributed the interest in doing so to a combination of factors including increased demand for food, rises in cereal prices, and higher than average rainfall.[[39]](#endnote-39)

 They responded with an ambitious proposal, one that entailed the construction of major drains in the east and the west, raising the east banks of the river, amalgamating and enlarging existing dikes, constructing a sluice with sea-doors above the bridge in Hull, and opening a new outlet to the Humber at Marfleet.[[40]](#endnote-40) Their full proposal, however, was never implemented. Had the scheme “been properly carried into execution,” their successor, the prominent engineer William Jessop, observed twenty years later, “the lowest part of the carrs might have been dry, arable land.” Jessop was of the opinion that Grundy and Smeaton’s vision had been scuttled by its expense, and concluded that it was “hardly practical to put their plan into execution now.” Instead, he proposed a scheme of “less dimensions than those originally proposed,” but one that would be “sufficient” to prevent regular flooding and separate the upland waters from those of the internal drainage. [[41]](#endnote-41)

 If the gradual gradient of the valley largely dictated a north-south orientation to the drainage network, it did not require that all outlets to the Humber should run through the river. Even so, any attempt to reduce the flow of water down this main channel met with opposition from the maritime and commercial interests of the port of Hull, who believed that the full force of the river was necessary to scour the silt out of the Old Dock, an opposition they maintained until new docks were constructed in the course of the nineteenth century.[[42]](#endnote-42) In the event, the Holderness Trustees built only the major drain, which entered the river north of Hull, and the intent of Jessop’s plan, too, was frustrated until the Marfleet outlet was constructed in 1832. [[43]](#endnote-43)

 Although these schemes were not fully implemented, the main features of the drainage system that exists today were laid down at this time. In the east, the Holderness Drain was completed in 1772, its contorted route the product of linking together a hotchpotch of preexisting drains, and without a separate outlet to the Humber. In the west, two new drains were authorized by act of Parliament in 1798, one, the Beverley and Barmston Drainage (Hull End), running parallel to the river draining about 10,500 acres southwards and converging with the river not far from its mouth, and another, the Beverley and Barmston Drainage (Sea End), draining about 2,200 acres to the northeast and eventually entering the North Sea at Barmston (Figure 2).[[44]](#endnote-44) These acts of Parliament also removed large tracts of the valley from the jurisdiction of the Court of Sewers. In all, nine drainage districts were carved out of the court’s original jurisdiction, each governed by their respective acts and managed by separate sets of commissioners or trustees.

**<<Figure 2 about here>>**

 These measures alone did not solve the problem of drainage in the upper River Hull Valley and flooding remained commonplace. The summer floods in 1828 and 1829 caused by incessant rain, for example, caused an estimated £40,000 worth of damages “when nearly the whole of the fine and luxuriant crops of those years were destroyed.”[[45]](#endnote-45) However, the newly constructed drains did bring some improvements, especially to the southern carrs where land had already increased in value by more than five shillings an acre by 1775.[[46]](#endnote-46) A subsequent scheme proposed by Edward Page and enacted in 1832 converted much of the former peat marshes from pastoral to arable usage by diverting water from the eastern side of the valley to a new outfall on the Humber at Marfleet.[[47]](#endnote-47) There were also improvements to drainage on the western side of the River Hull during the nineteenth century though matters were always complicated by the necessity of tunneling under major road and rail links that connected the port of Hull to the country’s main centers of commerce.[[48]](#endnote-48) Also, by the second half of the nineteenth century, pumps began to appear, powered first by steam, then by oil and, finally in the mid-twentieth century by electricity.[[49]](#endnote-49)

 In the conclusion to her pioneering history of drainage in the River Hull Valley, Sheppard attributes the reasons for the region becoming one of the best drained marshlands of England to a combination of three factors: a sizeable enough area to make the returns on large-scale schemes profitable, the long-term presence of competing drainage authorities focused on land improvement, and physical and engineering problems that were challenging but not insurmountable.[[50]](#endnote-50) Over the centuries, then, successive generations of local landowners, through a series of piecemeal and often contingent decisions about land use in the River Hull Valley, created a drainage system whose basic structure once laid down proved increasingly difficult to alter.

**Building path dependence**

 Scholars have identified two types of path-dependence sequences: self-reinforcing and reactive.[[51]](#endnote-51) Self-reinforcing sequences are characterized by the long-term reproduction of a given institutional pattern whose continuation, once adopted, delivers increasing returns or benefits that make it difficult to change or select an alternative option, even if the latter is more efficient. Reactive sequences are chains of temporally and causally connected events in which each subsequent event is directly dependent on and is a reaction to the one before it.[[52]](#endnote-52) There is evidence of both forms of path-dependence in the history of drainage in the River Hull Valley: reactive sequences in terms of the physical infrastructure created over the centuries and self-reinforcing sequences with respect to the institutional patterns of local water level management that have evolved.

 River systems are dynamic, and changes made to one part of it can lead to changes in other parts of it – often in unanticipated ways. Over the centuries, the River Hull Valley has been transformed out of all recognition. The former meandering river channel (the outlines of which are still visible in today’s landscape) was shortened, straightened and heightened so that in both aspect and intent it resembles a canal. As such, it forms the central part of the high-level drainage system into which the main drains discharge or are pumped.[[53]](#endnote-53) It is called a high-level system because watercourses are embanked and raised above ground level to enable them to carry a higher volume of water and graded to allow gravity to facilitate the flow rate. In its current form, this system comprises the River Hull with its headwaters in the Wolds, the Beverley and Barmston Drain that runs parallel to the river along its western bank for most of its length, and the Holderness Drain to the east that since the realization of Edward Page’s scheme drains into the Humber at Marfleet. Other, shorter embanked drains run into one or other of these main channels.[[54]](#endnote-54)

 Its structure makes it evident that the present drainage network is largely the outcome of a series of discrete decisions made by individual landowners or groups of landowners over the centuries rather than any master design, the eighteenth century efforts of Grundy, Smeaton, and Jessop notwithstanding. The oldest channels, those built by the Abbey of Meaux, largely ran in an east-west direction.[[55]](#endnote-55) Although the two main drains constructed in the late eighteenth century followed a north-south orientation, they incorporated older, existing works (particularly Holderness Drain) even if they substantially widened them and raised their banks. Unsurprisingly, given the nature of its development, a patchwork of often conflicting jurisdictions emerged. Prior to 1930, for example, jurisdiction over the River Hull was exercised on its east bank by the trustees of Holderness Drainage, and on its west bank by the Court of Sewers and the proprietors of the Beverley and Barmston Drainage.[[56]](#endnote-56)

 Later improvements, building on the existing network of watercourses, were also carried out piecemeal by groups of landowning trustees who envisaged profits from draining one section or another of the valley. As a dynamic river system, however, changes to the drainage in one part of the valley had consequences for lowland areas elsewhere. If, as the commissioners reported in 1775, the Holderness Drain was a great success “on paper,” it proved less so in practice. Run-off from the clay hummocks of central Holderness still emptied into the River Hull through the same outlet as did the lowland drainage causing a backflow of water up the latter when the river was in flood or the tide high.[[57]](#endnote-57) Subsequently, the originally proposed outlet at Marfleet had to be constructed in 1832 to separate upland and lowland waters.[[58]](#endnote-58) Cost overruns were also notorious. In 1804, William Chapman reported an expenditure of £62,534 on improvements to the commissioners of the Beverley and Barmston Drainage for work originally estimated to cost £34,500.[[59]](#endnote-59) So the network of drains grew, incrementally, the next step largely dependent on the one before and, often, a reaction to the changes in water flow wrought by the works previously undertaken.

 The drainage infrastructure of the River Hull Valley, therefore, exhibits all the elements of path dependence: contingency in its inception (the navigation needs of the Abbey of Meaux); a chain of events in which each step is dependent on prior steps (the absence or non-implementation of a master plan and the unfolding reactive nature of drain construction); and deterministic (the opposition of shipping interests in the port of Hull to alternate outlets to the Humber). However, this path dependence is not only manifest in the physical infrastructure of the River Hull Valley but also in its social and institutional organization.

 Histories of the River Hull Valley have focused on the high-level drainage system referred to as “main rivers” under the 1930 Land Drainage Act that designated Hull as one of forty-seven catchment areas in England and Wales. While this act finally abolished the Court of Sewers, it also effectively created a dual drainage system by passing the responsibility of maintenance and the right to levy taxes for the embanked or high-level drains to more geographically expansive Catchment Boards.[[60]](#endnote-60) The remainder of the drainage network, the mainly smaller, un-embanked low-level drains, remained the concern of localized IDBs.[[61]](#endnote-61)

 The institutional structure of how IDBs function today can be traced back as far as the Marsh Law based on the practice followed in Romney Marsh, one of the earliest reclaimed areas in England, and confirmed by royal charter in 1257. Accordingly, it was the custom for twenty-four jurors, chosen from among the local landowners to maintain the sea defenses and watercourses upon which their lands and prosperity depended. Meeting together as a court, they organized the general work that needed to be done, set the annual marsh rate levied on all landholdings to pay for its upkeep, and imposed fines and damages on those who proved recalcitrant and negligent in their obligations.[[62]](#endnote-62) This was the basis of the practice enforced by the Court of Sewers in the River Hull Valley from its inception, the first extant minute book dating to 1660.[[63]](#endnote-63) William Dugdale, in his 1662 treatise on embankments and drains, made frequent reference to commissioners in the county being appointed “to act therein according to the law and custom of this realm, and the custom of Romney Marsh.”[[64]](#endnote-64) The extent of the Court’s jurisdiction locally, however, is not altogether clear. Even under the system of trustees established under various acts of Parliament in the late eighteenth and nineteenth centuries that replaced the appointed commissioners and created the individual drainage boards, landowners in the nineteenth century were only liable to regular taxation (approximately once every eighteen months) for administrative costs, and commissioners needed to seek approval only to carry out new work in excess of £1,000.[[65]](#endnote-65) Significantly, much the same landowning proprietors, now nominally elected as board members to IDBs, continued to administer affairs in much the same way, serving much the same interests.

 Indeed, the current Beverley and North Holderness IDB, an amalgamation of three smaller IDBs (Holderness, Beverley, and Barmston) retains much of its former institutional character and is often, in practice, administered much as before. Under the Land Drainage Act 1991, all but the smallest IDBs are now managed by boards comprising both elected members representing the local landowners and appointed members (mainly serving councilors) nominated by local authorities. In effect, though, there are often vacancies for appointed members on IDB boards and many councilors are too busy to regularly attend board meetings, leaving landowners in a clear majority.[[66]](#endnote-66) A recent study by the National Audit Office found that across all boards, 63 percent of members are elected, 36 percent are appointed and 1 percent are co-opted (i.e. chosen for some particular skill or experience).[[67]](#endnote-67) The board’s chairman (chairwomen are virtually unknown) is also invariably a farmer and most appointed members will defer to the elected members on all matters pertaining to drainage; local councilors largely see their role as one of monitoring public expenditure.[[68]](#endnote-68) Both in absolute numbers and on a day-to-day basis, local landowners continue to exercise water level management in their areas as the jurors and trustees of the past had done previously.

 The degree to which an institution is dominated over the centuries by a certain type of person suggests a positive feedback mechanism at work whereby a structure, once adopted, delivers compounding benefits to those involved with its continuous adoption (in this case, landowners) and so, over time, becomes increasingly difficult to replace. This has long been the case with IDBs. As Herbert Sheffield, Clerk to the Beverley and Barmston Drainage, commented in his evidence to the Royal Commission in 1927: “If all these old liabilities could be swept away and a uniform system of taxation applicable to the district affected devised, it would be of undoubted advantage, but it would be an almost impossible task and would arouse the very strongest opposition by the owners of those lands that had hitherto escaped taxation, so that it would have to be carried out by compulsory legislation as no voluntary system would ever be agreed to.”[[69]](#endnote-69)

 Nowhere is the evidence for this path dependency more evident than in the unwieldy size of some IDB boards with the three largest having respectively fifty-seven, forty-seven, and forty-five members.[[70]](#endnote-70) To be sure, the large size of these boards partly reflects the rapid reduction in the number of IDBs in recent years through consolidation and amalgamation. In 2006, there were 172 IDBs; as of this writing, there are 112, and that number is expected to fall further.[[71]](#endnote-71) The persistence of such a top-heavy administrative structure also reflects the vested interests of large landowners in the elective structures of IDBs. Nominally, at least, all rate paying farmers within the IDBs’ jurisdiction are electors able to vote for their representative on the board. But the number of votes to which each elector is entitled depends on the assessable value of their landholdings, ranging from one to ten votes (Table 1).

**<<Insert** **Table 1 about here>>**

 In practice, elections are rarely contested, and most board members are long serving, with a tenure frequently measured in decades. Vacancies, when they do arise, are usually filled by invitation. All IDBs must meet statutory operational procedures and have open and transparent elections even if only one candidate is standing. The Noland Rules apply to IDBs whereby all public offices are for a period of three years and an individual can only stand for office three times in a row. However, these rules only apply to a specific office so a vice-chairman can become chairman, and after a period of twelve months can stand for another three, three-year periods. As one IDB member commented, “It’s not very democratic but that’s how it works, and we appoint somebody when there’s a gap.”[[72]](#endnote-72) Nor are such positions remunerated but are entirely voluntary and the position of officeholders is often time-consuming and quite onerous. The pool of electable board members, therefore, is effectively quite small. Altogether, the unwieldy nature of these boards, a voting system that promotes larger landowners, and an elective cycle that entrenches incumbents constitutes a self-reinforcing institutional practice that favors a system of governance that serves the interests of its own members. Sheffield’s comment of nearly a century ago could very well apply today. In the River Hull Valley, in short, the manner in which the network of drains developed over the centuries locked-in not only a particular orientation to the infrastructure but a management system that has consistently served one interest over that of others.

**Lock-in**

 The opposition of sectoral interest groups or the cost of the schemes proposed were only half the reason attempts to rationalize the drainage network in the Hull River Valley were modified, delayed, or never fully implemented. In his report on the Beverley and Barmston Drain, George Leather insightfully identified what he deemed was the underlying cause behind such failures. “Had we to consider the drainage of this district without reference to what has already been done,” he wrote in 1849, “the task would be much less difficult; but after the large expenditure of capital which the proprietors of the low lands and carrs have been called upon from time to time to advance, it becomes necessary to make best use of the present works, and expend as little in further works as the nature of the case will admit!”[[73]](#endnote-73)

 Similar sentiments were expressed by William Evans, surveyor for the Beverley and Barmston drainage for nearly thirty years, in his evidence to the Royal Commission in 1927: “ I do not consider there is any physical or engineering difficulty improving the river in any part of it, but the risk and cost would be so serious that it would be quite beyond the means of this drainage to attempt it, neither have you the power to do so.”[[74]](#endnote-74) Elaborating on this statement, Evans recounted how the commissioners had spent £3,522 in dredging the Hull River between 1863 and 1865 and successfully lowering the water level by ten inches. No sooner was the dredging completed, however, than some mill owners alleged that damage had been done to either their buildings or machinery, forcing the commissioners to pay £2,514 in compensation and lay more than one-thousand tons of stone back into the bed of the river at a further cost of £280. Highlighting how sectoral interests frustrated plans to improve the system, Evans concluded: “It was only a short time before the whole of the advantages derived from the dredging was lost and the £6,317[sic] practically thrown away.”[[75]](#endnote-75) Nor have matters changed much in recent years. Asked to comment on the effectiveness of the present drainage infrastructure, a current IDB Board Member reflected that “It would be phenomenally difficult…for them, in fact, to rearrange the system that is actually set up,” adding that “unless it’s maintained, this thing [i.e. the valley] goes back to swamp.”[[76]](#endnote-76)

 Institutionally, too, the Beverley and North Holderness IDB tends to be innately conservative. Maintaining the existing drainage system (or, as board members frequently say, “keeping the water moving”) is the primary reason for their continuing existence. The IDB is responsible for an area of ninety-two square miles (238 km2) and maintains 163 miles (262 km) of low-level drains on both banks of the River Hull.[[77]](#endnote-77) An estimated 80 percent of this water discharges through mains waterways (the River Hull and the two main drains) whose maintenance is not their responsibility but under the control of a national agency, the Environment Agency (EA), the successor to the more geographically expansive river and catchment authorities, and ultimately responsible to the Department of Environment, Food and Rural Affairs.[[78]](#endnote-78) A significant amount of this water must be pumped from the low-level to the high-level system by pumping stations that are, apart from one exception, not managed by the IDB. This interaction with state institutions has fostered resentment and blame shifting. IDB members reserve their harshest criticisms for any inadequacies in the ways in which mains waterways are now maintained by the EA. “Most of our problems stem from the EA not doing the work properly, in my opinion, and not doing the maintenance that they used to be doing when it was either National Rivers Authority or before that Yorkshire Water but before it was a PLC [i.e. before privatization in 1989].”[[79]](#endnote-79) Yet when a radical solution was suggested to divert some 50 percent of the low-level water directly into the North Sea, as, incidentally, had previously been proposed by Jessop in the 1790s, it was dismissed out of hand. “When somebody thinks outside the box, it was a bit sort of too risqué, and why don’t we go for another solution.” The board member went on to qualify this remark by adding “The thing is I’m not sure if they can be innovative because the system is so difficult. The solution for him was something, which, interesting enough, was something we’ve already done.”[[80]](#endnote-80) Or to put this in terms of the argument being made here: the infrastructural lock-in of the system serves to reinforce the institutional lock-in, and vice versa.

**Conclusion**

A better understanding of the historical dynamics at work in it can shed new light on contemporary drainage issues in the River Hull Valley. It is not simply a question of determining what was done in the past but is more about the process by which it was done. It is the order in which events took place that makes the difference and, in many cases, it is what happened earlier in the process that carried disproportionate even decisive influence.[[81]](#endnote-81) The history of drainage is not only a matter of time – but of timing. Once a course of action was introduced, it proved virtually impossible to reverse. The condition of lock-in manifest in both the infrastructural and institutional nature of contemporary drainage in the River Hull Valley thus has important implications for contemporary water level management and flood risk management issues.

 From its formulation as a model, the assumption has been that path dependence is a negative condition that locks-in inefficient or less optimal methods of operation and ensures that change is difficult or prohibitively expensive to realize. This inference undoubtedly has its roots in the initial and largely continuing application of the model to economic concerns.[[82]](#endnote-82) It may be necessary, however, when it comes to analyzing matters like land drainage that have much wider implications than simply economic ones to reassess this prejudice. For IDBs, path dependence and lock-in are the source of both strengths and weaknesses. For a start, the self-reinforcing institutional nature of IDBs and their forerunners has meant that landowners have had control over their local environments for centuries. It is widely recognized that they are now often the sole repository of such local knowledge that has mainly been lost by centralized agencies like the EA or even by many local authorities, which have shed their engineering departments and now rely on private contractors (including IDBs) to perform much of their maintenance work.[[83]](#endnote-83) One board member expressed this in terms of “not just knowledge of what has happened but also knowledge of where to go.”[[84]](#endnote-84)

 Lock-in, too, by its nature suggests a much longer-term view of drainage and environmental concerns that are expressed more in generational terms. Farmers are concerned about passing their farms onto their children and grandchildren and have a vested interest in decisions that may not mature in their own lifetimes. This long-term view is also expressed in terms of institutional stability with chairmen holding the position for nine years at a stretch, and with children often succeeding their parents as board members or office holders.[[85]](#endnote-85) As a result, there is continuity in leadership and administration that provides stability in decision-making and reinforces more longer-term decisions about drainage matters. Moreover, the broad representational nature of boards and their elective quality ensures that decisions are made for the sake of the agricultural interests of the district rather than for the benefit of individual landowners.[[86]](#endnote-86) In that sense, they are profoundly democratic institutions – at least for landowners. Finally, the size of most IDBs permits most of them to operate largely “under the radar” and allows them a considerable degree of latitude in what they do and how they do it. This is not to say that they operate without scrutiny and due diligence: IDBs are subject to the Local Audit and Accountability Act 2014 and undergo an annual limited assurance whereby auditors provide an opinion on the IDB accounts. They are also governed by the provisions of the Land Drainage Act 1991 and Flood and Water Management Act 2010. But the fact that they have existed for centuries provides a certain “flexibility” to their operations and activities that is perhaps unavailable to other public authorities.

 Lock-in, however, equally has its disadvantages for IDBs. The most obvious has been the focus of this article: the foreclosing of other possibilities both in infrastructural terms, in the difficulty of implementing alternatives to the existing drainage system, and, in institutional terms, in the sense of board members being rarely inclined to think “outside of the box.” Whatever else they may be, they are not agile or flexible, characteristics that might better suit them to an era of climate change. If precipitation rates alter (and they may well do so), the workings of the entire river system might shift and, in the process, render the current drainage network in the River Hull Valley inappropriate or even hazardous. The political climate, too, may also undergo a radical transformation and the primary role of IDBs alter from that of facilitating land drainage to that of retaining sources of freshwater.[[87]](#endnote-87) Already, they are increasingly seen as playing an important role in flood risk management.[[88]](#endnote-88) How adaptable IDBs are to such retooling and whether board members are willing to countenance such radical changes are debatable.

 An inability to countenance rapid change is compounded by recent developments in the IDB sector at large. As has already been noted, the number of IDBs has reduced rapidly through amalgamations and/or consolidations. Some of these consortia are quite large such as the Witham and Humber Drainage Boards, a consortium of four IDBs, or the York Consortium of Drainage Boards consisting of five IDBs including Beverley and North Holderness. Sharing management services, engineering expertise, and equipment, such consortia run the risk of losing the local knowledge and flexibility of operations enjoyed by smaller, still independent boards. Indeed, some IDBs in the East Riding such as the South Holderness IDB, itself an amalgamation of six smaller boards, have resisted any proposed mergers to become larger on these grounds.[[89]](#endnote-89) The day-to-day operation of IDBs is also changing with many boards, including Beverley and North Holderness, having only a single permanent employee, an engineer, and hiring contractors to perform their maintenance functions. In other cases, IDBs have themselves become contractors, hiring out expertise and equipment to other drainage boards, or performing maintenance work on main rivers for the EA. As the size and functions of IDBs change, the structure and inherent conservatism of IDBs may become insuperable impediments to their continuing existence.

 Applying a historical approach thus not only provides insight into how this drainage system was formed and operated in the past, it underscores the vulnerability and resilience of its physical infrastructure and institutional nature today. The fact that the River Hull Valley is a physical and social construction shaped by a particular chain of events that created a drainage network that lacks flexibility and is vulnerable to changes of a radical nature highlights the need to think and work across disciplines. The ditches, drains, and dikes built over centuries matter, but so to do the processes that produced them. Consequently, properly assessing the existing system’s resilience and potential adaptability to changing climatic and political circumstances requires a broader approach than the one provided by the humanities, social sciences, or physical sciences on their own.

1. “JM” to the Chairman and Members of the Cottingham Drainage Board, 14 June 1940. East Riding Archives, Cottingham IDB, DBCO-2-3-3 Drainage Projects 1936-41. [↑](#endnote-ref-1)
2. Path dependency has been used as a conceptual framework by a diverse group of scholars from different disciplinary backgrounds to explain the continuing influence of past decisions on present practices and future options. It has been used, among other ways, to explore impediments to economic development; the restrictive practices of governance structures; the nature of industrial relations; issues related to land usage and forestry policy; and more recently, to better understand the challenges arising from climate change. See, for instance, Patrick O’Brien, “Path Dependency, or Why Britain Became an Industrialized and Urbanized Economy Long Before France,” *Economic History Review* 49 (1996): 213-249; Matteo Del Fabbro, “The Institutional History of Milan Metropolitan Area,” *Territory Politics Governance* 6 (2017): 342-361; Ralf Hoffrogge, “Voluntarism, Corporatism and Path Dependency: The Metalworkers’ Unions Amalgamated Engineering Union and IG Metall and their Place in the History of British and German Industrial Relations,” *German History* 37 (2019): 327–344; Hannes Palang, Theo Spek, and Marie Stenseke, “Digging in the Past: New Conceptual Models in Landscape History and Their Relevance in Periurban Landscapes,” *Landscape and Urban Planning* 100 (2011):344-346; Virginia Iglesias and Cathy Whitlock, “If the Trees Burn, Is the Forest Lost? Past Dynamics in Temperate Forests Help Inform Management Strategies,” *Philosophical Transactions of the Royal Society B* 375, 1794 (2020) https://doi.org/10.1098/rstb.2019.0115; George Adamson, Matthew Hannaford, and Eleonora Rohland, “Rethinking the Present: The Role of a Historical Focus in Climate Change Adaptation Research,” *Global Environmental Change* 48 (2018): 195-205. Surprisingly, water concerns have not figured prominently in these discussions, though lock-in has been applied to both farmers and regulators with respect to irrigation and flood management. See, for instance, Georg Holtz and Claudia Pahl-Wostl, “An Agent-based Model of Groundwater Overexploitation in the Upper Guadiana, Spain,” *Regional Environmental Change* 12 (2011): 95-121; Thanti Octavianti and Katrina Charles, “The Evolution of Jakarta’s Flood Policy over the past 400 Years: The Lock in of Infrastructural Solutions,” *Environment and Planning C: Politics and Space* 37 (2019): 1102-1125l; and Elizabeth Kirk, Alison Reeves, and Kirsty Blackstock, “Path Dependency and the Implementation of Environmental Regulation,” *Environment and Planning C: Government and Policy* 25 (2007): 250-268. [↑](#endnote-ref-2)
3. Urban and industrial drainage, however, has received much recent attention. See, for example Carry Van Lieshout, “London's Changing Waterscapes: The Management of Water in 18th Century London,” PhD thesis, Kings College London (University of London), 2013; Georgina H. Endfield and Carry Van Lieshout, “Water and Vertical Territory: the Volatile and Hidden Historical Geographies of Derbyshire's Lead Mining Soughs, 1650s–1830s,” *Geopolitics* 25 (2020): 65-87. [↑](#endnote-ref-3)
4. Henry Darby, *The Medieval Fenland* (Cambridge: University of Cambridge Press 1940); Henry Darby, *The Drains of the Fens* (Cambridge: Cambridge University Press, 1956), Joan Thirsk, *English Peasant Farming: The Agrarian History of Lincolnshire from Tudor to Recent Times* (London: Routledge and Kegan Paul, 1957); Michael Williams, *The Draining of the Somerset Levels* (Cambridge: Cambridge University Press 1970); Dorothy Summers, *The Great Level: A History of Drainage and Land Reclamation in the Fens* (London and Vancouver: David and Charles, 1976); Jeremy Purseglove, *Taming the Flood: A History and Natural History of Rivers and Wetlands* (Oxford: Oxford University Press, 1988); A. D. M. Phillips, *The Underdraining of Farmland in England during the Nineteenth Century* (Cambridge: Cambridge University Press 1989); Hadrian Cook and Tom Williamson (EDS), *Water Management in the English Landscape: Field, Marsh and Meadow* (Edinburgh: Edinburgh University Press 1999). [↑](#endnote-ref-4)
5. IDBs are now effectively restricted to England. Wales used to have twelve inland drainage districts, but these were abolished on April 1, 2015 and their functions transferred to Natural Resources Wales. Scotland has a single drainage commission, the Pow of Inchaffray established in 1696, an artificial channel that drains some 8.3 km² of low-lying, fertile agricultural land in Strathearn. In Northern Ireland, the Drainage Council established in 1947 is responsible for over 6,800 kilometres of watercourses. [↑](#endnote-ref-5)
6. Two clauses (15 and 16) of Magna Carta revised by King John in 1225 forbid the raising of any but customary assessments to maintain embankments, which not only confirms the prior existence of local water boards but implies a desire to expand their functions. [↑](#endnote-ref-6)
7. No history of IDBs has yet been written. On earlier forms of local water level governance, one of the most informative sources is still H. G. Richardson, “The Early History of Commissions of Sewers’,” *The English Historical Review*, 34 (1919): 385- 393. See also the substantial body of work by John Morgan on the Commission of Sewers: John E. Morgan, Funding and Organising Flood Defence in Eastern England, C .1570 – 1700, in Giampiero Nigro (ED), *Gestione dell'acqua in Europa (XII-XVIII Secc.): Water Management in Europe (12th-18th Centuries)* (Firenze: Firenze University Press 2018), 413-431; John E. Morgan, “The Micro-Politics of Water Management in Early Modern England: Regulation and Representation in Commissions of Sewers,” *Environment and History* 23 (2017): 409-430; John E. Morgan, “Understanding Flooding in Early Modern England,” *Journal of Historical Geography* 50 (2015): 37-50. [↑](#endnote-ref-7)
8. J. A. Chandler, *Explaining Local Government: Local Government in Britain since 1800* (Manchester and New York: Manchester University Press 2007), 1-24. [↑](#endnote-ref-8)
9. National Audit Office, *Internal Drainage Boards. Report by the Comptroller and Auditor General*, March 16, 2017. Available at https://www.nao.org.uk/wp-content/uploads/2017/03/Internal-Drainage-Boards.pdf (accessed July 16, 2019). [↑](#endnote-ref-9)
10. The “Medway” Letter, Ministry of Agriculture and Fisheries, June 28, 1933. Available at https://www.wlma.org.uk/uploads/medwayletter.pdf (accessed July 16, 2019). [↑](#endnote-ref-10)
11. The list of such studies is considerable and includes: Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York and Oxford: Oxford University Press 1985); Mark Cioc, *The Rhine: An Eco-biography, 1815-2000* (Seattle: University of Washington Press 2002); Paul Schneider, *Old Man River: The Mississippi River in North American History* (New York: Henry Holt and Co 2013); Paul Sinclair, *The Murray: A River And Its People* (Melbourne: Melbourne University Publishing 2013); and Sudipta Sen, *Ganges: The Many Pasts of an Indian River* (New Haven: Yale University Press 2019). [↑](#endnote-ref-11)
12. For the histories of water management on the continent, see: David Blackbourn, *The Conquest of Nature: Water, Landscape and the Making of Modern Germany* (London: W. W. Norton & Company 2007); Salvatore Ciriacono, *Building on Water: Venice, Holland and the Construction of the European Landscape in Early Modern Times* (New York and Oxford: Berghahn Books, 2006); Tim Soens, “Resilient Societies, Vulnerable People: Coping with North Sea Floods before 1800,” *Past and Present* 241 (2018): 143-177; Petra J. E. M. van Dam, “An amphibious culture: coping with floods in the Netherlands,” in Peter Coates, David Moon, and Paul Warde (EDS), *Local Places, Global Processes: Histories of Environmental Change in Britain and Beyond* (Oxford: Oxbow Books 2017), 78-93; Milja van Tielhof, “Forced Solidarity: Maintenance of Coastal Defences along the North Sea Coast in the Early Modern Period,” *Environment and History* 21 (2015): 319-350; G. P. van de Ven, *Man-made Lowlands: History of Water Management and Land Reclamation in the Netherlands* (Utrecht: Uitgeverij Matrijs 1993). [↑](#endnote-ref-12)
13. W. G. Hoskins, *The Making of the English Landscape* (London: Hodder and Stoughton 1955), 78. [↑](#endnote-ref-13)
14. Iain Downey and Ian Moodie, *Good Governance for Internal Drainage Board Members* (Stoneleigh Park: Association of Drainage Authorities 2018). [↑](#endnote-ref-14)
15. Interview with IDB Board Member, North East Lincolnshire, March 27, 2019. Such a policy is already inherent in the European Water Framework Directive and the laws implementing its regulation in the various nations of the UK in 2003. [↑](#endnote-ref-15)
16. Greg Bankoff, “The ‘English Lowlands’ and the North Sea Basin System: A History of Shared Risk,” *Environment and History* 19 (2013): 3-37. [↑](#endnote-ref-16)
17. Ian D. Rotherham, *The Lost Fens: England's Greatest Ecological Disaster* (Stroud: The History Press 2013), 54-60. [↑](#endnote-ref-17)
18. Robert Van de Noort, *The Humber Wetlands: The Archaeology of a Dynamic Landscape* (Macclesfield: Windgather Press 2004). [↑](#endnote-ref-18)
19. Stephen Ellis, “Physical background to the Hull Valley” in Robert Van de Noort and Stephen Ellis, (eds) Wetland Heritage of the Hull Valley (Kingston-upon-Hull: Humber Wetlands Project 2000), 1. [↑](#endnote-ref-19)
20. June A. Sheppard, The *Draining of the Hull Valley* (Beverley: East Yorkshire Local History Society 1958), 23 [↑](#endnote-ref-20)
21. Many sites may have been subsequently abandoned during the Anglo-Saxon period. Michael Peter Townley Didsbury, *Aspects of Late Iron Age and Romano-British Settlement in the Lower Hull Valley*, MPhil Durham University 1990, available at: <http://etheses.dur.ac.uk/6477/1/6477_3777-vol1.PDF?UkUDh:CyT> (accessed July 22, 2019); River Hull Valley Drainage Heritage Group, *Becks, Banks, Drains and Brains: the Drainage History of the River Hull Valley* (East Riding of Yorkshire Council c2013), 11-13. [↑](#endnote-ref-21)
22. S.G.E. Lythe, ‘Drainage and Reclamation in Holderness and the River Hull Valley, 1760-1880’, *Geography* 23 (1938): 237. [↑](#endnote-ref-22)
23. Baron. F. Duckham, *The Inland Waterways of East Yorkshire 1700-1900* (East Yorkshire Local History Society 1972), 6. [↑](#endnote-ref-23)
24. Van de Noort, *The Humber Wetlands*, 156. [↑](#endnote-ref-24)
25. Sheppard, The *Draining of the Hull Valley*, 2. Van de Noort cites the appointment of commissioners to survey riverbanks and sea defences in 1285. Van de Noort, *The Humber Wetlands*, 156. [↑](#endnote-ref-25)
26. Van de Noort, *The Humber Wetlands*, 156-157. [↑](#endnote-ref-26)
27. Petra J. E. M. van Dam, “Sinking Peat Bogs: Environmental Change in Holland, 1350-1550,” *Environmental History* 6 (2001): 32-45; J.A. Galloway, “Storm Flooding, Coastal Defence and Land around the Thames Estuary and Tidal River C. 1250 – 1450,” *Journal Medieval History* 35 (2009): 171-188; Tim Soens, “Flood Security in the Mediaeval and Early Modern North Sea Area: a Question of Entitlement,” *Environment and History* 19 (2013): 209-232. [↑](#endnote-ref-27)
28. Eric H. Ash, *The Draining of the Fens: Projectors, Popular Politics, and State Building in Early Modern England* (Baltimore: Johns Hopkins University Press 2017), 50-80 [↑](#endnote-ref-28)
29. There are little extant data for these courts prior to 1580 and records only become abundant after 1660. S.G.E. Lythe, ‘The Court of Sewers for the East Part of the East Riding’, *The Yorkshire Archaeological Journal* 34 (1939): 11-24; Sheppard, The *Draining of the Hull Valley*, 6. [↑](#endnote-ref-29)
30. William Dugdale, *The History of Imbanking and Draining of Divers Fens and Marshes, Both in Foreign Parts and in This Kingdom, and of the Improvements Thereby* (London W. Bowyer and J. Nichols 1772, first printed London: Alice Warren 1662), 134. [↑](#endnote-ref-30)
31. Evidence of H. Meadows, Commissioner of Sewers for the East Parts of the East Riding of Yorkshire, Royal Commission on Land Reform, Minutes of Evidence, 11th Day, Wednesday, July 13, 1927. National Archives, MAF-49-818, A-8. [↑](#endnote-ref-31)
32. A notable episode came in 1646 when the flood banks at Drypool failed and Stoneferry was inundated for 26 weeks. See *Becks, Banks, Drain and Brains*, 27. [↑](#endnote-ref-32)
33. Sheppard, *The Draining of the Hull Valley*, 11. [↑](#endnote-ref-33)
34. Arthur Young, *A Six Months Tour through the North of England, Containing, an Account of the Present State of Agriculture, Manufactures and Population, in Several Counties of This Kingdom* (London: W. Strahan 1771), Vol 1, Letter IV, 156. Poaching is the name of the damage done to grass and the underlying soil by livestock which has been allowed to stand and walk on it for prolonged periods in wet conditions. [↑](#endnote-ref-34)
35. Young, *A Six Months Tour through the North of England*, 207. [↑](#endnote-ref-35)
36. Ian D. Rotherham, *Yorkshire's Forgotten Fenlands* (Barnsley: Wharncliffe Books 2010), 64. [↑](#endnote-ref-36)
37. Reports of John Grundy and John Smeaton, 1-2. [↑](#endnote-ref-37)
38. Reports of John Grundy and John Smeaton, Beverley, December 30, 1763. East Riding Archives, DDCC 143-92, 1-2. [↑](#endnote-ref-38)
39. Lythe, “Drainage and Reclamation,” 237-238. [↑](#endnote-ref-39)
40. Reports of John Grundy and John Smeaton, 2-4; Report of William Jessop, Engineer, Newark, July 17, 1786. East Riding Archives, DDIV 29-7, 2-4. [↑](#endnote-ref-40)
41. Report of William Jessop, 2-3. [↑](#endnote-ref-41)
42. Sheppard, *The Draining of the Hull Valley*, 13-14. Beginning with the opening of Humber Dock in 1809, further docks were opened in Hull throughout the nineteenth century: Junction Dock in 1829, Railway Dock in 1846, Victoria Dock in 1850, Albert Dock in 1869, William Wright Dock in 1873, St. Andrew's Dock in 1883 and Alexandra Dock in 1885. James J. Sheahan, *History of the Town and Port of Kingston-Upon-Hull* (Beverley: John Green 1866). [↑](#endnote-ref-42)
43. Wright, *John Grundy, of Spalding Engineer,* 15. [↑](#endnote-ref-43)
44. Lythe, “Drainage and Reclamation,” 240. *Becks, Banks, Drains and Brains*, 27-35. [↑](#endnote-ref-44)
45. Edward Page, *Report of the State of the Beverley and Barmston Drainage with Remarks Respecting Its Improvement* (Beverley: John Kemp 1858), 15, 22, 25. Page describes being able to sail in a boat “without much interruption, over land and fences, in nearly a direct line, from Hull Bridge to Frodingham Bridge”. [↑](#endnote-ref-45)
46. Neil R. Wright, *John Grundy, of Spalding Engineer, 1719-1785: His Life and Times* (Lincolnshire County Council: Department of Recreation Services c1990s), 15. [↑](#endnote-ref-46)
47. A.W. Skempton, “The Engineering Works of John Grundy (1719-1783),” *Lincolnshire History and Archaeology* 19 (1984): 72. [↑](#endnote-ref-47)
48. Sheppard, *The Draining of the Hull Valley*, 20. [↑](#endnote-ref-48)
49. *Becks, Banks, Drain and Brains*, 45. [↑](#endnote-ref-49)
50. Sheppard, *The Draining of the Hull Valley*, 22-23. [↑](#endnote-ref-50)
51. James Mahoney, “Path Dependence in Historical Sociology,” *Theory and Society*, 29 (2000): 507. See also: Paul A. David, ‘Clio and the Economics of QWERTY’, *American Economic Review* 75 (1985): 332-337; and W. Brian Arthur, “Competing Technologies, Increasing Returns, and Lock in by Historical Events,” *Economic Journal* 99 (1989): 116-131. [↑](#endnote-ref-51)
52. Mahoney, “Path Dependence in Historical Sociology,” 508-509. [↑](#endnote-ref-52)
53. The Beverley-Barmston drain still discharges gravitationally to the River Hull at High Flaggs but very little of the water it conveys escapes this way and most is now pumped. The Holderness Drain, since the completion of a separate outlet to the Humber at Marfleet in 1832, is effectively a completely separate drainage system from the River Hull. [↑](#endnote-ref-53)
54. A further drain, the Barmston Drain (Sea End) to the northeast of the valley enters the North Sea directly at Barmston but does not actually drain, strictly speaking, the River Hull Valley. [↑](#endnote-ref-54)
55. The channels in questions are Monkdike, Eschedike, Forthdike and Skerndike. Sheppard, *The Draining of the Hull Valley*, 3. [↑](#endnote-ref-55)
56. Evidence of William Evans, Beverley and Barmston Drainage (Hull End Division), Statement to the Commissioners by the Surveyor, History or Historical Notes, Royal Commission on Land Drainage, Minutes of Evidence, 11th Day, Wednesday, July 13, 1927. National Archives, MAF-49-818, A-37. [↑](#endnote-ref-56)
57. Page, *Report of the State of the Beverley and Barmston Drainage*, 23. [↑](#endnote-ref-57)
58. Lythe, “Drainage and Reclamation,” 239. [↑](#endnote-ref-58)
59. William Chapman, *Report on the Beverley & Barmston Drain* (Beverley: M. Turner 1806), 2-6. [↑](#endnote-ref-59)
60. These Catchment Boards also had the power to consolidate and extend drainage districts. See, John Sheail, “Arterial Drainage in Interwar England: The Legislative Perspective,” *Agricultural History Review* 50 (2002): 253-270. [↑](#endnote-ref-60)
61. Ibid., 267. [↑](#endnote-ref-61)
62. H.G. Richardson, “The Early History of Commissions of Sewers,” *English Historical Review* 34 (1919): 389-390. Romney Marsh adjoins the Rother and Pett Levels and the great Pevensey Level along the southeast coast of England. [↑](#endnote-ref-62)
63. Evidence of William Sheffield, Clerk to the Commissioner of Sewers for the East Parts of the East Riding of Yorkshire, Royal Commission on Land Reform, Minutes of Evidence, 11th Day, Wednesday, July 13, 1927. National Archives, MAF-49-818, A-6. [↑](#endnote-ref-63)
64. Dugdale, *The History of Imbanking and Draining*, 133. [↑](#endnote-ref-64)
65. Evidence of William Sheffield, A-1 and A-13. [↑](#endnote-ref-65)
66. The number of appointed members to elected members is in proportion to the IDB’s income derived from the special levy, though appointed members can never exceed the number of elected members by more than one. [↑](#endnote-ref-66)
67. National Audit Office, *Internal Drainage Boards*, 13. [↑](#endnote-ref-67)
68. Interview with IDB Board Member, East Riding, June 5, 2019 [↑](#endnote-ref-68)
69. Evidence of William Sheffield, A-2. [↑](#endnote-ref-69)
70. National Audit Office, *Internal Drainage Boards*, 13. Even the smallest IDBs in England, Northworld and Goole Fields, still have boards comprised of five members. [↑](#endnote-ref-70)
71. National Audit Office, *Internal Drainage Boards*, 14. [↑](#endnote-ref-71)
72. Focus Group Discussion with IDB Board Members, East Riding, April 5, 2019. [↑](#endnote-ref-72)
73. George Leather, *Reports on the State of the Beverley and Barmston Drainage, with Improvements Suggested Therein* (Hull: William Stephenson 1849),9. [↑](#endnote-ref-73)
74. Evidence of William Evans, A-34. [↑](#endnote-ref-74)
75. Evidence of William Evans, A-35. [↑](#endnote-ref-75)
76. Interview with IDB Board Member, East Riding, June 5, 2019. [↑](#endnote-ref-76)
77. York Consortium Drainage Boards, Beverley and North Holderness Internal Drainage Board, available at http://www.yorkconsort.gov.uk/beverley.html (accessed on July 25 2019). [↑](#endnote-ref-77)
78. Between 1950 and 1996, there were numerous organisations which preceded the EA: River Boards (1950-1965), Regional Water Authorities (1973-1989), and the National Rivers Authority (1989-1996). [↑](#endnote-ref-78)
79. Focus Group Discussion with IDB Members, East Riding, April 5, 2019. [↑](#endnote-ref-79)
80. Interview with IDB Board Member, East Riding, June 5, 2019. [↑](#endnote-ref-80)
81. Mahoney, “Path dependence in historical sociology,” 510-511. [↑](#endnote-ref-81)
82. Arthur, “Competing Technologies”; David, “Cleo and the Economics of QWERTY”; Joseph Farrell and Garth Saloner, “Standardisation, Compatibility, and Innovation,” *RAND Journal of Economics* 16 (1985): 70-83; Robin Cowan, “Nuclear Power Reactors: a Study in Technological Lock-in,” *Journal of Economic History* 50 (1990): 541-567; Dominique Foray, “The Dynamic Implications of Increasing Returns: Technological Change and Path Dependent Inefficiency,” *International Journal of Industrial Organization* 15 (1997): 733-752. [↑](#endnote-ref-82)
83. Graham Haughton, Greg Bankoff, and Tom Coulthard, “In Search of ‘Lost’ Knowledge and Outsourced Expertise in Flood Risk Management,” *Transactions of the Institute of British Geographers* 40 (2015): 375-386. [↑](#endnote-ref-83)
84. Interview with IDB Board Member, East Riding, June 5, 2019. [↑](#endnote-ref-84)
85. Focus Group Discussion with IDB Board Members, East Riding, April 5, 2019. [↑](#endnote-ref-85)
86. Interview with IDB Board Member, East Riding, June 5, 2019. [↑](#endnote-ref-86)
87. Interview with IDB Board Member, Lincolnshire, March 27, 2019; Risk & Policy Analysts, *The Role of Internal Drainage Boards in Managing Water Levels: Best Practice and Potential Future Roles: R&D Technical Report WT 1512/TR* (London: DEFRA 2013) available at: [file:///C:/Users/Win10/Downloads/11631\_TR\_-RoleofIDBsinmanagingwaterlevels.pdf](file:///C%3A/Users/Win10/Downloads/11631_TR_-RoleofIDBsinmanagingwaterlevels.pdf) (accessed on July 29, 2019). [↑](#endnote-ref-87)
88. Downey and Moodie, *Good Governance*. [↑](#endnote-ref-88)
89. Interview with IDB Board Member, East Riding, December 5, 2018. South Holderness IDB was formed in 2013 after the abolition of Preston, Keyingham, Ottringham, Skeffling, Winestead and Thorngumbald IDBs. [↑](#endnote-ref-89)