Environmental Context of Watermills in Medieval Sussex: Natural and Social Contexts

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Regardless of their lifestyles, hunter–gatherers and sedentary agriculturalists have taken advantage of the massive stores of nutrients found within these cereal grains and, while hunter–gatherers and nomads would harvest wild cereals with tough shells and standard nutritional packages, agricultural societies constructed technologies that ranged in sophistication from simple mortar–and–pestles and hand mills to complex windmills with rotating turrets and steam– and fuel–powered mills from the Industrial Revolution, all process increasing amounts of cereals to access the necessary nutrients found within.[1] One mill, in particular, rose to prominence in the earlier medieval period as its prevalence, popularity, efficiency, and accessibility made it a popular technology in medieval Europe and Britain: the watermill. With its genesis dating back to around 200 BCE, the watermill has become a focus of study for scholars over the past century as its importance in economies and societies attracted the scholar's attention.[2] The research produced on the topic of the watermill evolved steadily throughout the past century, yet scholars primarily focus on the economic significance of the structure, while sidelining the environmental context and importance of these structures.

As one of the first inventions that has relied on power sources outside of animal or human muscle, the watermill has shaped much of the physical and social landscapes of Britain and Europe, yet the environmental context of watermills has only been examined as a facet of the economic impact of the structures. This paper will examine the environmental context of watermills in medieval Sussex and show the deterministic role the environmental context plays in the successful operation of watermills in this specific region. The environmental context of a watermill is not, however, limited to the natural context, which will be shown to have played a part in the placement, construction, and operation of the watermill, but also the social context, which determined the operation and success of a watermill within its community. Without a proper environment, the watermill could not function to its fullest extent and its owners and operators inevitably suffered. This prompted various parties to take certain measures regarding both the natural and social contexts their mills existed in. These environmental contexts of watermills in medieval Sussex will be demonstrated by the examination of a legal document pertaining to a watermill along the Cuckmere River in Sussex, England in the thirteenth century.

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[1] Lewis Mumford, *Technics and Civilization* (University of Chicago Press, 1934), 116.
[2] John Langdon, *Mills in the Medieval Economy: England 1300–1540* (Oxford University Press, 2004), 70.

This case study will examine a legal document, which dates to around 1255 CE, involving the legal rights of water flow to the watermill of Michelham Priory that sits downriver of two watermills, the Hellingly (*Hellingeleye*) mill and the Starnash (*Sternesse*) mill, both owned by the abbot of Battle Abbey.[3] This case study will demonstrate the environmental context, social and natural, of watermills in medieval Sussex through the examination of the interactions between mills and mill owners, and the importance of the environmental context in the successful operation of watermills in medieval Sussex.

Humans have always inhabited the natural environment, in one form or other, yet most scholarly work available to us focuses primarily on social, cultural, and economic advancements and innovations achieved through the natural environment. Only recently, in the last forty years, or so, scholars have begun to view and study the environment as an influential force in the development of humanity. Nowadays, few people can truly argue that the natural environment has little or no influence over the lived experience of humanity and, I believe, the watermills of medieval Sussex are prime examples. Their successful operations were determined, firstly, by their natural environment and, secondly, by their social environment, both of which combine to form the environmental context in which the watermill found itself, while the economic successes, which remain the focus of scholars, were simply products of the successful environmental contexts and operations of the watermill.

Historiography of Mills

The years 1934 and 1935 marked the true genesis of the study of mills and milling technology as Lewis Mumford and Marc Bloch published their hugely influential works *Technics and Civilization* and "Avènement et conquêtes du moulin à eau," respectively.[4] Among the main theses of these works, they argued that the increasing uses of water and wind power within the medieval period indicated the possible start of a medieval revolution that paved the way for the Industrial Revolution of the eighteenth century,[5] because the introduction of large numbers of production machines that ran on power, other than human or animal muscle, marked an early and pseudo–industrial revolution within the framework of medieval societies. In my eyes, though, these arguments, however influential and valuable, are

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[3] SAS/G 16/1, The Keep, Brighton, UK, (hereafter cited as SAS/G 16/1, The Keep).

[4] Mumford, *Technics and Civilization*; Marc Bloch, "Avènement et conquêtes du moulin à eau," *Annales d'histoire économique et sociale* 7, no. 36 (1935), 538–563. Others had published works before Mumford and Bloch that related to or included watermills and milling technology. These two, however, were the first to publish works *about* watermills and milling technology.

[5] Adam Lucas, "Industrial Milling in the Ancient and Medieval Worlds: A Survey of the Evidence for an Industrial Revolution in Medieval Europe," *Technology and Culture* 46, no. 1 (2005), 1–2.

not what makes the works of Mumford and Bloch so valuable. By drawing massive scholarly attention to the value of mills, they opened an entirely new avenue of socio–economic history in the mid–twentieth century that authors, such as Eleanora Carus–Wilson, Lynn White Jr., and many others, took the foundational works of Mumford and Bloch and expanded upon it.

Eleanora Carus–Wilson added further to Mumford and Bloch's theories in her 1941 article "An Industrial Revolution of the Thirteenth Century," stating that the traditional methods of fulling[6] were steadily being replaced by mechanized fulling methods, increasing linen output in both urban and rural settings.[7] The watermill was said to have been a common preference for fulling mills in England as they were less complex than grain mills, lacking gears and complex constructions, yet they nearly completely automated the physical and repetitive actions required in the fulling process.[8] It was because of these works, and others like them, that the ideas of very primitive existences during the medieval period began to changes into a time of steady innovation.

After World War II, scholars warmed up to the idea that the medieval period produced highly influential technological advancements which contributed heavily to the socio–economic statuses of certain individuals, such as farmers, millers, landowners, and others, and to future innovations that led to the Industrial Revolution. This generation of scholars, led by Lynn White Jr., Jean Gimpel, Robert J. Forbes, and others, further explored the technological advancements of the medieval Period, delving deeper into the economic and social successes of these advancements and even beginning to broach the natural environment components of these technologies.[9] White's book *Medieval Technology and Social Change* addressed many technological advancements seen throughout the medieval period, however he dedicates well over a third of the book, Chapter III,[10] to the development and harnessing of the natural powers of water and wind that began the centuries long process of industrializing the Western world. In this chapter, White superficially addresses the environmental contexts of these mills, instead White focused on the problems of their environments, a small aspect of the greater environmental context.

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[6] Fulling is the act of cleaning clothing materials of impurities before they are made into clothes or other products. See Jean Gimpel, *The Medieval Machine: The Industrial Revolution of the Middle Ages* (Penguin Books, 1976), 15.
[7] Eleanora Carus–Wilson, "An Industrial Revolution of the Thirteenth Century," *The Economic History Review* 11, no. 1 (1941), 44–45.
[8] Steven Walton, *Fifty Years of Medieval Technology and Social Change* (Routledge, 2020), 158.
[9] Robert J. Forbes, "Power," in *A History of Technology*, ed. Charles Singer et al., vol. 2, *The Mediterranean Civilizations and the Middle Ages, c. 700 B.C. to c. A.D. 1500* (Oxford University Press, 1957) 601–606, 645–649; Lynn White Jr., *Medieval Technology and Social Change* (Oxford University Press, 1962).
[10] White Jr., *Medieval Technology and Social Change*, 79

With the introduction of the relationship between technology and environment, White's 1967 essay, "The Historical Roots of Our Ecological Crisis," cannot be ignored. With its widespread influence, there are innumerable reviews and works that address this text. In short, White accuses Christianity and its exploitative practices and sermons for the current environmental conditions we find ourselves in, however, its significance regarding the specific focus of this paper does not stop there. White specifically draws attention to how the application of waterpower, through the watermill, for industrial and agricultural production laid the very early foundations for the Industrial Revolution that has caused the environmental catastrophes we see today.[11] A very bold and interesting statement, it remains an incredibly controversial statement on our current environmental problems, yet it might have prompted a re–evaluation of medieval environmental practices and perspectives, opening new avenues of investigation and research for future environmental historians.

Another scholar who addressed the environmental requirements and impact of mills, among other structures, was Jean Gimpel. Gimpel dedicated a chapter in his 1976 book, *The Medieval Machine: The Industrial Revolution of the Middle Ages,* to outline the environmental cost of the industrialization of the medieval period and the subsequent environmental effect, particularly on forests, of the industries and constructions of every timber–dependent structure, which was practically everything.[12] White and Gimpel published some of the most influential works of the mid–twentieth century that addressed not only the social and economic effects of mills, but also their environmental effect. White and Gimpel remained the peak of mill research until Richard Holt and John Langdon began publishing their works.

Richard Holt published his book *The Mills of Medieval England* in 1988 and continued publishing works alongside John Langdon on the milling monopolies held by lords, either ecclesiastical or secular, and further expanding on the economic and social effects of mills.[13] They did not, however, expand on the ideas of a medieval industrial revolution, instead they contradicted these theories, explaining how there really was not enough evidence for industrial mills during the medieval period to

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[11] Lynn White Jr., "The Historical Roots of Our Ecological Crisis," *Science* 155, no. 3767 (1967), 1205.
[12] Gimpel, *The Medieval Machine*, 75–77, 75–92.
[13] Richard Holt, *The Mills of Medieval England* (Basil Blackwell, 1988); Richard Holt, "The Medieval Mill – a Productivity Breakthrough?", *History Today* 39, no. 7 (1989), 31; Richard Holt, "Milling Technology in the Middle Ages: The Direction of Recent Research**,"** *Industrial Archaeology Review* 13, no. 1 (1990), 57–58; John Langdon, "Water–Mills and Windmills in the West Midlands, 1086–1500," *The Economic History Review* 44, no. 3 (1991), 429; John Ambler and John Langdon, "Lordship and Peasant Consumerism in the Milling Industry of Early Fourteenth–Century England," *Past & Present* no. 145 (1994), 4; John Langdon, "The Mobilization of Labour in the Milling Industry of Thirteenth– and Early Fourteenth–Century England," *Canadian Journal of History* 31, no. 1 (1996), 40.

justify that stance because mills intended for industrial production only composed a minute percentage of all mills in medieval Europe.[14] Furthering his stance against Mumford and Bloch's ideas on mills, Holt specifically stated in his 1990 work on milling technology that mills should not be researched as a precursor phase to the Industrial Revolution and should instead be examined for what they were in the context in which they existed.[15] It seems many scholars have taken this advice to heart.

Ever since Holt and Langdon took to publishing research on mills, many others have begun to realize the true wealth of information regarding socio–economic relations throughout history via the research of mills. Numerous scholars have delved deep into these relations, compiling books, writing countless articles, reviewing and updating older theories and works, and progressing modern theories at rapid rates. Among these scholars, Adam Lucas, Paolo Squatriti, Elizabeth Smith, Michael Wolfe, and Steven Walton, just to name a few, have begun conducting and compiling specialized and focused analyses of watermills, using localized case studies to draw conclusions or focus on specific regional, seigneurial, or taxation practices that affected mills and their owners and operators.[16] It seems that most scholars have not truly considered the requisite environmental context for watermills throughout Europe, though, which does tend to be difficult during archival research as most primary documentation rarely records or acknowledges the environmental context at the time unless problems arose.

For nearly the entire history of the study of mills, the industrialization and economic facets of mills appear to have been the primary focus for scholars, with social changes and natural impacts as a secondary focus. The environmental context of mills appears to have been studied as simple sidebars of mills, determining only where a mill could be placed, rather than their very real effect on the economic successes of the mill and the social interactions between towns, lords, villagers, and, possibly even, whole regions. It must be clearly understood that most primary documents did not actually acknowledge the environmental factors that surrounded mills, and for this reason, we must turn to other, non–archival sources to gain a greater understanding of the environmental

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[14] Lucas, "Industrial Milling," 25.
[15] Holt, "Milling Technology in the Medieval Ages," 52.
[16] Lucas, "Industrial Milling;" Adam Lucas, *Ecclesiastical Lordship, Seigneurial Power and the Commercialization of Milling in Medieval England* (Ashgate Publishing Ltd., 2014); Adam Lucas, *Wind, Water, Work: ancient and medieval milling technology* (BRILL, 2006); Paolo Squatriti, *Working with Water in Medieval Europe: Technology and Resource–Use* (Brill, 2000); Elizabeth B. Smith and Michael Wolfe, *Technology and resource use in medieval Europe: cathedrals, mills, and mine* (Ashgate, 1997); Steven Walton, *Fifty Years of Medieval Technology and Social Change;* Steven Walton, *Wind & water in the Middle Ages: fluid technologies from antiquity to the Renaissance* (ACMRS, 2006); John Landers, *The Field and the Forge: Population, Production, and Power in the Pre–industrial West* (Oxford University Press, 2005), 51–52.

context of medieval mills, particularly in the region this paper will focus on: Sussex County.

Environmental Context of Watermills in Sussex

The environmental context of the watermill had huge ramifications on the future of the mill, and everyone involved in its operation and productions, as the natural environment played a massive role in the successes or failures of the mill, both socially and economically. As most primary sources do not offer much insight into the contemporary environment of the mill or region, we must turn to other sources, as the rigorous work done by archaeologists, geologists, ecologists, and many other professionals allow us to create a vivid image of the environmental conditions and contexts of the past, of which many have been highly influenced by human civilizations.

It is well known that many watermills require extensive environmental manipulation to create the proper contexts in which they can reach their true potential, however these environmental manipulations and subsequent contexts were known to create problems in the communities that these mills served. Because of the social ramifications of the context of watermills within nature, the social context must be included within the mill's environmental context, as communities linked via waterways tended to influence each other throughout history, just as they do now.

The inclusion of the social context of medieval watermills within their environmental context is significant to this study of watermills in medieval Sussex because the hydrological environment of Sussex hosted a relatively higher numbers of watermills per capita.[17] These higher numbers of mills created many issues between mill owners and members of the community, with one such example being the focus of a later portion of this paper. For this reason, the natural context of watermills of the medieval Sussex region will be examined alongside the social contexts of the same region. As the region of focus, Sussex was known for its sparse populations during the medieval period and its varying hydrological conditions.[18] The region boasted large numbers of watermills and each belonged to unique, yet similar, natural and social environments as the regional variation and environmental manipulation experienced by watermills created various, and possibly adverse, effects on local populations.

Though Britain is an island, it is well known for its multitudes of waterways, large and small, many of which flow from the island's central altitudes down to the coast, forming waterways that range in size from small, babbling brooks to large, torrential rivers, and its population, all of

[17] Ambler and Langdon, "Lordship and Peasant Consumerism," 32–33.
[18] Stephen Broadberry, Bruce M.S. Campbell, and Bas van Leeuwen, "English Medieval Population: Reconciling Time Series and Cross Sectional Evidence," (Working paper, 2010), 25.

which were heavily dependent on cereal grains for nutrition.[19] Because of this abundance of waterways and the population's reliance on cereals, mills have dotted the island for centuries. Margaret Hodgen reportedly counted over five thousand mills recorded in the Domesday Book of 1086.[20] This means that England's waterways have been altered for over one thousand years to accommodate watermills, which required quite a bit of human intervention to create a suitable environment for them on a waterway. These modifications included, but were not limited to, mill ponds, which form reservoirs for the mill, a sluice, designed to control the water levels and manage flooding, a mill race, an offshoot stream of the waterway designed to concentrate water onto the waterwheel, and a weir, which can be used to control the water movement and direct it towards the waterwheel.[21] These alterations to the waterway appeared to work quite well since we still use this system when designing hydroelectric dams today, however, as with these dams, there were significant repercussions to these environmental manipulations.

The environmental manipulations of waterways required by watermills had drastic effects on populations both up– and downriver. Damming a waterway often floods upstream along the water's edge, with the severity of the flooding dependent on the waterway's catchment area, the river's size, and its discharge rate. The flooding is often only a dramatic, short–term event that eventually levels out to a consistent, seasonally influenced, height that the sluice gate maintains until a heavy rain, or the seasonal snow melt again floods the waterway. The downstream effect, however, is a constant deprivation of water, affecting local farming practices and impeding the operation of watermills further downstream. These dams are also considered by many to be factors in the collapse of migratory fish populations because the dams, weirs, and sluices obstruct migration routes and formed catch basins which trapped fish and permitted overharvesting of trapped populations.[22] Other impacts can be seen on

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[19] Katie A. Hemer, et. al., "A multi–isotope investigation of diet and subsistence amongst island and mainland populations from early medieval western Britain," *American Journal of Physical Anthropology* 162, no. 3 (2017), 424–5; David Stone, "The Consumption of Field Crops in Late Medieval England," in *Food in Medieval England: Diet and Nutrition,* eds. Christopher Woolgar, Dale Serjeantson, and Tony Waldron (Oxford University Press, 2006), 11.

[20] Margaret Hodgen, "Domesday Water Mills," *Antiquity* 13, no. 51 (1939), 262.

[21] Stuart Downward and Kevin Skinner, "Working Rivers: The Geomorphological Legacy of English Freshwater Mills," *Area* 37, no. 2 (2005), 140–141; Owen Bedwin, "Excavation of Batsford Mill, Warbleton, East Sussex, 1978," *Medieval Archaeology* 24, no. 1 (1980), 191; Christopher Whittick, "Dallingridge's Bay and Bodiam Castle Millpond – Elements of a Medieval Landscape," *Sussex Archaeological Collections* 131 (1993), 120–122.

[22] H. J. R. Lenders, et. al., "Historical rise of waterpower initiated the collapse of salmon stocks," *Scientific Reports* 6, no. 29269 (2016), 3–4.

water transportation on larger waterways in which transportation routes were obstructed and trade was disrupted. [23]

It was very common in Sussex for many watermills to exist along the same waterway, regardless of its size, especially during the 1300s when the populations throughout Southern England increased.[24] Holt and Langdon estimated between 10,000 and 15,000 watermills in operation throughout England,[25] and Stuart Downward and Kevin Skinner identified 22 watermills along a 19km stretch of the Tillingbourne River in Surrey County,[26] an impressive number of mills for a river stretching 24km total.[27] To address the environmental issues created by the watermills, agreements were made between mill owners to maintain a steady, carefully planned flow of water to each watermill, thereby allowing each watermill a constant and sufficient amount of water into its mill pond and to allow for the navigation of water transport along its route, yet that was not the extent of the social dealings of millers. Millers were required to accommodate requests by farmers who had lost land to the flooding of the millponds, contain their millponds in certain circumstances with "water–walls", to upkeep the millpond dams, weirs, and sluices to avoid flooding downstream, to maintain "water rights" with their communities, and many other forms of agreements and deals. [28] These agreements, and the problems and incidents that surrounded them, were essential aspects of the environmental context in which watermills existed in medieval England, however, these problems were not exactly the same across the country. Different environmental factors affected the environmental contexts of watermills in various ways, and Sussex had, and still has, some unique natural factors that contributed to the environmental context of medieval watermills.

The natural environmental context of watermills in medieval Sussex can be best understood by examining the hydrological conditions

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[23] John Langdon, "Inland water transport in medieval England," *Journal of Historical Geography* 19, no. 1 (1993), 1.
[24] Broadberry Campbell, and van Leeuwen, "English Medieval Populations," 15.
[25] Langdon, *Mills in the Medieval Economy,* 9–11.
[26] Downward and Skinner, "Working Rivers," 141–142.
[27] "Tillingbourne Water Body," *Department for Environment, Food, & Rural Affairs,* last modified May 20, 2022, https://environment.data.gov.uk/catchment–planning/WaterBody/GB106039017840.
[28] Often, if a lord owned the mill, ecclesiastical or secular, the mill owner may have been allowed to use seigneurial resources to upkeep the mills. See Langdon, *Mills in the Medieval Economy*, 159, 193; Downward and Skinner, "Working Rivers," 141–142; Langdon, *Mills in the Medieval Economy*, 88, 159, 193; Water–rights are designed to do exactly as the name suggests: honour people's right to have and use water. While this idea has technically evolved throughout history based on the cultural values and the complexity of legal codes, its core values have remained quite consistent in honouring rights to water. See Anthony Scott and Georgina Coustalin, "The Evolution of Water Rights," *Natural Resources Journal* 35, no. 4 (1995), 821–979. See also Langdon, *Mills in the Medieval Economy*, 228 for an example of water–right contentions between the settlement of Carlisle and a mill owner in 1347.

of the region which, in turn, requires an overview of the geology and topography of Sussex, both of which strongly influence the regional water systems and are quite unique to both the England and the world. Divided into seven regions that are differentiated by geology and topography, Sussex has produced unique waterways that cut flow south and south–east to the coast and coastal plains, cutting through the chalk cliffs that ring the southern end of the county.),[29] have been titled the High Weald, the Low Weald, the Romney Marshes, the Pevensey Levels, the South Downs, the Wealden Greensands, and the Coastal Plain. Each region possesses distinct geology and topography that interact with the hydrology of the region differently.

Of the seven NCAs in Sussex, three are coastal regions, the Romney Marshes, Pevensey Marshes, and the Coastal Plain, and are largely reclaimed land, meaning they very close to sea level and composed mostly of alluvium, or sediment deposited by rivers, streams, and oceans, and gravel, which was used in the reclamation of the land. The three NCAs in north and central Sussex are composed of sandstones and clays, sedimentary deposits that are highly susceptible to erosion and are well known for their ability to create small streams and brooks which eventually join to form large rivers. The regions of high altitude, particularly in the High Weald, allow for the hills to catch and funnel water down into valleys that have been eroded for the past tens of thousands of years. These smaller waterways eventually join each other in the clay valleys of the Low Weald and create larger rivers that have cut through the solid chalk cliffs of the South Downs. Chalk is a sedimentary stone that is more resistant to erosion than the clays of the Low Weald, so the rivers running south have only managed to create several areas through which they can flow.[30] It is upon the many Low Weald waterways and the larger South Downs waterways that many hundreds of medieval watermills existed.

Compared to the waterways of Northern England that were able to support much larger watermills, requiring far fewer numbers of those structures, the waterways of Sussex are smaller and closer to larger proportions of the populated parts of the country.[31] These smaller waterways prohibited large watermills, forcing the populations to rely on more watermills that were smaller in size and that could have been found in almost every settlement, big or small.[32] Because of this practice of

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[29] Nicola R. Bannister, *Sussex Historic Landscape Characterisation: Vol. 2, Interpretation* (Archaeology Data Service, 2010), 13.
[30] Bannister, *Sussex Historic Landscape Characterisation*, 13–16.
[31] Ambler and Langdon, "Lordship and Peasant Consumerism," 38. Beyond environmental factors, Ambler and Langdon describe several economic reasons for the establishment of larger mills in the North, including the monopoly of the milling industry by Northern lords.
[32] Ambler and Langdon, "Lordship and Peasant Consumerism," 19; Mark Antony Lower, "Notes on Watermills and Windmills in Sussex," in *Sussex Archaeological Collections, Vol. 5*, ed. John Russel Smith (Sussex Archaeological Society, 1852), 272.

creating many smaller mills, waterways began to look like the Tillingbourne River, discussed above, in which large numbers of watermills existed upon on branch of a waterway, impacting the water movement all along the system and requiring the implementation of resource management between seigneurial estate mills and independent mills. Fortunately for the owners and investors who wished to construct watermills in Sussex, there were dense woodlands available for the exploitation of suitable construction timbers, legally or otherwise, and particularly after the plague of the 1350s.[33]

The unique environmental contexts of watermills in medieval Sussex cannot be attributed solely to the natural environment. The social environment to which these watermills belonged were just as important to the watermill as the natural environment was. There are many records, often legal documentation recorded and kept by ecclesiastical estates, of the social interactions between medieval watermills, so it makes good sense to utilize one of these documents for a case study. The legal case pertains to the demands for water rights along the Cuckmere River by Michelham Priory, in Upper Dicker, East Sussex, against two watermills owned by the abbot of Battle Abbey that are upriver of the Priory's watermill.

Michelham Priory's Watermill: A Case Study

The Augustinian priory of Michelham, constructed in 1229 and dissolved in 1536, Michelham Priory is considered one of the oldest standing moated sites in England, with the moat dating to the late 14th or early 15th century.[34] It is, however, the watermill on the southwest corner of the moat that is the subject of this study as it is believed to predate the moat and may even date back to the founding of the priory.[35] It is this watermill on the Cuckmere River that prompted the Prior of Michelham Priory, a man named Peter, to seek a legally binding agreement with the Abbot of Battle Abbey, Hadrian, that permits the water of Hadrian's millponds in Starnash (*Sternesse*) and Hellingly (*Hellingeleye*), upstream along the Cuckmere, to flow to the millpond of the Michelham watermill. The document used for the basis of this case study was identified by The Keep archive in Brighton, UK, is only ten lines long, and yet it provides invaluable insight into the environmental context of watermills in 13th

[33] Jean R. Birrel, "The Medieval English Forest," *Journal of Forest History* 24, no. 2 (1980), 84; Dan Yeloff and Bas van Geel, "Abandonment of Farmland and Vegetation Succession Following the Eurasian Plague Pandemic of AD 1347–52," *Journal of Biogeography* 34, no. 4 (2005), 580.
[34] Tom Hollobone, "Six Medieval Moated Sites near Arlington, East Sussex," in *Medieval Settlement Research Group Annual Report, Vol. 17*, ed. Carenza Lewis (Medieval Settlement Research Group, 2002), 31–33.
[35] Hollobone, "Six Medieval Moated Sites," 32.

century Sussex as it depicts the medieval watermill's natural and social environments as they existed in Sussex.[36]

Around the year 1255, it was agreed, under the supervision of King Henry III, that Hadrian, abbot of Battle Abbey, would permit water to flow along the Cuckmere River and into the millpond of Michelham Priory, up to a height of two feet and nine inches (*duarum pedum et dimidum et trium pollicit*) for a payment of ten shillings each year, half at Easter and half at the Festival of Saint Michael, "forever" (*in perpetuum*). If the payment was not made, then the abbot and his successors were permitted to withhold the water until the prior, or his successors, paid off the accumulated debt. It is very important to note that, at the time of this agreement, neither the moat nor the stone gatehouse and bridge had been constructed.[37] The lack of a moat would have limited the volume of water available for the mill to utilize and the lack of a gatehouse or stone bridge may indicate that the Priory was not very wealthy, which it was not.[38] There is evidence for a wooden bridge spanning the river at this time, which makes the specific water depth prescribed by Peter, prior of Michelham, a mystery as there is no known documentation that may indicate the purpose of this height.[39] Fortunately, though, this study is not about what the document does not reveal but, rather, what it does.

This short legal document shows that there was occasionally a need for mill owners to seek legal assistance in securing the requisite water resources for their watermill to work, which is a very clear form of resource management, something that recent scholarship has shown was quite important in medieval England and Europe. This document also describes that two foot nine inches of water was a sufficient of a height for the operation of the watermill, potentially indicating the presence of an undershot watermill, as the site and river size lack substantial variation in topography.[40] Fortunately, the watermill of Michelham Priory still exists today and is probably in the same spot as it was several hundred years ago, though it has undergone several forms of renovations.[41] It allows visitors

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[36] SAS/G 16/1, The Keep.
[37] Hollobone, "Six Medieval Moated Sites," 32.
[38] "Houses of Augustinian Canons: Priory of Michelham," in *A History of the County of Sussex: Volume* 2, ed. William Page (Victoria County History, 1973), 80.
[39] Hollobone, "Six Medieval Moated Sites," 32. An important note is that a large flood in the winter of 1852 may have destroyed the Medieval bridge of Michelham Priory, prompting a rebuilding of the bridge. See George Miles Cooper, "Some Account of Michelham Priory, in Arlington," in *Sussex Archaeological Collections, Vol. 6* (Lewes: Sussex Archaeological Society, 1853), 158.
[40] Undershot watermills possess water wheels that require water to flow beneath the wheel, through an excavated trough called a wheel pit, rather than overtop of the wheel. See Langdon, *Mills in the Medieval Economy*, 84; Bedwin, "The Excavation of Batsford Mill," 190; Gimpel, *The Medieval Machine*, 8.
[41] Jessica Hodge, *Michelham Priory: House and Gardens* (Scala Arts & Heritage Publishers, 2017), 44–46.

to experience, first–hand, the environmental context in which the watermill currently exists and to imagine its context throughout history.

Though it was a short document, the c. 1255 legal record for the agreement of water rights between Abbot Hadrian of Battle Abbey and Prior Peter of Michelham Priory clearly shows the social context in which a medieval Sussex watermill may have existed in. The document also alluded to the natural context and the water resource requirements of medieval watermills, providing solid foundations for future resource requirement extrapolations among other sites of watermills within Sussex County. This document demonstrates that the environmental context of medieval watermills cannot be limited to the natural environment, instead it must incorporate the social environment the mill belongs to as that context plays a vital role in the operation and success of the watermill.

Conclusion

Watermills have existed within the Western world for over two thousand years, and, throughout their existence, their environmental context has been composed of the same two contexts: the natural context and the social context. The environmental context, however, has often only been used by scholars as components of studies since most research done on watermills has focused primarily on their participation within small– and large–scale economies. This paper sought to produce a solid study for the value of scholarly research on environmental contexts as a primary focus of research because a watermill's context has far more deterministic effects and underlying values than many realize.

Mumford and Bloch can be considered the first scholars to truly bring attention to watermills, and other milling techniques and technologies, yet the views they put forth on watermills were constrained to the idea that the mills were symbols of a medieval industrial revolution or were precursors to the true Industrial Revolution. It was Holt and Langdon that shifted modern scholarship towards the study of the economic facets of watermills. Throughout the whole study of watermills, the natural and social contexts of mills, their environmental contexts, were examined simply to support the scholar's ideas and arguments rather than as a primary subject of study, regardless of how multifaceted and complex the environmental contexts were. The regional focus of this study was Sussex County, UK during the medieval period, and it proved to be a region full of information on the environmental context of watermills.

Influenced significantly by the geology and topography of the regions, the waterways of Sussex are, and were, complicated networks of small waterways that combine into larger rivers. It is upon the branches and tributaries of these larger rivers that the small, South England watermill existed, alongside others of its kind. Relative to Sussex's sparse population, watermills boasted a relatively high density per capita, likely influenced by both the low population density of the county and the ubiquitous nature of

small waterways that hosted smaller, lower–powered mills.[42] Each of these watermills required considerable amounts of human intervention within the landscapes to create suitable environments for a watermill to function. These landscape alterations subsequently caused many problems and conflicts within their communities, all of which had to be resolved, one way or another, before the watermill could fulfill its purpose. Many of these conflicts were often between watermill operators and owners and they generally concerned the management and distribution of water resources to each mill, requiring judicial mediation, whether that meant debates before the local council or legal proceedings overlooked by the monarch. The natural context of watermills can be understood best via the examination of the geology and topography, as stated above, while the social context of watermills can be discerned from primary sources, of which one composes this paper's case study.

The c. 1255 legal agreement between Prior Peter of Michelham Priory and Abbot Hadrian of Battle Abbey, which addressed the flow of water from Abbot Hadrian's watermills in Starnash and Hellingly down to the watermill of Michelham Priory, downriver on the Cuckmere River, exemplifies the types of agreements and concessions that were made by and between watermill owners and operators. Had Prior Peter not secured the appropriate volume of water to his mill, in this case two feet and nine inches of water, then his watermill would have failed, revenue would have been lost, and the Priory would have had to depend on, and pay, other watermills that were farther away. This document shows exactly how important the social context for a medieval Sussex watermill was.

The environmental context of watermills can be divided into two facets: the natural context and the social context. The natural context deals with the hydrology, topography, geology, ecology, and any other natural feature that may influence the functions of a watermill. The social context focuses on the influence of the communities and competition in contact with the watermill, or, in other words, any human force that may influence the watermill's operation. Studied individually, these contexts may provide unique perspectives on how a watermill functions versus how it should function, yet studied together, they form the environmental context that examines and portrays much of the real external forces that played a part in the placement, construction, operation, and success of a medieval watermill. I believe that this perspective of analysis could be applied to watermills across the rest of England, Europe, and into the Far East and would allow scholars to compare and contrast the various contexts and adaptations experienced and adopted by people of different environmental contexts.

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[42] Bruce M.S. Campbell, "Benchmarking Medieval Economic Development: England, Wales, Scotland, and Ireland, c. 1290," *The Economic History Review* 61, no. 4 (2008), 929.

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