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**Environmental Management in Medieval London: Was
London a “Filthy City”?**

**A thesis presented in partial fulfillment of the requirements for
the degree of**

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Abstract

The BBC series “Filthy Cities” presented medieval London as knee deep in muck, with rivers of butchers’ waste washing into streams and chamber pots emptied on the heads of hapless passers-by. This thesis asks whether medieval London was really a “filthy city”. It also investigates medieval attitudes towards the London environment, as a living space, pollution sink and a source of sustenance. The evidence for the state of the environment in medieval London and how the environment was managed is contained in a variety of primary sources, largely court records, ordinances, complaints and directives to abate pollution.

In order to provide a framework for analysis, this study examines whether environmental models currently used to manage and monitor the environment might provide a useful method for assessing the state of the environment in medieval London. A modified Driver-Pressure-State-Impact Response environmental reporting framework is proposed, taking account of the data limitations and the paucity of data on the environment *per se*. The selection of indicators for drivers and pressures on the environment is based on available information on the medieval economy, demography, housing, and industrial processes from documentary and archaeological sources. The key drivers are economic, cultural and demographic and give rise to pressures related to population, density, consumption, and associated resource demands and waste disposal problems.

Records of regulations and complaints provide information on both pressures and responses to environmental problems. Building on and considerably extending previous work, this study provides a detailed analysis of the Assize of Nuisance court records. It focusses on cases of environmental nuisance and supplements these with information on ordinances and cases from the Mayor’s Court. As shown in the modified DPSIR framework, responses may be precipitated by environmental problems, or that have spin-off environmental benefits. This thesis assesses public infrastructure and services, and private activities, serving to reduce environmental effects. It also looks at how the city

managed the Thames, and in particular the conflicts between various uses. Overall, the evidence suggests that the city's environment was well managed other than in times of crisis such as the plague epidemics, given the resources and technology available. The inhabitants of medieval London may have tolerated a dirtier smellier environment than inhabitants of modern-day western cities, but beyond a certain threshold, they were highly intolerant of pollution of their immediate environment.

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¹ <http://www.medievalists.net/2012/06/23/dirty-old-towns-environmental-impacts-of-medieval-irish-towns/>

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CHAPTER 1: Introduction

In trying to project myself back in time to late medieval London I keep wondering just what life in London was like. Unlike John Stow, I cannot stroll around the city, little changed from two hundred years before, and draw my own conclusions.¹ Yet a key aspect of daily life is our environment: the air we breathe, the odours we experience, the streets and lanes we walk or ride down, the houses we live in, and how we dispose of our waste. With cramped, dark living spaces, medieval Londoners would spend considerable time in the streets socialising and carrying out their business.² The Thames was a defining feature of the landscape and the life blood of the city, providing food, water, transport and waste disposal. This thesis examines the environment that people experienced in late medieval London, and how their attitudes shaped it.

A recent BBC documentary “Filthy Cities” presents medieval London as dirty, noisy and crowded; the streets (and the presenter) knee deep in muck; with rivers of butchers’ waste washing into streams.³ Researchers have been making assessments of how crowded and dirty the medieval environment was since the early twentieth century. Based on the surviving documentary evidence, early researchers concluded, like BBC presenter Dan Snow, that the environment was dirty, malodorous, crowded and insanitary and watercourses virtually open sewers. The pivotal work of Lynn Thorndike and Ernest Sabine in the 1920s and 1930s examining measures to control nuisance activities and offensive trades suggests that the environment was not as polluted as had been previously assumed.⁴ Researchers have expressed a variety of views in the eighty years since the publication of Sabine’s research and there is still a sharp division of views expressed in recent publications.

¹ John Stow, *The Survey of London*, Rev. ed., London: Dent, 1987; John Stow, *A Survey of London*, Oxford: Clarendon Press, 1971.

² Barbara A. Hanawalt, *Growing Up in Medieval London: The Experience of Childhood in History*, New York: Oxford University Press, 1993, 29. Harald Kleinschmidt, “Space, Body, Action: The Significance of Perceptions in the Study of the Environmental History of Early Medieval Europe,” *The Medieval History Journal*, 3: 2 (2000), 175–221.

³ BBC, *Filthy Cities - Medieval London*, 2011, http://www.youtube.com/watch?v=qC0mKH0HvYY&feature=youtube_gdata_player.

⁴ Ernest L. Sabine, “Butchering in Mediaeval London,” *Speculum*, 8: 3 (1933), 335–353; Ernest L. Sabine, “Latrines and Cesspools of Mediaeval London,” *Speculum*, 9: 3 (1934), 303–321; Ernest L. Sabine, “City Cleaning in Mediaeval London,” *Speculum*, 12: 1 (1937), 19–43; Lynn Thorndike, “Sanitation, Baths, and Street-Cleaning in the Middle Ages and Renaissance,” *Speculum*, 3: 2 (1928), 192–203.

Different ways of examining the available information on environmental conditions in medieval London, and different reasons for doing so, can yield different results. Some authors may be motivated by the desire to demonstrate how far we have come, by highlighting the worst features of the medieval environment. Some have highlighted the trouble spots – and assuredly there were some incidents where filth ran in the streets – and made it seem they were universal, because this provides greater entertainment. Undoubtedly the streets and streams of London would not meet modern standards of hygiene and a pollution control officer would not know where to begin with some hot spots. However, the number of regulations and provision for pollution complaints to be investigated suggests that this was not considered the norm, and streets running with filth were not acceptable to the king, the city governors or the inhabitants.

What is the value of taking another look? As shown in Chapter 2, researchers in the field, working from the same evidence base, have opposing views on how dirty and insanitary London was. Coming from a background of environmental policy and on-the-ground environmental management at the local level, I have a valuable contribution to make to this debate. First, I will examine whether the frameworks provided by current-day models of environmental reporting and environmental indicators are of value in assessing the environment of medieval London. These models were designed to use indicator information to assess the effectiveness of responses such as pollution-control legislation, levies or clean up initiatives in both reducing the pressures, and in improving the ambient environment. Other uses of these models are to assess longer term trends and compare conditions between different regions or countries. However, these models generally require a detailed time-series of consistent information to monitor the pressures on the environment and the state of the air, land and water. I propose to examine the workability of an environmental reporting framework where the information is patchy, qualitative, and potentially nuanced.

Secondly, while there is information on late medieval ordinances and regulations and the operation of the courts as avenues for complaints about environmental nuisance, this information has yet to be systematically interrogated using quantitative methods and text mining methodology. There is also a growing body of knowledge on environmental

conditions and sanitary arrangements from archaeological investigations which has yet to be fully integrated into the information from surviving documents. The key in both cases is “surviving”, because the record has large gaps, and is reliant on a random collection of surviving records or artefacts at sites in the case of archaeology that are dictated by availability through site clearance for development rather than a systematic approach.

Further compounding the deficiency in the information required for applying conventional frameworks is the lack of medieval datasets on the environment itself. We can never be sure what complainants and chroniclers meant when describing foul stench and streets blocked with muck, whether these were usual conditions or isolated incidents, or whether these were perhaps exaggerations designed to inspire action. This bias and the lack of a consistent, verifiable, time series of information limit the use of environmental models and frameworks, but the concepts may assist in answering the key research question of what the environment was like. The more sophisticated models take societal attitudes into account, and I will attempt to assess attitudes from the available information. There is a great deal of information on environmental pressures, both archaeological and documentary, in primary and secondary sources.

A key question is: what pressures were there on the environment in medieval London? For example, population and population density are drivers resulting in pressures from the level and concentration of human activity and the wastes generated. Economic activity also drives pressures on local resources and the production of waste streams, some of them toxic. We have information on actions that appear to be in response to the impacts resulting from these environmental pressures. I propose to examine the evidence of late medieval London society dealing with environmental issues and managing resources, and assess what can be deduced about the state of the environment. In some cases, political or cultural factors may be driving the response, but these actions still indicate a problem with an environmental component. Sometimes the king intervened in response to complaints and required that environmental ordinances be enforced, and as well as indicating that there was an environmental problem, these directives sometimes provide a rationale.

This leads to a second key question, what medieval attitudes to the environment were, indicated by whether the reason for responses was primarily environmental, social, political, or economic. I will examine attitudes to the environment and whether these changed over time, and whether the measures were effective. I will assess what was considered an acceptable level of pollution, the priority given to environmental issues, compared with economic and social issues, and how these were connected. I will also look at whether actions with environmental benefits were a response to an environmental issue or whether they were a response to external political factors such as threats of war highlighting the need for tightening defence, relationships with and stability of the crown, or internal factors such as the power of factions within the local government hierarchy.

While medieval Londoners' resource demands were basic by modern standards and the pollution largely organic, the concentration of people and activities would have had a significant effect on the local environment and on public health within the city. Technology for dealing with that pollution and abating environmental nuisance was also basic and required co-operation from residents. Societal attitudes to the environment would govern the type and magnitude of the environmental effects of Londoners' activities and the management of those effects. Attitude is seldom directly stated, apart from occasional references to an ordinance being made to preserve the fishing resource or the health of the population. It must therefore be inferred from the type of regulations made and infringements prosecuted, complaints, and other sources, such as medieval views on the miasmatic cause of disease. Other reasons for the city government taking action, such as maintaining a powerful stance against the Crown in times of unrest or dissent, must be taken into account. Sometimes these benefitted the environment, for example by keeping the streets clean.

This study covers the geographical area that came under the jurisdiction of the mayor and aldermen of late medieval London, both the wards within the city walls and the five wards outside the walls that came under the city's jurisdiction. In addition, information has been incorporated from the satellite towns of Westminster and Southwark where it

helps to build up a picture of the London environment.⁵ Because the Thames was such a key feature of the medieval London environment, this study looks at the Thames catchment as it relates to London city. The area of late medieval London is shown in Figure 1.

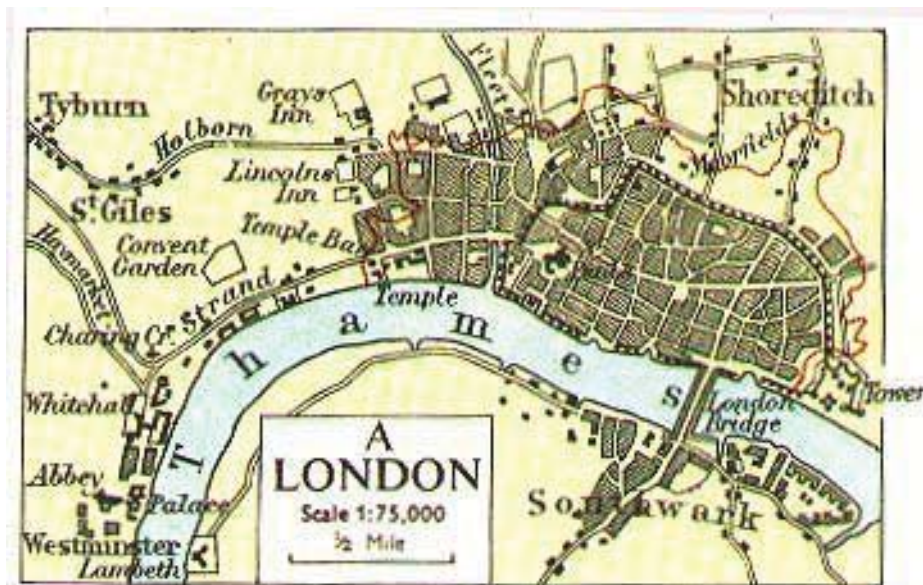


Figure 1: Map of medieval London

Adapted from *Muir's Historical Atlas*: (1911)⁶

The time period I have chosen to investigate is from the late 1290s to the -1420s. I also draw on later information where it illustrates a trend, and information from the later thirteenth century when pressures developed and some measures were introduced, although information on this early period is sparse. I have selected the fourteenth and early fifteenth centuries because it is a time where external factors such as war, famine and plague affected the day-to-day life of the population and political upheavals affected the ability of Londoners to govern themselves. It was also reasonably well documented and in particular is the period covered by the records of the Assize of Nuisance, a special

⁵ Generally the late medieval London urban area is considered to include Westminster and Southwark because of their proximity to and close association with the city. For example Stow mentions two main satellite towns or suburbs in his *Survey of London*: the "Citty" of Westminster and the "Burrough" of Southwark. They were the two main suburbs/satellite towns, one because of the influx of visitors associated with parliament, the other because of ready access across the bridge and that's where the stews were. Also noxious industries were either relegated to or fled to these areas to escape regulation by city. The city was granted increasing control in the governance of Southwark by charters of 1327 1406, 1444, 1462 and 1550. The charter of 1327 specifically refers to criminals fleeing to Southwark beyond the reach of the law. David J. Johnson, *Southwark and the City*, London: Corporation of London and Oxford University Press, 1969, 43, 387–394.

⁶ "Map of Medieval London," accessed June 29, 2013, <http://www.fordham.edu/halsall/maps/London.jpg>.

court convened on-demand to deal with private nuisance complaints, many of which are environmental.

The Assize of Nuisance is a valuable a source of information on environmental conditions in medieval London, but very few people have really drilled deeply into it, nor attempted to integrate detailed information from the Assize with the other documentary sources that demonstrate medieval responses to environmental issues. Studies on the Assize have dipped into it for cameos illustrating a point, or else have looked at it from a legal perspective. Only two recent studies have analysed the cases (discussed in Chapter 4), but one is an overview looking at buildings rather than the environment and one is potentially flawed. Early researchers, even as recently as the 1980s, were limited to working with hard copies of original material. It was not possible to download digitised text into a spreadsheet as I have done, nor analyse it with database queries, because those tools have only recently become accessible to the non-specialist. Even when Chew and Kellaway published their translation of the Assize records in 1973, computing was in its infancy and the analysis that could be done required massive mainframes occupying entire buildings, with queries and data entered via punch cards.⁷ It is unlikely that historians would have had access to these computing tools in the early 1970s.

The information that we have on the medieval environment comes from archaeological and documentary sources. Chapter 2 looks at the documentary sources available for analysis, both primary and secondary, other sources of information, and sums up the arguments of other researchers for and against London being a “filthy city”. Many useful primary documents have been collated, translated, and published, and more recently digitised, making them very accessible for analysis. Documentary sources often record disputes, complaints, and infringement of what society regarded as acceptable behaviour. Archaeology can provide information on the uses of land, buildings and watercourses. Secondary sources, including the introductions to the translations of primary documents, provide research methodologies and the results of research studies that can flesh out what we know about the medieval environment and attitudes, as well as other researchers’ assessments of the state of the medieval London environment.

⁷ Personal experience at the University of Canterbury, 1973 to 1977.

Chapter 3 introduces and evaluates some environmental models for their potential for assessing the state of the medieval London environment, and contemporary attitudes to it. It also discusses the drivers and pressures on the medieval environment, and the impacts arising. Many of the drivers are political and social but have consequences for the environment and the way it was managed. Chapter 4 continues this theme by discussing how the pressures and impacts were managed through regulations, ordinances, and procedures for dealing with infringements. It contains an in-depth analysis of the *Assize of Nuisance* and combines this with other sources of information on responses to environmental issues, or that had environmental outcomes.

While Chapter 4 focuses on expectations of the behaviour of the population, Chapter 5 looks at civic response in terms of providing public services and infrastructure to deal with pollution and public health, and in particular environmental management around the time of plague epidemics. It also examines the wider issue of management of the Thames a sustainable fishery and major transport corridor, looking at conflicts between competing uses. This chapter also looks at private actions that have environmental benefits, such as self-imposed restrictions on work practices and recycling of goods.

Chapter 6 pulls together the analysis on the medieval London environment and discusses what can be deduced about attitudes to the environment in medieval London. It uses the framework developed in Chapter 3, and the information presented in Chapters 4 and 5, to assess the extent to which we can determine what the medieval London environment was like, and whether the methods assessed can assist in answering this question. It is inevitable that there will still be gaps in information and understanding. This final chapter will also assess those gaps and suggest areas where further work would be productive.

CHAPTER 2: Sources of information and historiography

This chapter outlines the key primary sources used in this study. It also introduces the main secondary sources used either for information on the medieval environment, on pressures and resulting activities with environmental impacts. In addition this chapter looks at the debate on how dirty medieval London is likely to have been.

Primary sources

This study is based on the numerous published translations of primary source material, available in hard copy or on-line, covering the period from the late thirteenth century through to the mid- fifteenth century. The source material includes information on the governance of the city, regulations and ordinances, and records from the courts that enforced them. The *Assize of Nuisance* is the primary source document for the analysis of complaints covering environmental issues.¹ It contains the proceedings of the Assize of Nuisance court, set up to hear cases of private nuisance contravening a set of ordinances referred to as the Assize of Buildings.² The *Assize of Nuisance* covers the period 1301 to 1431 and list details of court dates, officials present, plaintiffs and defendants, details of the cases and the outcomes. A detailed analysis of these cases is set out in Chapter 4. This seems to be a full record of the business of the court, apart from a few entries that are noted as being incomplete. The records were probably written in fair copy after the assize had been held as each case is contained in a single record, even though many were adjourned and reconvened at a later date.

The city *Letter Books*, commencing in 1275, are a valuable source of information on city ordinances and prosecutions for violating them, public works, proclamations and directives from the king, the use of the Thames and regulations concerning fishing.³ They contain records of the proceedings of the Court of Common Council and Court of

¹ Helena M. Chew and William Kellaway, eds., *London Assize of Nuisance 1301 - 1431: A Calendar*, London: London Record Society, 1973. Also available digitally at www.british-history.ac.uk. The three assize rolls are held in the Corporation of London Records Office.

² The Assize of Buildings and the operation of the Assize of Nuisance court is discussed in detail in Chapter 4 and Appendix 1.

³ The series of *Letter Books* was published by the London Corporation between 1899 and 1912. See the bibliography for details of individual letter books.

Aldermen from 1275 to the early fifteenth century.⁴ From 1416 these records were entered in separate Journals. The Journal records begin at the end of this study period, although some relevant entries, reproduced in Barron (1970), have been used in this study. Sharpe describes the court record keeping as haphazard, so it is not clear how complete the Letter Books are. They may be selected examples, or what was available from rough copies handed in.⁵ As well as recording a wide variety of cases brought before the courts, the Letter Books intermittently record proclamations by the incoming mayor of city ordinances including keeping the streets clean.⁶ They also contain records of royal proclamations about public health and pollution, although these were mainly sourced from the parliamentary *Close Rolls*.

Whereas the *Letter Books* mainly cover the executive and administrative activities of the City authorities, the *Plea and Memoranda Rolls* cover a wider range of activities. The six volumes of *Plea and Memoranda Rolls*, covering the period from 1323 to 1457, contain material similar to the Letter Books: “writs and returns, political occurrences, proceedings of assemblies, ordinances of crafts, assessments and appointments of civic officers”.⁷ In addition, a handful of early nuisance cases are recorded in the *Early Mayor’s Court Rolls*, covering the period from May 1298 to August 1307. These rolls are the only surviving rolls from the mayor’s court from the fourteenth and fifteenth century, other than fragmentary membranes from 1377.⁸ The introduction states that the material is

⁴ Reginald Sharpe, ed., *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book A: Circa A. D. 1275-1298*, London: The Corporation of London, 1899. The Repertories of the Court of Alderman continued into the mid twentieth century. The Journals and Repertories are not available on-line, but relevant information has been quoted by Caroline Barron: C. H. Barron, “The Government of London and Its Relations with the Crown 1400-1450,” 1970, <https://qmro.qmul.ac.uk/xmlui/handle/123456789/1393>.

⁵ Sharpe, *LtrBkA*, iii. In the introduction to *Memorials*, Riley also suggests that entries were made at a later date from rough notes.

⁶ For example in early Nov 1420: “general proclamation [by the mayor] for the government of the City, the preservation of the peace, cleansing the streets, as well as forbidding the forestalling of merchandise, the enhancing of the price of poultry, the casting of rubbish into the river, &c” Reginald Sharpe, ed., *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book I: Circa A. D. 1400-1422.*, London: The Corporation of London, 1909, 427.

⁷ A. H. Thomas, ed., *Calendar of Plea and Memoranda Rolls Preserved Among the Archives of the Corporation of the City of London at the Guildhall, Rolls Ala-A9, A.D. 1323-1364*, Cambridge: Cambridge University Press, 1926, i.

⁸ *Calendar of Early Mayor’s Court Rolls : Preserved Among the Archives of the Corporation of the City of London at the Guildhall A.D. 1298-1307*, London: University Press, 1924, Introduction, part 1. Some cases

reproduced “in abstract”, so it may be an abbreviated and potentially nuanced version of selected events. Each mayor may have retained his own correspondence and legal documents after the permanent clerks had copied what they deemed to be worth preserving into the *Letter Books* and *Plea and Memoranda Rolls*.

A small number of nuisance cases are scattered through other primary sources such as the records of the Eyres of 1244, 1276 and 1321.⁹ The earlier two provide information on cases before the start of the Assize of Nuisance court, and the 1321 record contains full transcripts, although there are very few nuisance cases. Other records such as coroner’s rolls and the London Bridge accounts provide snapshots of daily life and glimpses of the environment people lived and died in. The London Bridge accounts from 1381 on show the rents paid by tenants, and in particular the butchers and the fishmongers for market stalls at the Stocks, and itemises vacancies. They also show expenses for pavoirs, and for fodder for horses, and for hiring horses, for masons, carpenters, lime and other building materials. While I haven’t used this source directly, excerpts are quoted in secondary sources.¹⁰

In addition to these primary records, various town clerks (known as “common clerks”) assembled records from their time in office that they believed to be worth preserving. The most important of these custumrals is the *Liber Albus* compiled by John Carpenter in 1419, during the last mayoralty of Richard Whittington, and a translation was published in 1861.¹¹ The *Liber Albus* is an important and accessible source for matters relating to the governance of the city, including the functioning of the wardmotes and ordinances such as the Assize of Buildings and references to statutes and the series of charters granted to the city. In his introduction, Carpenter notes that “due to the fallibility of

are set out in the Calendars of Plea and or the Letter Books, and from the reign of Edward III on, notes on cases were kept.

⁹ Helena M. Chew and Martin Weinbaum, eds., *The London Eyre of 1244*, 1974, <http://www.british-history.ac.uk/source.aspx?pubid=153>; Martin Weinbaum, “The London Eyre of 1276,” 1976, <http://www.british-history.ac.uk/source.aspx?pubid=156>. The records of the London Eyre of 1321 only contain two nuisance cases relating to bridges. Helen Maud Cam, ed., *Year Books of Edward II: Vol. XXVI (Part I): The Eyre of London 14 Edward II AD 1321 Vol I*, London: Selden Society, 1968.

¹⁰ British History Online, “London Bridge: Selected Accounts and Rentals, 1381-1538,” June 22, 2003, <http://www.british-history.ac.uk/source.aspx?pubid=1273>.

¹¹ John Carpenter, *Liber Albus: The White Book of the City of London*, trans. by Henry Thomas Riley, London: R. Griffin, 1861, viii.

memory and the shortness of life” important information may be lost, if it is not recorded systematically. Carpenter also notes the possibility of all the experienced rulers being carried off by pestilence at the same time. His stated aim is to bring together important memoranda, ordinances, and regulations scattered throughout the city records, as well as unrecorded customs.¹²

As a contemporary compilation, the *Liber Albus* author would have had full access to recent sources, but the source is subject to potential bias from selection and presentation of sources to meet an agenda. Carrel proposes that the *Liber Albus* was carefully crafted by John Carpenter and mayor Richard Whittington to present the city as a well regulated entity. She describes it as political “spin doctoring” to present London as a centre of “ancient and sacrosanct legal privilege, which is currently very successfully run by the government of which they are both a part”.¹³ Carrel examines the treatment of food retailers as an example of this manipulation, and highlights sections of the *Liber Albus* she believes were inserted by Carpenter. This raises an interesting question: in instances where the *Liber Albus* has more detail than the letter books, could it have been augmented by Carpenter for any political purpose? Carrel also notes the emphasis placed on the ancient origins of London’s ordinances to give them credibility.¹⁴

Memorials comprises “a series of extracts, local, social, and political, from the early archives of the City of London”, selected, translated, and edited by Riley and published in 1868. The introduction notes that the *Memorials* are derived from the same sources as John Carpenter’s *Liber Albus*, (the *Letter Books*) and is the result of traversing “some thousands of folio pages”.¹⁵ The *Liber Albus* focuses on city laws, rights and customs whereas the *Memorials* sets out to demonstrate local history and social life. Like the *Liber Albus*, it covers the period between 1276 and 1419 and uses the first nine of the

¹² Ibid., 3.

¹³ Helen Carrel, “Food, Drink and Public Order in the London *Liber Albus*,” *Urban History*, 33: 2 (2006), 177.

¹⁴ Ibid., 183, 187. Claiming origins in antiquity was a common theme in the late medieval and early modern period. For example, Stow firmly roots the origins of London in classical times, quoting Geoffrey of Monmouth’s story of Brut, a descendant of demi-gods, founding London. Stow, *The Survey of London*, 3.

¹⁵ See introduction for a discussion of medieval sources of compilations of records and difficulties encountered in accessing them. Henry Thomas Riley, *Memorials of London and London Life in the XIIIth, XIVth and XVth Centuries*, London: Longmans, Green & Co., 1868, xviii. *Memorials* p xviii

letter books for source material. Unlike the *Liber Albus*, the later compiler, a well-respected archivist, is unlikely to have been working to a political agenda.

Other customnals mentioned in compilations are the *Liber de Antiquis Legibus*, compiled about 1274, and the *Liber Horn*, compiled about 1311 by Andrew Horn, City Chamberlain, the *Liber Custumarum*, compiled in 1324 and the *Liber Dunthorn* compiled by Town Clerk William Dunthorn (1461-90). These are not readily accessible but extracts have been preserved in other more accessible sources such as the *Liber Albus* and *Memorials*. For example, the Assize of Buildings as set out in the *Liber Custumarum* is replicated in the translated *Liber Albus*.

John Stow's *Survey of London* was first published in 1598. Stow, born in 1525, was a tailor with a passion for history, collecting historical manuscripts and drawing information from physical surveys of the city. His *Survey* combines this documentary information, including collations such as the *Liber Custumarum*, *Liber Horn* and the *Letter Books*, with information on the physical features to trace the history of the city.¹⁶ The introduction to the 1908 edition notes that he “witnessed the passing of medievalism and the birth of the modern capital.” In particular he discusses the water supply infrastructure, urban sprawl and ribbon development and the loss of open spaces and old buildings within the city after the reformation. While Stow's *Survey* was compiled two hundred years after the period of this study, he had access to records from that period. Stow's *Survey* is very useful background on the layout and infrastructure but makes extensive use of primary sources that I have access to, and it is not always clear whether what Stow describes was present in the early fifteenth century or is a later construction.

Early historiography

Early historians and archivists have transcribed, translated, interpreted and made the primary sources listed above accessible. Their analysis and interpretation in introductions to of the translated primary material forms a body of secondary material. Two early books on medieval London provide very useful background. Sir Walter Besant, writing in the early 1900s, has provided a comprehensive description of medieval London that is

¹⁶ Stow, *The Survey of London*, v – vii.

very informative but relies a great deal on Stow.¹⁷ Eilert Ekwall has produced a comprehensive analysis of street names and their meanings that is helpful in locating and dating specific types of industry and land use.¹⁸

In 1928 Lynn Thorndike published a paper on “Sanitation, Baths, and Street-Cleaning in the Middle Ages and Renaissance”.¹⁹ In this paper he seeks to correct three misconceptions about the middle ages: that “the streets of mediaeval towns were constantly foul-smelling and full of filth”; that soap and bathing was “little known”; and that there was a lack of sanitary legislation or care for public health.²⁰ He refutes these notions as being based on projecting back from crowded, insanitary conditions in the nineteenth century and assuming that the middle ages must have been much worse, i.e. that conditions would necessarily improve with the march of time. He cites the widespread existence of public baths in medieval towns, and suggests that documented complaints about medieval dirty streets represent not the normal state of affairs, but rather a deviation from this. Similarly he suggests that medieval legislation against nuisance reveals action to ensure an orderly state of affairs rather than an indication that pollution was prevalent.²¹

In the 1930s Ernest Sabine produced three innovative articles on medieval London covering butchers, latrines and cess pools, and city cleaning.²² In his article on latrines, he notes that the waste from these latrines was often disposed directly into, or flushed into, water, or disposed of in a “cesspool”.²³ Sabine uses information from the Bridge Accounts, Early Mayor’s Rolls, Plea and Memoranda Rolls, letter Books and Coroners’ Rolls and Stow, and selected cases from the Assize of Nuisance. He traces the history of building latrines over the Walbrook, starting with attempts to prevent the practice, then

¹⁷ Walter Besant, *The Survey of London*, London: A. & C. Black, 1902.

¹⁸ Eilert Ekwall, *Street-Names of the City of London*, London: Oxford University Press, 1954.

¹⁹ Thorndike, “Sanitation.”

²⁰ *Ibid.*, 192.

²¹ *Ibid.*, 198–9.

²² Sabine, “Butchering”; Sabine, “Latrines”; Sabine, “City Cleaning.”

²³ Sabine, “Latrines,” 303–5. Although Sabine uses the term “cesspool”, the term “cesspit” better describes what would usually have been a covered structure, and is consistent with the terminology in the translation of the Assize of Nuisance which forms the basis of this thesis.

allowing it subject to the payment of a fee, then prohibiting the practice again.²⁴ He also traces the difficulties in finding an acceptable location for disposal of butcher's waste, first being granted a jetty for waste disposal, and then being ordered out of the city limits because of the stench of the waste, and the city officials appointed to deal with city cleaning and sanitation.²⁵ Sabine, like Thorndike, concludes that the frequent occurrence of offences relating to wastewater does not mean that the whole of London was filthy, even according to the standards achievable at the time, and that the majority of citizens managed their privy waste effectively.²⁶

In 1950 the Corporation of London published a brief history that provides a comprehensive description of the early London court system.²⁷ Extensive archaeological work has been undertaken since this history was published and has filled in some of the information gaps identified, but the information on medieval courts and administration is extremely valuable. While this history provides useful background on the city officials and courts, extending up to 1950, it does not discuss the political role the city played, nor dissensions between the city and the monarch. This aspect of the city governance is covered extensively by Barron (1970), mainly for the later fifteenth and sixteenth century.²⁸

Recent historiography

In studying the environment of medieval London, I have used three main kinds of documentary sources. The primary material discussed above is my source of data for analysis. Numerous secondary sources provide information and background on the medieval urban environment, industry and daily life and on medieval attitudes and values, and these are discussed at the appropriate point through this thesis. Other secondary sources provide key information and draw conclusion relevant to the

Studies based on documents

Numerous researchers have published articles and books that provide an overview and background on the late medieval urban environment and on social, political and economic conditions in late medieval London. Foremost among these is the work of

²⁴ Ibid., 309–10.

²⁵ Sabine, "Butchering"; Sabine, "City Cleaning."

²⁶ Sabine, "Latrines."

²⁷ The Corporation of London, *The Corporation of London: Its Origin, Constitution, Powers and Duties*, 2nd ed. London: Oxford University Press, 1953.

²⁸ Barron, "Government of London."

Caroline Barron, whose recent comprehensive book on medieval London includes chapters on governance and the judiciary, and on the urban environment. Her PhD thesis, which covers a slightly later period than this study, includes information from relevant records that are not published or available electronically.²⁹

A specific and very detailed survey of Winchester has been carried out by Derek Keene, combining detailed information on individual properties with more general documentary evidence to recreate the layout, ownership and occupancy of the town. This provides invaluable information on medieval urban living conditions, and as will be seen later, Keene concludes that these were unsanitary. Keene has also published a detailed property by property survey of London before the great fire.³⁰ Gervase Rosser has undertaken detailed studies on Westminster and Martha Carlin on medieval Southwark, both satellite towns of medieval London.³¹ Frank Rexroth has published a study of medieval London that makes interesting connections between pollution and social control.³²

Several researchers have published major studies demonstrating how information on local events and people can be extracted from otherwise dry records and crafted into a narrative to create a picture of everyday medieval London life and insight into events. Pamela Nightingale has published a detailed study of the Grocers' Company, interpreting the records in light of other contemporary events.³³ Barbara Hanawalt demonstrates her methodology of extracting evidence from barren court records in her study of childhood and adolescence in medieval London and in looking at the poor in London.³⁴ Hanawalt

²⁹ Ibid.; Caroline M. Barron, *London in the Later Middle Ages: Government and People 1200-1500*, Oxford: Oxford University Press, 2004.

³⁰ Derek Keene, *Survey of Medieval Winchester*, vol. 1, Oxford: Oxford University Press, 1985; Derek Keene and Vanessa Harding, "Historical Gazetteer of London before the Great Fire - Cheapside; Parishes of All Hallows Honey Lane, St Martin Pomary, St Mary Le Bow, St Mary Colechurch and St Pancras Soper Lane," June 22, 2003, <http://www.british-history.ac.uk/source.aspx?pubid=8>.

³¹ Gervase Rosser, *Medieval Westminster 1200-1540*, Oxford: Clarendon Press, 1989; Martha Carlin, *Medieval Southwark*, London: Hambledon Press, 1996.

³² Frank Rexroth, *Deviance and Power in Late Medieval London*, Cambridge: Cambridge University Press, 2007.

³³ Pamela Nightingale, *A Medieval Mercantile Community: The Grocers' Company & the Politics & Trade of London*, New Haven, Conn: Yale University Press, 1995.

³⁴ Hanawalt, *Growing Up*; Barbara A. Hanawalt, "Reading the Lives of the Illiterate: London's Poor," *Speculum*, 80: 4 (2005), 1067-1086.

notes the difficulty of extracting information from court records, where the participants' story is translated into Latin and often into a formulaic statement.³⁵

Archaeological studies

The key researchers looking at what archaeology can reveal about the medieval urban environment are John Schofield and Alan Vince. In *Medieval Towns* they examine the environment of medieval British towns, and point out some of the difficulties in using archaeological evidence to assess human activity. For example, plant material could indicate natural occurrence, cultivation, importation from other areas of a crop or weed contaminant, or use in industry. Dating and assessing relative abundance is difficult, for example some seeds can survive hundreds of years without alteration whereas other materials break down very quickly.³⁶ The best material comes from undisturbed water-logged sites, such as the Thames waterfront.

In *Medieval London Houses*, Schofield pulls together archaeological and documentary evidence in a survey of London houses and streets. His main sources are surviving fragments of buildings; archaeological excavation; documentary records; panoramas, surveys and plans; contemporary descriptions including Stow; and visual representations and photographs from a later period.³⁷ In his most recent work, *London 1100-1600*, a useful overview of medieval London life and living arrangements, Schofield looks more specifically at human health and the environment. The archaeological surveys provide very useful background on sanitary arrangement and, for example, locations of cesspits and wells on urban sites.³⁸

Scientific and technical

In more specific studies, a good general overview of medieval industries is provided in a collection of articles edited Blair and Ramsay, particularly chapters on leather production, textiles and bone and horn working.³⁹ Richard Hoffman has undertaken extensive research on the medieval urban environment and the exploitation of freshwater and

³⁵ Hanawalt, "London's Poor," 1067.

³⁶ John Schofield and Alan Vince, *Medieval Towns: The Archaeology of British Towns in Their European Setting*, London: Equinox, 2005, 214–5.

³⁷ John Schofield, *Medieval London Houses*, New Haven: Yale University Press, 1994.

³⁸ John Schofield, *London 1100-1600: The Archaeology of a Capital City*, Sheffield: Equinox, 2011.

³⁹ John Blair and Nigel Ramsay, eds., *English Medieval Industries: Craftsmen, Techniques, Products*, London ; Rio Grande, Ohio, U.S.A: Hambledon Press, 1991.

marine fishing resources.⁴⁰ Peter Brimblecombe's research speciality is causes and impacts of historic air quality, looking at sources of pollutants and likely pollution levels, particularly from burning coal.⁴¹ Medieval skeletons have also been examined for evidence of sinusitis related to air quality.⁴²

Various authors have published books and articles on legal history that provided useful background to the court and legal system (discussed in Chapter 4). However, none discuss the Assize of Nuisance court in great detail, apart from the introduction to the *Assize of Nuisance* which gives an overview of cases and discusses the operation of the court. Although some of the sources make suggestions about the origins of the Assize court, none present a case for their suggestions. Janet Loengard provides history of the Assize and her introduction to the *London Viewers and their Certificates* has useful background information.⁴³

Environmental history

Two key authors in medieval environmental history that focus on water and wastes are Roberta Magnusson and Dolly Jørgensen. Magnusson's research is in the area of medieval water technology and she has published a useful overview of the environment of medieval London.⁴⁴ Jørgensen's PhD thesis focusses on the environment of several small medieval cities in England and Scandinavia, and she has published several articles on

⁴⁰ Richard C. Hoffmann, "Medieval Europeans and Their Aquatic Ecosystems," in *Beiträge Zum Göttinger Umwelthistorischen Kolloquium 2007- 2008*, ed. by Bernd Herrmann, Göttingen: Universitätsverlag Göttingen, 2008, 45–64; Richard C. Hoffmann, "Economic Development and Aquatic Ecosystems in Medieval Europe," *The American Historical Review*, 101: 3 (1996), 631–669; Richard C. Hoffmann, "A Brief History of Aquatic Resource Use in Medieval Europe," *Helgoland Marine Research*, 59: 1 (2005), 22–30.

⁴¹ P. Brimblecombe, "Industrial Air Pollution in Thirteenth-Century Britain," *Weather*, 30: 12 (1975), 388–396; Peter Brimblecombe, "Attitudes and Responses Towards Air Pollution in Medieval England," *Journal of the Air Pollution Control Association*, 26: 10 (1976), 941–945; Peter Brimblecombe, *The Big Smoke: a History of Air Pollution in London Since Medieval Times*, London ; New York: Methuen, 1987; L. Makra and P. Brimblecombe, "Selections from the History of Environmental Pollution, with Special Attention to Air Pollution. Part 1.," *International Journal of Environment and Pollution*, 22: 6 (2004), 641–656.

⁴² M. E. Lewis, C. A. Roberts, and K. Manchester, "Comparative Study of the Prevalence of Maxillary Sinusitis in Later Medieval Urban and Rural Populations in Northern England," *American Journal of Physical Anthropology*, 98: 4 (1995), 497–506.

⁴³ Janet Loengard, "The Assize of Nuisance: Origins of An Action at Common Law," *The Cambridge Law Journal*, 37: 1 (1978), 144–166; Janet Loengard, ed., *London Viewers and Their Certificates, 1508-1558 - Certificates of the Sworn Viewers of the City of London*, 2003, <http://british-history.ac.uk/source.aspx?pubid=158>.

⁴⁴ Roberta J. Magnusson, "Water and Wastes in Medieval London," in *A History of Water. Vol. 1, Water Control and River Biographies*, ed. by Terje Tvedt and Eva Jakobsson, London: I. B. Tauris, 2004, 300–313.

medieval waste disposal.⁴⁵ Her research is discussed in more detail below. Derek Keene has also written extensively on water and waste in medieval London and these articles are discussed in the chapters below.

Richard Hoffmann has proposed a model for assessing the medieval environment, in turn based on work by Boyden.⁴⁶ This work is discussed in more detail in Chapter 3. Two studies estimate an ecological footprint for medieval London. The most definitive study on medieval London's fuel supply is a study by James Galloway, Derek Keene, and Margaret Murphy.⁴⁷ This study looks at medieval London's demand for fuel wood and the impact on the hinterland. A complementary study looks at meeting London's demand for food.⁴⁸ The publications of international environmental agencies on environmental management systems and environmental reporting models are discussed in Chapter 3.

How polluted was medieval London?

Dan Snow, in 'Filthy Cities', would have us believe that medieval cities were awash with the blood and guts of slaughtered animals, the streets knee deep in animal and human excrement, and the risk of being hit with the contents of a chamber pot or privy located over a lane enormous. Various authors support this view. For example, writing in 1906, Besant describes the Fleet river as "much choked with filth and rubbish", the lanes near the river as "a tangle of narrow lanes and courts...foul and stinking" and describes streets with gutters choked with offal, fish heads, bones and other refuse and yet acknowledges that this refuse would have been washed away by rainfall, and that the people would not

⁴⁵ Delores Marie Jørgensen, "Private Need, Public Order: Urban Sanitation in Late Medieval England and Scandinavia" PhD, University of Virginia, 2008, <http://proquest.umi.com/pqdweb?did=1801471531&sid=1&Fmt=2&clientId=52314&RQT=309&VName=PQD&cfc=1>; Dolly Jørgensen, "'All Good Rule of the Citee': Sanitation and Civic Government in England, 1400—1600," *Journal of Urban History*, 36: 3 (2010), 300–315; Dolly Jørgensen, "Local Government Responses to Urban River Pollution in Late Medieval England," *Water History*, 2: 1 (2010), 35–52.

⁴⁶ Richard C. Hoffmann, "Footprint Metaphor and Metabolic Realities: Environmental Impacts of Medieval European Cities," in *Nature's Past: The Environment and Human History*, ed. by Squatriti Paolo, Ann Arbor: University of Michigan Press, 2007, 288–325; Stephen Boyden, "Nature, Society, History and Social Change," *Innovation: The European Journal of Social Sciences*, 14: (2001), 103–116.

⁴⁷ James A. Galloway, Derek Keene, and Margaret Murphy, "Fuelling the City: Production and Distribution of Firewood and Fuel in London's Region, 1290-1400," *The Economic History Review*, 49: 3 (1996), 447–472.

⁴⁸ "Feeding Medieval European Cities, 600-1500 by Derek Keene | Institute of Historical Research," accessed September 20, 2012, <http://www.history.ac.uk/resources/e-seminars/keene-paper>; Derek Keene, *A Medieval Capital and Its Grain Supply: Agrarian Production and Distribution in the London Region C.1300,1993*.

have tolerated the “intolerable level of filth” that might be assumed. He notes the stringent regulations for cleanliness and order.⁴⁹

Writing in the 1960s, Williams stated that in the thirteenth century “pigs roamed the streets and city ordinances dealt with the rearing of cattle in houses.”⁵⁰ Ekwall noted the existence of Fowle Lane, meaning the foul (dirty or evil smelling) lane and Stinking Lane (Styngkynglane) from 1228.⁵¹ In a recent study of plague, Gummer describes the back streets of mid-fourteenth century London as a “giant maelfactory” with fumes from tanneries, soapmakers, coal and wood fires, rubbish and dung heaps, slaughterhouses and fishmongers, cesspits and sewers, and notes that the stink from the Thames caused Edward III to complain to the mayor and aldermen about the threat to Londoners’ health.⁵²

In the introduction to a collection of essays on the English medieval town published in 1990, Richard Holt and Gervase Rosser describe the “mundane reality” as “insalubrious and unhealthy” and propose that “filth running in open ditches in the streets, fly-blown meat and stinking fish, contaminated and adulterated ale, polluted well-water, unspeakable privies, epidemic disease, casual interpersonal violence, disastrous fires – were experienced indiscriminately by all social classes”.⁵³ However, in support of this sweeping statement, Holt and Rosser cite articles by Sabine on butchering and latrines and an article by Keene on rubbish in medieval towns, and Sabine certainly does not come to this conclusion. In discussing Winchester, Keene estimates that “In wet weather most streets and lanes must have been at least ankle-deep in refuse”. He reports that excavated street surfaces had “large quantities of animal bone in a matrix of decayed organic material”, corroborating the evidence of court records that throwing dung and rubbish into the streets was common practice, and that there would have been heaps of rubbish in every street, with some areas worse than others.⁵⁴ However, Jørgensen

⁴⁹ Besant, *The Survey of London*, 167, 169, 171, 177, 226.

⁵⁰ Gwyn A. Williams, *Medieval London: From Commune to Capital*, London: Athlone Press, 1963, 16.

⁵¹ Ekwall, *Street Names*, 101.

⁵² Benedict Gummer, *The Scourging Angel: The Black Death in the British Isles*, London: Bodley Head, 2009, 97–99.

⁵³ Richard Holt and Gervase Rosser, eds., *The English Medieval Town: A Reader in English Urban History 1200-1540*, London ; New York: Longman, 1990.

⁵⁴ Keene, *Winchester*, 1:53–54.

disagrees, noting that rubbish was used as fill and finding it in excavations doesn't necessarily mean that it was just dumped on the streets.⁵⁵

Some researchers present medieval towns as polluted but acknowledge that councils made serious attempts to resolve the problems. Writing in 1960, Mumford paints a picture of medieval cities as "wallowing in rubbish and filth".⁵⁶ Bryson quotes this and says that it is wrong, or at least incomplete, although he suggests that because of the foul job of cleaning out cesspits, they were probably seldom emptied.⁵⁷ Hanawalt notes that immediately following the Black Death the streets may have dirtier than usual, but although "not clean by our standards, the streets... were not perhaps as filthy as modern mythology about medieval times would have them."⁵⁸ Fagan proposes that the Assize of Buildings was an attempt to resolve overflowing cess pits flooding cellars, stormwater and contentions between neighbours arising from these, and presents a picture of the watercourses fouled with waste from latrines built over them, butchers' waste cast into them and probably groundwater pollution from deep cesspits. However, he praises the water supply system from the Conduit as "advanced for its time" and regards the provision of drainage channels in the streets as a benefit and does not suggest the streets were running with muck.⁵⁹

Many researchers have challenged the view of London being a filthy city. Lilley argues that the view of medieval cities as being "squalid, chaotic and unrefined" is a caricature and in fact they were highly organised. He aptly describes the middle ages as a contested heritage.⁶⁰ Jørgensen also challenges the pessimistic view of these historians on the basis that they are extrapolating back from the polluted situation in the Victorian era and assuming that if the eighteenth century was polluted, the medieval period must have been much worse. However, in her view they fail to take into account that the "low-tech" solutions of pit privies and carting waste may have been appropriate for the level

⁵⁵ Jørgensen, "Urban Sanitation," 203.

⁵⁶ Lewis Mumford, *The City in History: Its Origins, Its Transformations, and Its Prospects*, New York: Harcourt Brace Jovanovich, 1961, 75.

⁵⁷ Bill Bryson, *At Home: A Short History of Private Life*, Random House, 2011, 486, 503–4.

⁵⁸ Hanawalt, *Growing Up*, 29–30.

⁵⁹ Brian M. Fagan, *Elixir: a History of Water and Humankind*, 1st U.S. ed., New York: Bloomsbury Press, 2011, 323.

⁶⁰ Keith D. Lilley, *Urban Life in the Middle Ages 1000-1450*, European Culture and Society Houndmills, Basingstoke, Hampshire ; New York: Palgrave, 2002, 20–21.

and density of population. In contrast, population had grown enormously by 1800, but technology had changed little. She notes that the pessimistic view was challenged as early as 1928 by Lynn Thorndike and the sanitary measures in place were examined intensively by Ernest Sabine in the 1930s. Jørgensen says that more recent work has rejected this positive view, returning to the view that complaints and ordinances against pollution indicate an unsanitary environment.⁶¹

While noting this return to a more negative reading of the medieval documentary sources, Jørgensen proposes that “cleanliness statutes indicate a genuine concern for the urban environment and were more effective than modern historians assume”.⁶² Taylor echoes this view, stating that medieval London would have “smelt horrible”, not because people were insensitive but because they didn’t have the technology to solve their pollution problem.⁶³ Jørgensen postulates that the simple technologies available, disposal of liquid waste via channels in the streets and removal of “muck” and cesspit waste by cart required complex intervention by civic authorities to ensure that the inhabitants met their civic responsibilities to keep the streets clean. In later periods, the authorities appointed street cleaners and provided cartage for householder’s waste, the organic portion being useful as fertilizer.⁶⁴ She argues that “Medieval sanitation developed through the reciprocal interaction between physical conditions and complex social systems”.⁶⁵

Magnusson describes the development of medieval urban environmental history, and refutes earlier theories that medieval cities were filthy. She interprets the extensive regulations and frequent complaints as sign that pollution was not regarded as acceptable.⁶⁶ Magnusson says that the repeated reissuing of sanitary laws “has been challenged by those who see sanitary legislation and the evident willingness of citizens to

⁶¹ Jørgensen, “Urban Sanitation,” 9.

⁶² Ibid., 12.

⁶³ Craig Taylor, “The Disposal of Human Waste: A Comparison Between Ancient Rome and Medieval London,” *Past Imperfect* 11 2005: 64.

⁶⁴ Dolly Jørgensen, “Cooperative Sanitation: Managing Streets and Gutters in Late Medieval England and Scandinavia,” *Technology and Culture*, 49: 3 (2008), 547–567; Dolly Jørgensen, “What to Do with Waste,” in *Living Cities: An Anthology in Urban Environmental History*, Ed. Matthias Legnér and Sven Lilja (Stockholm: Forskningsrådet Formas, 2010), 34–55, 2010; Jørgensen, “Urban Sanitation”; Jørgensen, “All Good Rule of the Citee’”; Jørgensen, “Local Government Responses.”

⁶⁵ Jørgensen, “Urban Sanitation,” 4.

⁶⁶ Magnusson, “Water and Wastes.”

lodge nuisance complaints as indications that the majority of medieval townsmen valued the health, decorum, and dignity of their communities. From this perspective, citizens kept promulgating such laws precisely because they viewed them as at least reasonably effective safeguards for the urban environment.”⁶⁷

Addressing the research gap

Although some of the publications listed above have examined aspects of the medieval urban environment, none has assessed the evidence for how polluted medieval London was within an environmental management framework. Two recent masters theses address nuisance in medieval London, but neither address the issues in depth, nor from an environmental management perspective. Pia Elverhøi starts from the position that London was crowded and dirty, but that the mayor and aldermen used mechanisms such as the Assize of Nuisance to control pollution.⁶⁸ Her thesis is not easily accessible as it is in Norwegian, and she uses a very limited range of primary sources (only the *Assize of Nuisance* and the *York Civic Ordinances* and a set of Norwegian by-laws). For example she has not looked at the Assize of Buildings ordinances that the Assize of Nuisance court judged cases against, saying that they had to be guessed from the cases. In fact, these ordinances are set out in both the *Liber Albus* and *Memorials*. The problems with her analysis of the Assize will be discussed in more detail in chapter 4.

Ciecieznski looks at nuisance in medieval London, but focuses on controls on social nuisance such as prostitution. Although the work was submitted in 2009 it does not mention the work of Rexroth in this area (published in 2007). She includes a chapter on environmental regulations in medieval London, and although it takes a wider view of nuisance, it makes no attempt to look at legal definitions of nuisance, instead relying on a dictionary definition. In addition, she seems to have misread the Assize of Nuisance in assuming that the records don't state whether complaints about pavements were instigated by citizens. In fact of the seven complaints to the Assize she discusses, two were brought by the neighbours, one by an individual and four by the mayor and aldermen or commonality. Her discussion of city cleaning and butchers' waste is largely reliant on Sabine's articles (discussed above), and she does not look at the potential

⁶⁷ Roberta J. Magnusson, "Medieval Urban Environmental History," *History Compass*, 11: 3 (2013), 191.

⁶⁸ Pia Elverhøi, "Making Cities Habitable in the Middle Ages? A Study of London via the 'London Assize of Nuisances 1301-1431. A Calendar'," 2007.

effects of the waste. Neither of these two studies provide a detailed and credible analysis of the Assize of Nuisance nor the evidence for pollution in medieval London, and both suffer from relying on secondary sources rather than going back and interrogating the range of primary source material available.

Jørgensen has undertaken extensive investigations into medieval waste disposal, in England and Scandinavia. Her PhD thesis focuses on late medieval sanitation technology and the role of city corporations in medieval Coventry, York, Norwich and urban centres in Scandinavia. She excludes London from her study on the basis that it is an anomaly in terms of size, and that smaller centres are more representative of general living conditions, and extends her study to 1600 to give a better flavour of the gradual changes occurring.

Conversely, I have focussed on London because the intensification of activities gives rise to more concentrated effects, and on the fourteenth and early fifteenth centuries because that is the period covered by the primary document I propose to examine, the *Assize of Nuisance*. Jørgensen states that “although the services provided in the late medieval city were low-tech, they were generally appropriate to the density and layout of medieval cities and to the environmental concerns and social relations of their residents.” She proposes that complaints of improperly disposed of waste indicate that such situations deviated from the norm of reasonable cleanliness.⁶⁹ I propose to examine this question in more detail.

Two key researchers in the field of medieval urban environmental history have each recently announced proposals to publish on the topic of whether the medieval environmental was as polluted as some researchers suggest. Magnusson proposes to publish a book on medieval urban environmental history in 2014, discussing the following: “For many years, medieval towns were thought to be universally foul and filthy, a stereotype that remains common in both academic and popular histories. Since the 1920s, however, historians who work closely with the documentary evidence have challenged such a one-dimensional characterization. A growing body of evidence from urban archaeological sites has created the potential for a more integrated,

⁶⁹ Jørgensen, “Urban Sanitation,” 9.

interdisciplinary approach to the study of urban ecosystems and waste management. Recent environmental scholarship has also focused on 'urban footprints' (the impact of cities on their supply hinterlands) and on the social construction of medieval attitudes to hygiene."⁷⁰

Jørgensen plans to publish a paper in 2014 on "Modernity and medieval muck" in which she challenges the idea of "the medieval street as a mud- and muck-filled cesspit", looking in particular at the episode on medieval London in the BBC *Filthy Cities* series that also grabbed my attention, and using documentary evidence to show that this portrayal is exaggerated and is based on a "constructed dichotomy of medieval filth versus modern cleanliness", distancing ourselves from our own waste problems.⁷¹

These two major researchers in medieval environmental history have identified the same gap that I have identified. I have endeavoured to fill this gap by combining a historical and environmental approach, and focussing on medieval London, a city with high population density and abundant records. The proposal by Jørgensen is similar to the approach I have taken in this thesis. I have interrogated the sources to determine what they actually say, looking at the making and restating of ordinances and the explanations given and the frequency of complaints, prosecutions, and follow-up enforcement.

⁷⁰ "COMING SOON: 'Medieval Urban Environmental History' by Dr. Roberta Magnusson," *History Compass*, accessed August 25, 2013, <http://history-compass.com/2012/11/15/coming-soon-medieval-urban-environmental-history-by-dr-roberta-magnusson/>.

⁷¹ The abstract of this forthcoming paper, to be published in *Nature + Culture*, fall 2014, was recently posted at www.dolly.jorgensenweb.net

CHAPTER 3: Analytical framework, drivers, pressures and impacts

This chapter evaluates a variety of environmental management and reporting models to see whether they could be used to assess the state of the medieval environment and attitudes to the environment. These models have been developed to deal with modern-day environmental problems, and assume that monitoring information is available to assess the state of the environment, the effectiveness of the responses and to inform policy development. I am not proposing to retrofit these models to a medieval setting, rather it is the framework and thinking behind the models that may be helpful in addressing my research questions. This chapter also looks at drivers and pressures on the environment, and the likely impacts created by those environmental pressures. The next chapter will continue this theme and look at documentary evidence of the responses to environmental issues provided by ordinances and their enforcement.

Assessment of environmental frameworks and models

There is an enormous amount of detailed information about the medieval environment, even just confining the time period to the fourteenth and early-fifteenth century, and the location to London. The information, as seen above, is scattered throughout city court records and compilations of lost records. In order to make sense of this information, it is essential to be able to look at it in a systematic way. The frameworks used to understand and evaluate the state of the present-day environment may be of some use in understanding the medieval environment. Environmental models can be used to fill data gaps and make predictions about past or future environments, however these models are data-intensive and assume systematic data collection. They often rely on having a time-series of replicable environmental monitoring information which of course is not available for the medieval period. However, in their simplest form models are frameworks for organising knowledge.¹ I will assess various models to determine whether they can contribute to answering the research questions regarding the state of the medieval environment and attitudes to the environment.

Environmental Management Systems (EMS) provide tools for local authorities and other organisations to identify and control the environmental impacts of activities within their

¹ Helen Couclelis, "Modeling Frameworks, Paradigms, and Approaches," *Geographic Information Systems and Environmental Modeling* 2002: 36–37.

sphere of influence and thus improve environmental performance. The organisation sets goals for environmental outcomes within a policy framework, establishes and implements plans for achieving the goals, monitors the outcomes and revises the EMS as required. The process of EMS is represented in Figure 2. International policy organisations encourage local authorities to use *ISO14001:2004 Environmental management systems - Requirements with guidance for use (ISO 14001)* or equivalent standards.² For example, the UK Department of Environment, Food and Rural Affairs (DEFRA) issued a position statement in 2008 encouraging local authorities to adopt EMS, and the United Nations Environment Programme (UNEP) has issued a toolkit to assist local authorities implement EMS.³ UNEP notes that local authorities are adopting EMS because of pressure from citizens, political pressure, complexity of environmental challenges, and rapid population and urban growth.

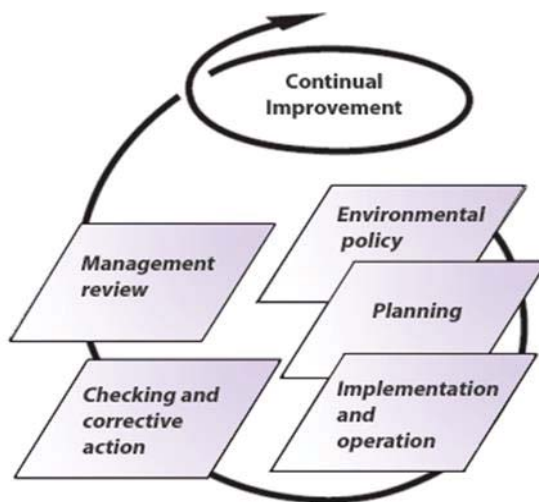


Figure 2: Environmental Management Systems

Reproduced from ISO 14001: 2004, Figure 1⁴

The authorities in medieval London faced all of these problems and, without the benefit of an explicit policy framework, the approach appears piecemeal but occasionally

² International Organisation for Standardisation, *ISO 14001:2004 - Environmental Management Systems - Requirements with Guidance for Use*, Geneva: ISO, 2004. This standard is also published jointly by Standards Australia and Standards New Zealand as AS/NZS ISO 14001: 2004 (adopted without modification).

³ Department for Environment, Food and Rural Affairs, "Defra Position Statement on Environmental Management Systems" DEFRA, 2008, 11, <http://archive.defra.gov.uk/environment/business/scp/documents/position-statement.pdf>. "UNEP / FIDIC / ICLEI Urban Environmental Management: Environmental Management Training Resources Kit," accessed June 20, 2013, http://www.unep.or.jp/ietc/announcements/emskit_launch.asp.

⁴ International Organisation for Standardisation, *ISO 14001*, Figure 1.

effective. There may have been an implicit equivalent of the EMS process, where the policies were directed at keeping the streets clean and regulating waste disposal as part of maintaining social order and the “king’s peace”. The overriding goal seems to have been political, to be seen to be managing the city effectively, and hence retain self-governance in a period when kings exercised their power to remove the city’s freedom on several occasions. This model is of limited use in assessing the state of the environment, but may provide information on attitudes to it and understanding the dynamics. For example, interventions by the king and directives from him for city cleaning (see Chapter 5) could be seen as precipitating a “management review” inspiring more focussed policies.

Environmental reporting models do not assume that there is a structured approach to managing the environment; they focus instead on the relationships between pressures on the environment, the resulting state of the environment, and responses to environmental degradation. Successful responses will result in improvements to the environmental pressures and a consequent change in environmental quality. The response could be part of an environmental management system as described above, or implemented on an ad hoc basis in response to specific events such as a major pollution incident.

In traditional **Pressure-State-Response** models, indicators are used to assess the pressures on the environment, the state of the environment itself, or the response. Modifications of this model discussed below also identify the drivers that give rise to pressures and the impacts arising, and incorporate a feedback loop to assess the effectiveness of the response. The models work well if the parameters, such as the waste generated by a city (pressure) or water quality downstream of a landfill (state), can be directly measured. They can be used to assess the effectiveness over time of environmental regulations or other incentives, for example the effectiveness of a waste disposal levy in reducing the quantities of waste generated. Indicators can also be used to assess wider environmental parameters such as water quality or air quality, based on on-going monitoring. A set of derived indicators can be used to assess changes over time or compare different sites or even countries. Figure 3 demonstrates the application of a

Driver-Pressure-State-Impact-Response model to a current environmental problem, climate change induced by human activities.

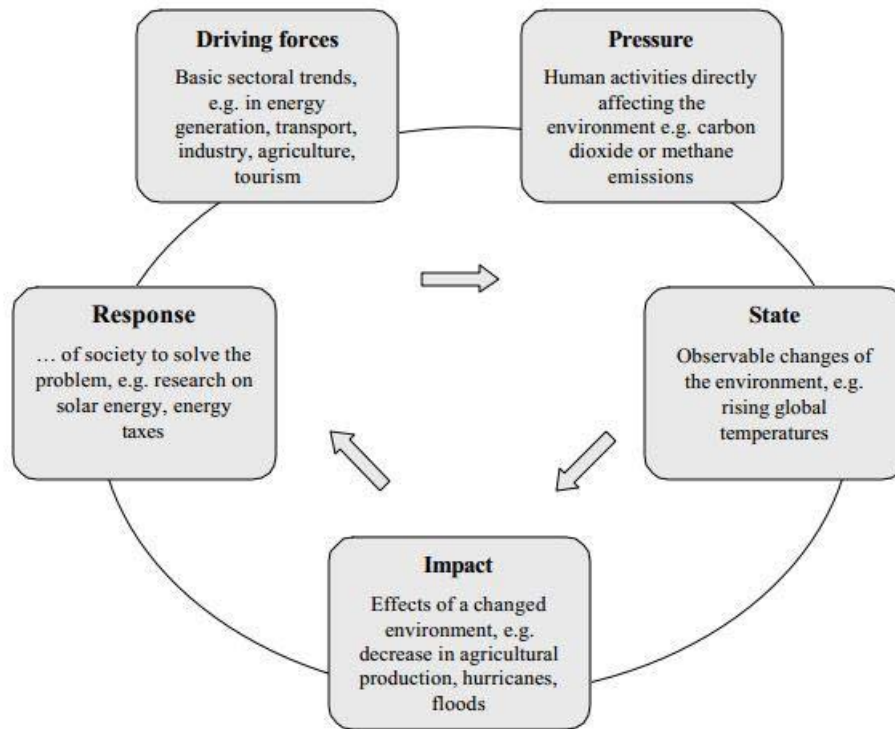


Figure 3: Driver-Pressure-State-Impact-Response (DPSIR) model

This shows the DPSIR model applied to the topical global problem of climate change. Reproduced from Shah 2000⁵

Driver-Pressure-State-Impact-Response (DPSIR) models work well when applied to current problems where indicators can be developed for each aspect and monitored over time. I have not found any attempts to apply this type of model to the medieval situation, probably because the information on most of the parameters is incomplete and needs to be deduced from scattered and inconsistent records. To overcome this problem, I have turned the model around and redesigned it so that the information that is available can be used to assess the state of the environment, as shown in Figure 4.

⁵ R. Shah, "International Frameworks of Environmental Statistics and Indicators," in *Statistics for Environment Policy 2000*, 2000, 7.

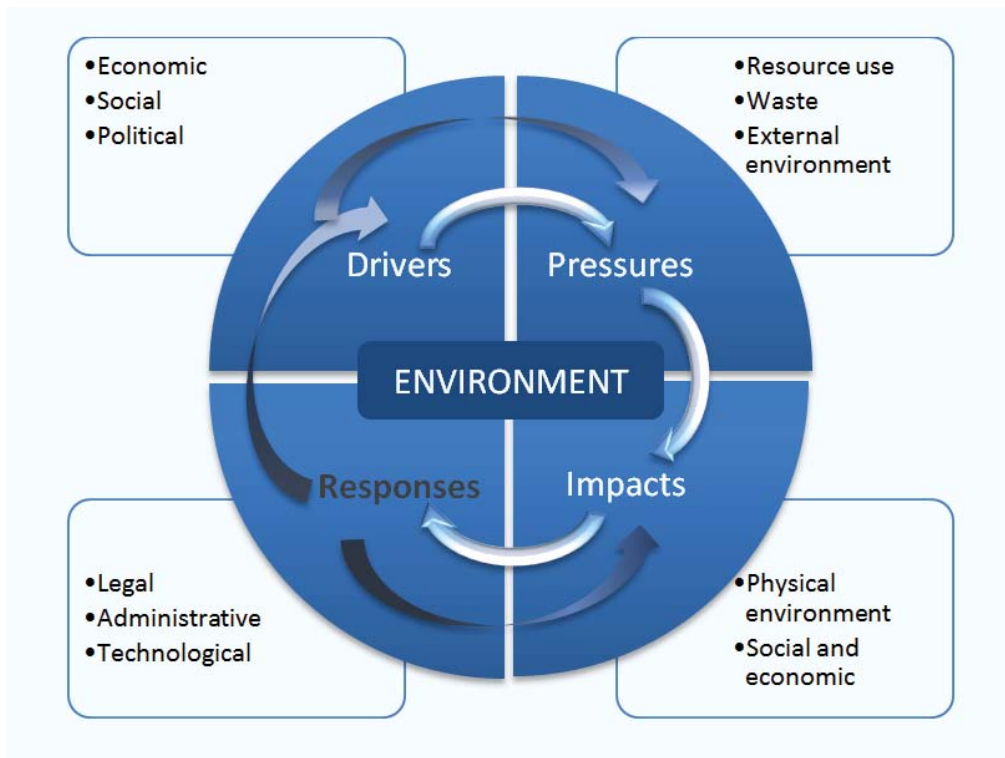


Figure 4: Modified Driver Pressure State Impact Response (DPSIR) model

A modification of the DPSIR model to understand how these factors inter-relate and how they could be used to assess the state of the environment in medieval London.

My revised DPSIR model shows that drivers result in environmental pressures, which in turn generate impacts on the environment, prompting a response. A response may address drivers, for example in the form of economic controls influencing consumption patterns. Responses can also address pressures, such as restricting the location of noxious industries; or the impacts of those activities through discharge requirements. A response such as a clean-up can also directly affect the state of the environment. The environment, or state, is shown in the centre of the diagram, because this is the information gap being addressed. This version of the DPSIR model can incorporate non-anthropogenic pressures from the external environment, such as disease or severe weather, which could result in famine, flooding and severe impacts on land. It also makes allowance for a response targeting a social or political pressure, but having a spin-off effect on the environment.

While there is not enough information available on the medieval state of the environment to make a direct assessment, the model proposed can be used to make a qualitative assessment based on what we know of drivers, pressures impacts and

responses. For example, information about the drivers and pressures, such as the amount of human waste generated from the assessed population, and “responses”, such as ordinances prohibiting dumping of human waste, and evidence of the effectiveness of these responses, can be used to assess the impact on the environment. Ordinances reflect a desired outcome, but to be able to assess the state of the environment, it is necessary to assess what people actually did, i.e. whether people obeyed the ordinances. Even if “responses” are not for environmental reasons, for example if a clean-up of the city fosse (ditch) is for defensive reasons, we can still deduce that there was some sort of waste problem, and assess the attitudes driving the response.

Hoffmann has investigated the use of environmental footprints and ecosystem models in considering the environmental impacts of medieval urbanisation.⁶ The calculation of the environmental footprint of modern cities has become popular for assessing comparative resource use and highlighting the impacts of resource demands on the environment. The footprint analogy is used to estimate the equivalent area or resource use required to operate a city. For medieval London, valuable work has been done assessing the city’s resource requirements, the geographical extent of the supply catchment and London’s impacts on the hinterlands. This work was part of a study by the Institute of Historical Research, University of London.⁷ In particular, the researchers established a “footprint” area from which grain and other foodstuffs would have been supplied, based on transport costs relative to the value of the product.⁸ Another part of the study looked at medieval London’s demand for fuel wood (used later in this chapter to assess particulate emissions).⁹ These studies are a valuable way of assessing the impacts of specific activities on the surrounding environment, but they don’t assess what the impact of the city’s population was on the immediate environment nor provide any information on attitudes to the environment.

Hoffmann suggests an alternative model that regards the medieval city and its hinterland as an ecosystem. He proposes a metabolic approach using the flows of materials to

⁶ Hoffmann, “Footprint Metaphor.”

⁷ <http://www.history.ac.uk/projects/research/feeding-the-city>

⁸ Derek Keene, “Medieval London and Its Supply Hinterlands,” *Regional Environmental Change*, 12: 2 (2011), 263–281.

⁹ Galloway, Keene, and Murphy, “Fuelling the City.”

identify resource use and tracing it to the source and eventual disposal. Hoffmann bases his suggested model on earlier work by Boyden. Boyden uses the concept of “biohistory” to highlight the importance of taking a historical approach to understanding the interaction between society and the ecological systems it depends on when proposing social changes aimed at ecological sustainability.¹⁰ Boyden’s schema, shown in Figure 5, takes account of the interactions between the people, culture, institutions and human activity. He combines this with an input-output model of activities which takes account of recycling of materials within the system, and in turn has effect on the biosphere and human population. The model stresses the impact of culture on the environment, particularly cultural control of human activities.¹¹ He proposes that if cultural assumptions are out of step with ecological realities, this cultural maladaptation will result in unsustainable behaviour and affect human health and well-being.¹² Conversely, in adaptive society, awareness of the effects will result in cultural reform.

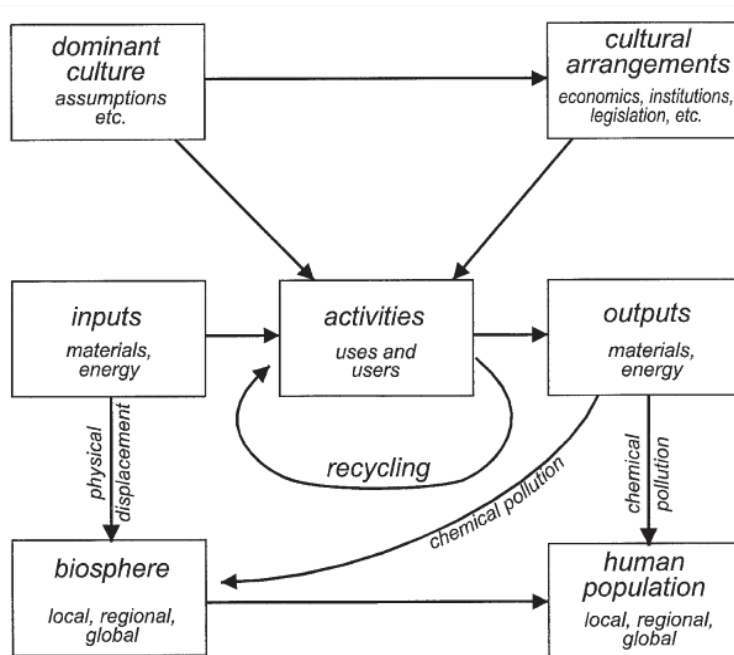


Figure 5: Urban metabolism and the cultural dimension of the system.

After Boyden¹³

¹⁰ Boyden, “Nature, Society,” 104. I have used Boyden’s original model because Hoffmann’s adaption of the model seems to de-emphasise the cultural component, and I am interested in looking at cultural drivers, particularly attitude to the environment.

¹¹ Ibid., 105. Boyden works through the steps he used in creating each of the elements in the model.

¹² An often-quoted example is the failure of Scandinavian settlers in Greenland to adapt to local conditions by using local resources, and hence the failure of the settlements once a cooling of the climate reduced the productivity of agriculture and the shipments of imported goods became unreliable.

¹³ Boyden, “Nature, Society,” 111.

As Boyden puts it “perhaps the most important lesson to be learned from biohistory is appreciation of the extraordinary biological and ecological power of culture.”¹⁴ Our actions, and the effect they have on the environment, are determined in by our culture, and our use and adaptation of technology. The former effect can be seen in the middle ages in the importance given to regulating fishing, because due to religious dietary restrictions, fish was an extremely important part of the diet. There was a heavy emphasis on regulating the technology used for catching fish, as discussed in Chapter 5. Likewise, culture in terms of medical and scientific knowledge influenced the kind of problem that was given attention. An action that would benefit the environment was often undertaken for the “wrong” reason because of a lack of scientific understanding. For example, cleaning up malodorous waste got rid of the waste and reduced the risk of water-borne disease. On the other hand, a lack of understanding of the causes of plague resulted in an inability to fix the problem.

In order to be useful for this analysis, any model or framework must help explain the interaction between medieval Londoners and their environment. It must describe the way Londoners used the environment and how they responded to environmental issues, including pollution and resource scarcity. It must also take account of civic actions that seem to be motivated by concern for the environment or public health but were to facilitate trade and freedom of movement of people and goods within the city, or for defensive purposes. As seen above, it must take account of cultural factors such as politics and religion, as medieval society was dominated by the Church, and the rapidly developing market economy.

I have produced the hybrid model shown in Figure 6 by combining Boyden’s model with the modified DPSIR model discussed above, and adding a feedback loop from the biosphere and human population to cultural arrangements to represent responses. In addition, the biosphere provides many resources that become inputs – food, clothing, building materials, and energy from animals, water, wood and coal. This diagram provides a conceptual framework for considering the state of the medieval environment. Although it looks complex, it is in fact already a simplified version of even more complex

¹⁴ Ibid., 105.

interactions. For example, the human population is also an input into activities in the form of labour. To try and show all the relationships between the variables would produce a diagram resembling a spider's web.

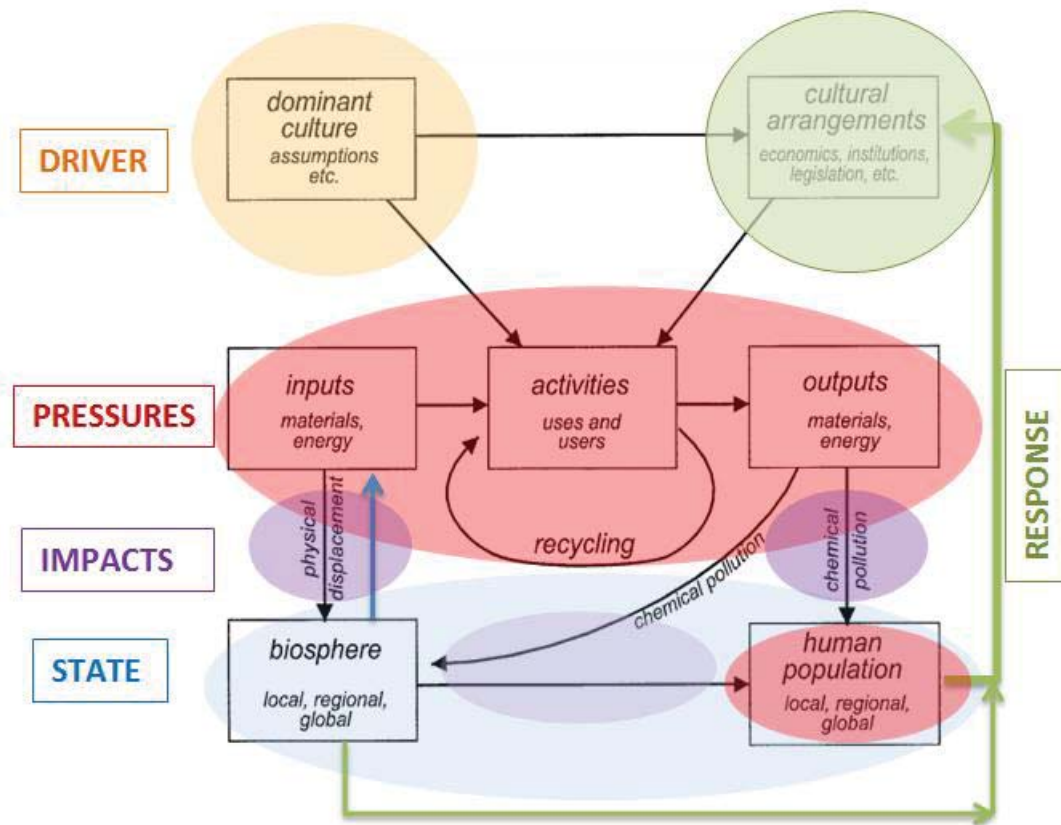


Figure 6: Relationship between people, culture, systems activities and the environment
Adapted from Boyden 2001 by adding in the DPSIR concept

This hybrid model takes account of the various motivations for responses that have environmental impacts. Both dominant culture (drivers) and cultural arrangements (responses) incorporate attitudes to the environment and the prevailing view about public health and causes of disease. Culture would also include the priority afforded to maintaining a prosperous economy, maintaining order and social cohesion, religious values, maintaining political autonomy, and protecting the environment and public health. The dominant culture acts both as a driver for pressure on the environment, and determines the range of likely responses through the cultural arrangements, particularly institutions and legislation.

This hybrid model requires more information than is available on medieval London, but it highlights the deficiencies of applying the DPSIR model too narrowly. Culture and technology are not well accounted for in the DPSIR model, and nor is the impact associated with economic activity. The DPSIR model has a major deficiency in ignoring the processes involved. This model also highlights the complex inter-relationships in real world systems, and the dangers of extrapolating with very little data.

Figure 7 below combines both concepts by taking the adapted DPSIR model developed above, adding “Technology” to the drivers, and allowing for technological controls (e.g. minimum mesh size for fishing nets), as well as technological solutions (e.g. rakers to clean the streets). It also adds an “Activity” loop between Pressure and Impact. Activity needs to take account of the available technology. For example, in the absence of the technology to harness renewable electricity or heat, burning carbonaceous fuels was the only way to generate concentrated heat. This amended diagram provides a simple framework for assessing the state of the medieval environment, and the attitudes to the environment, using the surviving information. Having developed this simple model, the next step is to identify indicators for each category.

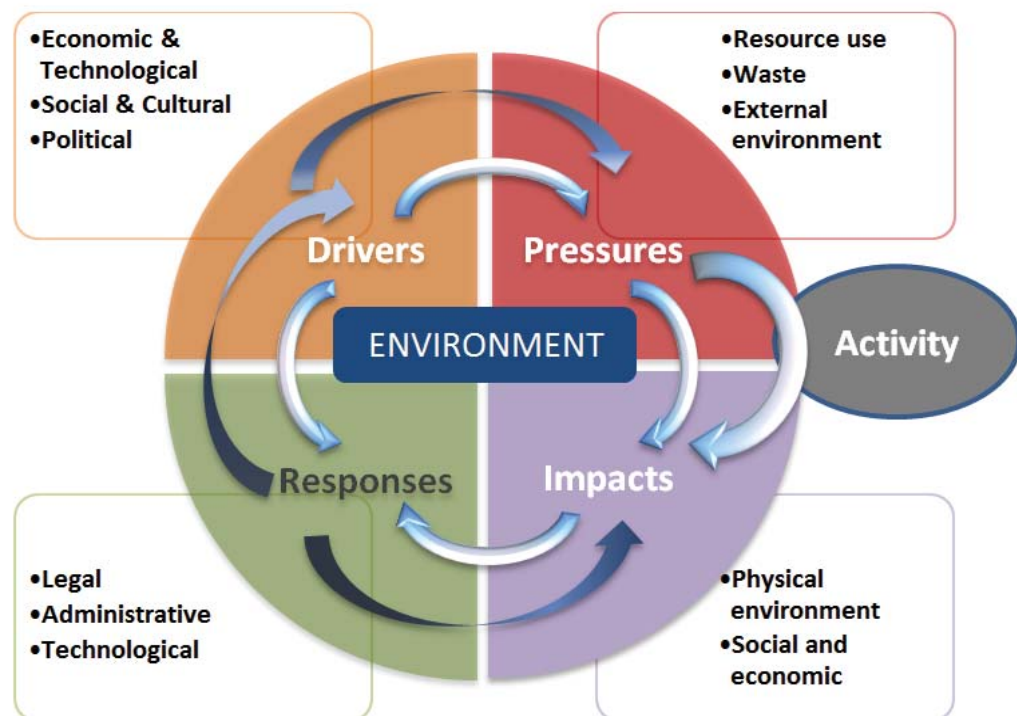


Figure 7: Modified DPSIR model

Selection of indicators

Indicators should simplify a complex reality and assist in explaining the causes behind trends and in assessing the effectiveness of actions.¹⁵ In 1993, the Organisation for Economic Co-operation and Development published a list of environmental indicators for the urban environment. The list included air quality; noise; degree of urbanisation; and condition of surface water bodies.¹⁶ A revised list, published in 2008, added intensity of waste generation; intensity of energy use; freshwater quality; use of freshwater; and fishery resources.¹⁷ These are useful categories to consider for indicators of pressures and impacts on the medieval environment.

The remainder of this chapter assesses potential indicators for the medieval urban environment for drivers, pressures and impacts. The assessment takes into account the information available and the potential to distil this information into a simple and coherent indicator. While it is preferable to have measurable indicators to assess progress, for the medieval environment indicators will be qualitative rather than quantitative, and the information is unlikely to be a complete and consistent time-series. Table 1 sets out the model parameters and proposes indicators for medieval London. The left column describes the model parameters and indicators, using air pollution from motor vehicles as a simple illustrative modern example. This could be applied to air quality issues from medieval coal and wood burning, but we have only a small amount of anecdotal information on the state. However, we can assess the drivers and pressures, and the impact on the human population in terms of disease. Responses such as proclamations against the burning of coal can also be fed into the model.

¹⁵ Peder Gabrielsen and Peter Bosch, *Environmental Indicators: Typology and Use in Reporting*, Copenhagen: European Environment Agency, 2003, 5, http://www.iwrms.uni-jena.de/fileadmin/Geoinformatik/projekte/brahmatwinn/Workshops/FEEM/Indicators/EEA_Working_paper_DPSIR.pdf.

¹⁶ Organisation for Economic Co-Operation and Development, *OECD Core Set of Indicators for Environmental Performance Reviews: A Synthesis Report by the Group on the State of the Environment*, Paris: OECD, 1993, 27, <http://www.oecd.org/handle/1834/2677>. As discussed below, medieval Londoners were more likely to complain about neighbours invading their privacy rather than the noise from neighbours. There are occasional complaints about noise and vibration from metal-working industries, but in conjunction with complaints addressing the more serious issue of acrid coal smoke.

¹⁷ Organisation for Economic Co-Operation and Development, "Key Environmental Indicators" OECD, 2008, 5, <http://www.oecd.org/environment/indicators-modelling-outlooks/37551205.pdf>. Intensity can be expressed as per capita use or output, or can be related to economic activity, such as a country's energy user per unit of Gross Domestic Product or other economic measure.

Table 1: Driver-Pressure-State-Impact Response model parameters and possible indicators for medieval London.

Model parameters and examples for the effect of motor vehicle use on air quality and on human health ¹⁸	Possible Indicators for Medieval London: A Retrospective	Example for the effect of energy use and air quality
Driving force indicators: Demographic, social and economic developments that provoke changes in the overall levels of production and consumption and exert pressures on the environment. E.g. population growth and changes in travel patterns	Total population Population density Demand for goods and services (e.g. food, fuel,) Political situation Culture Religious practices Climate	Population, need for warmth Demand for energy-intensive goods Relative price of wood and coal Concentration of industries using coal Societal view of corrupt air causing disease
Pressure indicators: developments in the main human activities that could potentially adversely affect the condition of the environment such as discharges, use of resources and land. E.g. Motor vehicle use	Quantity of Human waste Waste from animals, crafts and industries Land area to meet resource demand, land use practices Demand for fish in diet	Consumption of wood and coal
State indicators: Describe the condition of the environment in terms of the quality and quantity of physical or biological phenomena. E.g. concentration of airborne contaminants, trends	Have at best anecdotal or inferred evidence for state indicators: Air quality Water quality Cleanliness of streets	Complaints
Impact indicators Describe the effect that environmental changes have on environmental or human health, resource availability or biological capital. E.g. illnesses caused by poor air quality such as asthma and respiratory diseases.	Inferred from ordinances and complaints Waterborne diseases Airborne diseases Respiratory diseases Weather and climate impacts (famine, flooding)	Archaeological evidence of: Respiratory disease Building damage
Response indicators : Actions to alleviate pressures or drivers, or to improve the condition of the environment. E.g. transport demand measures, improving fuel quality, emissions control standards for vehicles	Making & enforcing environmental controls on: <ul style="list-style-type: none"> • Human waste disposal • Keeping disposal systems flowing • Use of coal • Fishing technology, timing, protection of fry 	Ordinances prohibiting use of coal Fire regulations e.g. for chimneys

¹⁸Adapted from: "Office of the Commissioner for Sustainability and the Environment - ACT State of the Environment Report," accessed June 20, 2013, <http://www.envcomm.act.gov.au/publications/soe>. and Marta Bottero and Valentina Ferretti, "Integrating the Analytic Network Process (ANP) and the Driving Force-pressure-state-impact- Responses (DPSIR) Model for the Sustainability Assessment of Territorial Transformations," *Management of Environmental Quality: An International Journal*, 21: 5 (2010), 620.

Table 1 shows the indicators of drivers, pressures, impacts and responses that I propose to use to predict the likely state of the medieval environment. The selection of indicators is determined by the available evidence. For example, not only were streets an important part of people's environment, and designed to carry waste away to watercourses, but we also have evidence of orders to clean up streets, and complaints about depositing waste in streets and blocking waste channels. Table 2 expands on the relationship between drivers, pressures and impacts and suggests indicators for each of these that could be applicable to the medieval London environment.

Table 2: Relationship between drivers, pressures and impacts, and proposed indicators

Driver	Pressure	Impact	Indicator
Population Demand for goods and services (e.g. food, fuel,)	Demand for energy Human waste Waste from crafts and industries (including air discharges) Land area required to meet resource demand (<i>out of scope</i>)	Waterborne diseases (<i>no information</i>) Respiratory diseases Degradation of water supply	Driver: Estimates of population in secondary sources Relative price of fuels Pressure: Estimates of waste generated Complaints about waste disposal
Population density (physical)	Crowding Concentration of wastes: <ul style="list-style-type: none"> • Human • Industry, food processing 	Waterborne diseases (<i>no information</i>) Respiratory diseases Degradation of water supply	Pressure: Complaints about stormwater, privacy and other nuisance Impact: Skeletal evidence of respiratory disease
Population density (social)	Social tension (<i>detailed analysis beyond the scope of this thesis</i>)	Criminal activity, violence Antisocial behaviour	Pressure: Complaints Ordinances governing behaviour
Political	Political instability	City striving to maintain good governance	Response: Ordinances and infrastructure to prevent pollution
Religious practices	Demand for fish because of dietary restrictions	Depletion of fish stocks	Response: Ordinances and prosecutions about fishing practices
Climate	Excessive rainfall Storms and Sea surges (<i>out of scope</i>)	Weather and climate impacts (famine, flooding, drought)	Pressure/Response: Complaints about stormwater or waste build-up

Drivers

As discussed above, driving forces comprise economic, technological, social, cultural, religious and political factors, which in turn, exert pressure on the environment and generate potential impacts via human activities (see Tables 1 and 2). Key drivers for medieval London are social factors including population and population density, cultural and religious values and economic considerations such as consumption patterns. Population growth in the thirteenth century, followed by the catastrophic decline in the mid fourteenth century, would have stressed social, administrative and ecological systems. Population density is a key driver because issues such as noise, blocking of light and waste disposal only become problems when people are crowded together in urban environments. Consumption patterns and per capita consumption also drive the pressures and impacts. For example, while the amount of human waste generated is proportional to the total population, resource demands and other waste products may not have decreased in proportion to the population, because of an increase in prosperity and per capita consumption.¹⁹ Whereas social, cultural and political drivers are difficult to quantify, population and consumption can be assessed in physical terms.

Social and cultural factors can also act as drivers for consumption patterns, as can economic and technological factors. For example, as discussed in detail in Chapter 5, the religious requirement not to eat meat on a large number of fast days per year placed pressure on the freshwater fishing resource. An important cultural driver is the prevailing medical view that disease was caused by miasma or corrupt air, which influenced the priorities for dealing with pollution problems such that any odorous waste was dealt with firmly. Many of the cases of complaint and clean up relate to foul-smelling waste and ordure, and to sulphurous coal smoke. There are no corresponding complaints about the less acrid wood smoke. In turn, the use of coal was technology-driven, because burning carbonaceous fuels was the only way of generating intense heat. Metalworking industries and lime-making depended on coal as a cheaper form of heat than wood. Noxious smelling waste was also heavily regulated with an aim to remove the odorous material. Disposal of privy waste into a cesspit was regarded as best practice provided that the waste didn't seep out and cause odours. The potential for contaminating wells must surely have occurred to people, but there is no mention of it being identified as a

¹⁹ Keene, "Supply Hinterlands," 264.

problem, probably because of the lack of understanding of pathogens and waterborne disease.

The driver of population and resulting density would have increased considerably throughout the thirteenth century, remained static or dropped during the early fourteenth century, and then plummeted after the onset of the cycle of plague epidemics. The population of London can only be guessed at because there were no parish registers before the sixteenth century, and no census before nineteenth, but various researchers have made estimates of population and trends.²⁰ In 1963, Williams estimated the population at 20,000 in the early thirteenth century and increasing to around 40,000 in the early fourteenth.²¹ In 1969, Hibbert estimated that London's population in 1180 was around 40,000, and that it never contained more than 75,000 inhabitants. He says there was scarcely room for more, due to the space taken up by walled gardens and orchards of noblemen and monasteries.²²

More recently Schofield came to a similar conclusion, estimating that by 1100 most of the space within the city walls was occupied, and population was probably 20,000 or more. He estimates that the population would have doubled by 1200 and doubled again by 1300 to reach at least 80,000.²³ Barron notes that the population would have increased considerably during the thirteenth century, and also estimates the population at 1300 as a minimum of 50,000, but more likely to be around 80,000.²⁴ Nightingale challenges Keene's estimate of a peak of 80-100,000, based on his work on demand for properties in Cheapside and the resources available to feed the city. Taking account of commercial activity, urban and rural land values and poll tax returns, she estimates that London's population was around 60,000 in 1300, declined in the first half of the fourteenth century and recovered well from the post-plague depopulation due to London's economic

²⁰ Barron, *London in the Later Middle Ages*, 237.

²¹ Williams, *Medieval London*, 20.

²² Christopher Hibbert, *London: The Biography of a City*, London: Longmans, 1969, 16–18.

²³ Schofield, *London Archaeology*, 8.

²⁴ Barron, "Government of London," 238. Barron's estimates take account in particular of the mid thirteenth century concerns with purprestures (encroachments of structures into the king's highways, discussed further in the chapter on responses below)

advantages.²⁵ Rosser finds that the population of Westminster followed a similar pattern to London, with rapid expansion in the thirteenth century, but there is evidence that population in Westminster was declining even before 1348.²⁶ The estimated death rate in the plague of 1348-50 was around 48 per cent, and the population of London in 1400 was probably half 1300 levels at around 40,000, taking into account migration and further plague episodes.²⁷

It is not clear the extent to which immigration would have buffered the impact of epidemics on the London population, but it played a significant role in maintaining London's population.²⁸ Keene suggests that medieval cities were so unhealthy they couldn't maintain their population without immigration, with people both moving to centres of greater wealth and, in the late fourteenth and fifteenth century looking for more lucrative employment. His research shows that London, Westminster and Southwark together had an extensive population catchment extending as far as the north east of England.²⁹ My analysis of the people using the Assize of Nuisance in Chapter 4 and of the fripperers in Chapter 5 bears this conclusion out. Therefore, although plague deaths are estimated at up to fifty per cent of the population in the first two epidemics,

²⁵ Pamela Nightingale, "The Growth of London in the Medieval English Economy," in *Progress and Problems in Medieval England: Essays in Honour of Edward Miller*, ed. by R. H. Britnell and John Hatcher, Cambridge ; New York: Cambridge University Press, 1996, 89–106; Keene, "Supply Hinterlands"; Keene and Harding, "Historical Gazetteer of London before the Great Fire - Cheapside; Parishes of All Hallows Honey Lane, St Martin Pomary, St Mary Le Bow, St Mary Colechurch and St Pancras Soper Lane."

²⁶ Rosser, *Westminster*, 189. Kershaw notes that the years 1315-17 saw unprecedented grain shortages and this was followed by cattle murrain and then a drought in 1325-26. Ian Kershaw, "The Great Famine and Agrarian Crisis in England 1315-1322," *Past & Present*, 59 (May 1, 1973): 13–17, 49–50.

²⁷ Schofield, *London Archaeology*, 8.

²⁸ Pryor, Francis, *Britain in the Middle Ages: An Archaeological History*, London: HarperCollins, 2006, 203. Barron, *London in the Later Middle Ages*, 45. Barbara A. Hanawalt, *Of Good and Ill Repute: Gender and Social Control in Medieval England*, New York: Oxford University Press, 1998, 107. D. R. Curtis, "Pre-industrial Societies and Strategies for the Exploitation of Resources : a Theoretical Framework for Understanding Why Some Societies Are Resilient and Some Settlements Are Vulnerable to Crisis" PhD, Universiteit Utrecht, 2012, 27, <http://igitur-archive.library.uu.nl/dissertations/2012-0822-200425/UUindex.html>.

²⁹ Derek Keene, "Metropolitan Values: Migration, Mobility and Cultural Norms, London 1100-1700," in *The Development of Standard English 1300-1800: Theories, Descriptions, Conflicts*, ed. by Laura Wright, Cambridge: Cambridge University Press, 2000, 105. Keene gives the example of extent of immigration late 15C, 46% of the 155 apprentices admitted to the skimmers and tailors companies came from outside London/home counties, whereas in the early 14C apprentices came mostly from counties close to the city. About ten per cent of the population were from outside the realm mainly from the Netherlands and lower Rhineland.

population may have been replenished by immigration, already a feature of the city's demography.

Migration was an established pattern, both for employment advancement and an opportunity to break free of feudal ties.³⁰ Increased wealth meant bigger houses, amalgamation of tenements, and development of new streets and lanes, but at a slower rate than before 1300.³¹ Following the drastic reduction in population in 1348-50, there was a trend towards subdivision of properties into smaller tenancies, reinforcing theories that even at this lower population density, London was crowded.³² Rosser also notes this trend to subdivision in Westminster and suggests that the building of small scale cottages and shops between 1360 and 1410 was due to increasing population, mostly from immigration by people looking for advancement.³³ An extensive influx of newcomers would have exacerbated social problems.

Population in the satellite town of Southwark also increased rapidly through the thirteenth century, based on records of properties rented, but rent reductions and vacancies in the early fourteenth century suggest a falling population.³⁴ Carlin notes that speculative building ceased in Southwark, as well as in Westminster, in the second decade of the fourteenth century for about 50 years, possibly as a result of a fall in population resulting from the famine of 1316-18 and the Black Death in the mid fourteenth century. However by the 1370s, Southwark was experiencing a building boom and immigration. An influx of Flemish immigrants in the early fifteenth century, and the growth of the brewing industry near the river, coincided with building of tenements.³⁵

The day population of the city could have far exceeded the resident population, swelled by day-traders, itinerant merchants and other travellers and their horses. This theory is

³⁰ Thomas discusses the opportunities for villeins residing in London for a year and a day to qualify for freedom of the city A. H. Thomas, ed., *Calendar of Plea and Memoranda Rolls Preserved Among the Archives of the Corporation of the City of London at the Guildhall, Volume 2 1364 to 1381.*, Cambridge: Cambridge University Press, 1929, xxiv – xxxl.

³¹ Pryor, Francis, *Britain in the Middle Ages*, 218–9.

³² Schofield, *London Archaeology*, 72. Schofield estimates that the population by 1550 would have expanded to an estimated 50-75,000, at which point there was “chronic overcrowding” *Ibid.*, 8.

³³ Rosser, *Westminster*, 74.

³⁴ Carlin, *Medieval Southwark*, 129–30.

³⁵ *Ibid.*, 53, 46.

supported by the frequent reiteration of city ordinances concerning hostellers taking responsibility for outsiders, and requirements for traders to unload and sell their goods under supervision in the city. Nichols notes that there was a trend for wealthy tradesmen to live in the suburbs to avoid tax, and come into the city to work.³⁶ It is not clear the extent to which this is taken account of in population estimates. It is also not clear whether the population estimates given apply to just the walled city, the suburbs outside the walls, or includes the satellite towns of Southwark and Westminster.

Both population and population density drive pressures on the environment. As discussed above, some pressures are directly related to the number of people, such as demands for food, shelter, warmth, and disposal of human waste. However, if the population were dispersed throughout the countryside, then the impact of their activities would be similarly dispersed. It is the concentration of people in towns and cities that results in significant environmental pressures, from supplying food, building materials and other goods that they need, and from dealing with the wastes that they generate. Similarly, the effects of human activity in medieval cities result from crowded living – disputes about shared resources and living spaces, odours and seepage from cess pits close to the boundary, smoke from nearby houses or industries, odours from noxious industries.

At its peak population of 80,000 at the start of the fourteenth century, Keene estimates that the population density of the greater urban area would be 65 per hectare, and 46 per hectare at the end of the fourteenth century, comparable to a modern European city with room for some open ground. Density within the walls may have been 132 per hectare in 1300 and 72 per hectare in 1400. In the densest inner-city areas, population density may have been 222 per hectare in 1300, dropping to 200 per hectare in 1400, comparable with modern dense urban areas.³⁷

³⁶ In 1881 the day population was estimated at 261,061 but the resident inner city population was only 50,652. Medieval London would not have had this level of day visitors, but may have had a significant number. The Corporation of London, *Origin and History*, 121; David Nicholas, *The Later Medieval City, 1300-1500*, New York: Longman, 1997, 67.

³⁷ In these estimates, Keene is assuming that the population of the crowded inner city areas would remain relatively dense despite an overall population decline. By comparison London's population density within the walls on the eve of the great fire was more than twice the highest late medieval density. Keene, *Winchester*, 1:370.

Social tensions would have increased during the thirteenth century with an increase in crowding. As will be seen in the next chapter, complaints about encroachments onto neighbours' properties and the king's highway are an indication of crowding and were a key feature of the two thirteenth century London Eyres. However, social tensions may not have eased during the fourteenth century as there would have been the added pressures of the famine years, an influx of outsiders after the plague epidemics seeking economic opportunities, and the initiation and resumption of the war with France. When city and ward ordinances are listed, it is common to find articles related to keeping the streets clean listed together with articles aimed at increasing public safety and reducing social tension and crime, such as those aimed at removing lepers, prostitutes, and keepers of bawdy houses etc.³⁸ Barron says there may have been a disproportionately large number of the genuine poor in London in the second half of the fourteenth century, attracted by economic opportunity and opportunity for freedom, even though labour would also have been needed in countryside to bring in harvest. The urban poor probably lived on intermittent daily wages, petty trading and the hope of alms. During the mayoralty of John de Northampton (1381-3), controls were imposed to ensure cheaper food and break down monopolies.³⁹

In my modified DPSIR model, drivers such as population density generate environmental pressures which in turn generated impacts. However, political drivers such as the tension between the city and the king directly prompted a response with environmental benefits unrelated to perceived environmental problems. The support of London was vital to the success of the ruling king, and in turn the support of the king was essential for the city to maintain self-governance. The king took control of the city several times in the late medieval period, and when control was returned, the mayor and aldermen were concerned to demonstrate their ability to maintain the king's peace. For example, in 1285, Edward I took control of the city for thirteen years and in 1321, Edward II suspended the mayoralty for several months and restricted freedom of elections until Edward III granted the city a new charter in 1327.⁴⁰ Richard II in 1392 seized the liberties

³⁸ Natalie Ciecieznski, "Defining a Community: Controlling Nuisance in Late-medieval London" University of South Florida, 2009, <http://scholarcommons.usf.edu/etd/1902>.

³⁹ Barron, *London in the Later Middle Ages*, 277.

⁴⁰ Williams, *Medieval London*, 15, 27. Sylvia L. Thrupp, *The Merchant Class of Medieval London: (1300-1500)*, Ann Arbor, Mich: University of Michigan Press, 1962, 71; Cam, *1321 London Eyre*, xxxii–xxxviii, xix–xxi.

of the City for several months and appointed a Warden, imprisoned the mayor and aldermen and fined them 3000 marks and fined the City as a whole £100,000.⁴¹

As Barron puts it “At the simplest level, the king needed money and the Londoners’ wanted self-government”, yet even the weakest and most unpopular king always had the right to take back governance of the city.⁴² Clean streets were perceived as being a part of demonstrating the ability to maintain the king’s peace, which was important for the city to maintain its rights to self-govern. The desire for clean streets was also motivated by civic pride, as evidenced by clean-ups in 1274, 1402 and 1416 in preparation for visits by the king or foreign dignitaries. On other occasions the king directly intervened and ordered that streets or streams be cleaned, such as the directive from Edward III in 1369 to clean up the butchers’ waste, discussed in chapter 5.⁴³ This desire for self-governance motivated the civic response to pollution and pre-emptive actions, and hence indirectly the pressures, impacts and state of the environment.

The war with France put pressure on city resources and also prompted actions to ensure the adequate defence of the city. In 1337, in preparation for the war, the king demanded that the city supply ships and 500 men and the city was required to undertake defensive works and provide further ships under threat of invasion in 1338 and 1339.⁴⁴ The war continued intermittently with a series of battles and truces and demands on the resources of the city through the 1340s with a major truce in 1347 after the battles of Crecy and the lifting of the siege of Calais.⁴⁵ A series of truces extended to 1 April 1355⁴⁶ When hostilities resumed, the priority became provisioning the army, enforcing trade sanctions and defending the realm.⁴⁷ Directives and actions that appear to be to do with sanitation are probably to support the defence of a city under threat of invasion. For

⁴¹ Barron, “Government of London,” 2.

⁴² Barron, *London in the Later Middle Ages*, 9.

⁴³ Barron, “Government of London,” 23–24.

⁴⁴ Reginald Sharpe, ed., *Calendar of Letter-Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book F: Circa A. D. 1337-1352.*, London: The Corporation of London, 1904, ii–iv, vi–vii; Jean Froissart, *The Chronicles of Jean Froissart, in Lord Berner’s Translation*, London: Centaur Press, 1963, 22.

⁴⁵ Froissart, *The Chronicles of Jean Froissart, in Lord Berner’s Translation*, 112; Sharpe, *LtrBkF*, xviii–xxii.

⁴⁶ Reginald Sharpe, ed., *Calendar of Letter-Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book G: Circa A. D. 1352-1374.*, London: The Corporation of London, 1905, ii & 21.

⁴⁷ *Ibid.*, iii.

example, in August, 1370, galleys with a large force on board were lying off the coast, and an armed watch was organised to defend the City.⁴⁸ Later that year an extensive proclamation concerning keeping the peace, trading, and control of foreigners in the city, included a directive to keep the streets clean.⁴⁹

The key drivers are total population, population density and population changes. These drive both physical pressures, such as the generation and disposal of waste, and also social pressures resulting from crowding and the influx of immigrants. The connection between physical and social pollution is demonstrated by pollution ordinances and directives are often being linked with directives concerning antisocial behaviour. The economic driver of consumption patterns combines with population drivers to produce pressures on resources and for waste disposal. Religious dietary proscriptions placed pressure on the Thames fishery resource. Political drivers created a motive to keep the streets and streams clean. Other drivers that would have affected the environment of London but are beyond the scope of this study are climate and social tensions. Dry periods could result in a build-up of waste in the streets, in a system that relied on flushing of the gutters with stormwater to move waste down to the streams and to the river.

Pressures and impacts

In the previous section I identified drivers that result in pressures on the environment. In turn, pressures result in environmental effects or impacts, generally as a result of human activity. In this section I will discuss environmental pressures and impacts for the key indicator areas. Indicators of a key pressure or impact can provide information on the likely state of the environment and whether the documented responses discussed in the next chapter are related to an environmental problem, or driven by economic or political factors.

As discussed above, the key pressures on the environment are driven by population and population density, the demand for goods and services, as set out in Table 2. These drivers lead to pressures from the quantity and concentration of human waste and waste from production processes, and hence a waste disposal problem. The impact of this

⁴⁸ Ibid., xviii.

⁴⁹ Ibid., 270–71.

waste is on human health and water and air quality, but these factors cannot be directly assessed so the number of complaints about waste disposal is a proxy indicator for human health issues. The quantity and type of waste can be estimated, and hence the potential impact on health and water quality. Burning fuel leads to emissions of particulates and can be used to assess potential air quality problems. Complaints about stormwater and light will be investigated as a possible proxy indicator for crowding.

Intensification of settlement

Population density and crowding result in: a reduction in amenity values in the urban environment; psychological factors increasing social tension; and an increase in the likelihood of contracting contagious diseases.⁵⁰ Intensification of urban development increases stormwater runoff as more of the available land is built on or paved over with impermeable materials.⁵¹ Judging by the ordinances made about metal-rimmed cart wheels damaging pavements, the major roads would have been paved.⁵² Even if the minor lanes were not paved, they would still be compacted dirt or grit and have limited ability to absorb rainfall, and a high proportion of the city would be built up.⁵³

Stormwater in the right place could be useful, and the waste disposal system relied on rainfall flushing out drains and washing the waste to the river. However, stormwater in the wrong place could cause flooding, damage buildings, contaminate water supplies, and

⁵⁰ Stephen Boyden, *Western Civilization in Biological Perspective: Patterns in Biohistory*, Oxford [Oxfordshire] : New York: Clarendon Press ; Oxford University Press, 1987, 144. The social and psychological effects of crowding are beyond the scope of this thesis, which focuses on the physical effects on the environment and direct effects on human health from the intensification of urban development. Current research on this is unlikely to be helpful. A recent literature review notes that the requirement to share bedrooms is an indicator of crowding Alison Gray and Ministry of Social Policy, *Definitions of Crowding and the Effects of Crowding on Health: a Literature Review*, Wellington, N.Z.: Ministry of Social Policy, 2001. However, a single bedroom for a family seems to have been a regular occurrence in medieval London and inventories show up to five beds per room was not unusual, suggesting different attitudes to space. Schofield, *Medieval London Houses*, 71.

⁵¹ Schofield and Vince, *Medieval Towns*, 213.

⁵² For example, on 6 June 1391, Richard II "agreed that the ancient ordinance forbidding carts bringing water, wood, victuals, &c., to the City to be bound with iron (lie de ferre) shall be proclaimed and observed." This refers to the ordinance recorded circa 1277. See Cal. Letter Book A, p. 217. The ordinance had been enforced against a Stratford carter in 1375. 'Pleas and Memoranda,' Roll A 20, membr. 8. Reginald Sharpe, ed., *Calendar of Letter-Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book H: Circa A. D. 1375-1399.*, London: The Corporation of London, 1907, 252.

⁵³ Schofield reports that alleys would have been paved with mortar and oyster shell or cobbled. Schofield, *Medieval London Houses*, 52.

cause conflict between neighbours. Stormwater problems are an indirect indicator of the driver of population density and intense urban development. We have records of the highly detailed Assize of Buildings requirements concerning dealing with stormwater, and records of complaints. In Chapter 4 I will investigate these records of conflict between neighbours as a possible indicator of population pressure.

The more crowded the urban area was, and the closer together the buildings, the more important it became to secure access to light. Plans of streets and courtyards show that the houses were very close together, and there would be “a forest of signs spreading over [the streets] like tree branches”, the signs being suspended on long poles up to seven feet long. Schofield notes that there were complaints about solars and pentices encroaching into the space above the street and describes galleries being built across streets at first floor level to join two buildings. There was no limit to the height of buildings and some one-room houses forming street frontages and squeezed into courtyards could be up to five and a half storeys high.⁵⁴ Most houses would have small windows which were probably kept closed for fear of vapours, high off the ground, and not made of transparent glass and so very little natural light would penetrate the interior. In the absence of electric lighting, the only alternative to natural light for working was expensive wax candles or cheaper tallow candles that smoked and smelt appalling.⁵⁵

Complaints related to light and stormwater often occurred together In the *Assize of Nuisance* records, adding weight to the theory that stormwater and light may be complementary indicators of crowding. Stormwater and light complaints are discussed below in chapter 4. In addition, general complaints about building encroachments can provide information on the level of crowding. While encroachments into the highway were a key feature of the two thirteenth century Eyres, they were very few cases of encroachment reported to the 1321 Eyre.⁵⁶ As seen in the previous chapter, late

⁵⁴ Ibid., 53, 84–5, 147. Signs: Hanawalt, *Growing Up*, 25. Keene found that most houses would be 3 storeys and around 45 feet high. Derek Keene, “Tall Buildings in Medieval London: Precipitation, Aspiration and Thrills,” *London Journal*, 33: 3 (2008), 205–6, 209–10.

⁵⁵ Nichols notes that many windows were covered with linen, hides or oiled parchment as late as the fifteenth century Nicholas, *The Later Medieval City, 1300-1500*, 328.

⁵⁶ Chew and Weinbaum, *1244 London Eyre*; Weinbaum, “1276 London Eyre”; Cam, *1321 London Eyre*; Helen Maud Cam, ed., *Year Books of Edward II: Vol. XXVI (Part II): The Eyre of London 14 Edward II AD 1321 Vol II*, London: Selden Society, 1969. There are four cases of encroachment and enclosure in in 1321 Eyre, pp. 64,

medieval London was crowded, particularly in some parishes within the walls, even after the population decline in the late fourteenth century.

Waste

With appropriate waste management technology, sanitation infrastructure, and enforcement of regulated good practice, population density does not necessarily mean a waste problem. However in medieval London, the drivers of total population, population density, per capita consumption and primitive technology combine to produce pressures resulting in waste disposal problems. The concentration of activities generating waste and the limited waste treatment technology meant that the impact of effluent disposal on the immediate urban environment in medieval cities had the potential to be severe. Specific types of waste, such as stable waste, could be collected and applied to land, probably after composting to break it down to a consistency useful as a fertilizer and soil conditioner. However, judging by the frequent complaints about dung in the streets, collecting it off the pavements was not an economic proposition. Disposal options for other types of waste were limited, and best practice seemed to be getting the waste into the nearest waterway, or channel leading to a waterway, burying it, or dumping it outside the city boundary. Some waste was used to build up the Thames embankment, encroaching into the river. Disposal by directly dumping in the street or other places in the city was discouraged, as discussed in the next chapter.

The alternative was to place waste in a cesspit, used primarily for human waste, but also used for other liquid waste and household solid waste, or cart it to laystalls or the Thames where it was taken away on barges.⁵⁷ At London's peak medieval population of around 80,000 people, the adults alone would have produced 7.2 tonnes of faecal solids per day, or over 2,600 tonnes in a year.⁵⁸ Assuming that each adult

86, 87 and 101-102, one relating to a defective party wall p. 148, and once ordering the maintenance of a watercourse pp. 65-66

⁵⁷ Cesspits were used as general dustbins for food preparation waste. Schofield and Vince, *Medieval Towns*, 230, 232. The Assize of Buildings ordinances set out in the make it clear that the requirements for cesspits apply to "any kinds of pits made for receiving water, whether clean or foul. Carpenter, *Liber Albus*, 280.

⁵⁸ This assumes that each adult generates approximately 150 grams of faeces per day. In producing a ballpark figure for human waste production, I have assumed that the medieval London population would have a high proportion of children (40%), and I have not counted their contribution to the human waste load, so this is a very conservative estimate. I have based this rough estimate on census data from New Zealand in

generates approximately 150 grams of faeces and 1 to 1.5 litres of urine each day, that population would also have produced a minimum of 48 to 72 thousand litres of liquid waste per day (not including any water used to wash this waste away) or up to 26 million litres per year.⁵⁹ The declining population of the later fourteenth century may have produced only half these volumes. This waste was either flushed into streams and ultimately into the Thames, or disposed of on-site in cesspits.

The Assize of Buildings contained specifications for setbacks from property boundaries for cesspits lined in stone and lined in other materials, most likely wood. Even the stone-lined pits would allow some movement of liquids into the groundwater, with the potential to contaminate adjacent wells.⁶⁰ Situated in the lower part of the Thames valley, London is located above a layer of water-bearing sand and gravel that feeds springs wells, overlying a layer of compressed clay and broad bands of chalk.⁶¹ Magnusson describes late medieval London as being “honeycombed” with waste pits, many of which would have penetrated the water-bearing gravels and potentially contaminated the wells.⁶² Archaeological excavations of medieval properties show that

the latter part of the nineteenth century (a rapidly growing population with high levels of infant mortality as I would expect medieval London to have had, and for which there are accurate records), when people under the age of 15 comprised around 40% of the population, and this decreased to around 30% by the early 1900s when infant mortality levels started to decrease. Stressed populations with high infant mortality tend to have a high proportion of children (Statistics New Zealand, Long Term Data Series http://www.stats.govt.nz/browse_for_stats/economic_indicators/NationalAccounts/long-term-data-series/population.aspx). Boyden also notes the high proportion of children in developing societies with high birth rates. Boyden, *Western Civilization in Biological Perspective*, 178–9. By comparison Taylor estimates that medieval London would have produced 5 tonnes of human faecal solids per day. Taylor, “Human Waste,” 64.

⁵⁹ Hoffmann, “Footprint Metaphor,” 309. To give some idea of the scale of this, a road petrol tanker holds between 15 and 30 thousand litres depending on design. Jørgensen uses an estimate of 250g of faeces per day, higher than Hoffmann’s estimate, and 800ml of urine per day, slightly lower. Jørgensen, “Urban Sanitation,” 35.

⁶⁰ Magnusson, “Medieval Urban Environmental History,” 191. Magnusson refers to stone-lined pits as “impermeable” but I believe that while these pits would retain solids, they would still allow some seepage of liquids, as with the available technology and material it would be difficult to construct a fully watertight lining. A photograph of a London cesspit shows that it is lined with large stones cemented together Schofield, *Medieval London Houses*, 86.. However, Pounds suggests that “holes would have been left for fluids to drain into the soil “ and that cesspits would be built of rough stones, without mortar so that fluids can drain into the soil. Norman Pounds, *The Medieval City*, Westport, Conn: Greenwood Press, 2005, 47–48.

⁶¹ Peter Ackroyd, *London Under*, London: Chatto & Windus, 2011, 8; N. J. Barton, *The Lost Rivers of London: A Study of Their Effects Upon London and Londoners, and the Effects of London and Londoners Upon Them.*, London: Phoenix House; Leicester University Press, 1962, 15; Magnusson, “Water and Wastes,” 299.

⁶² Magnusson, “Water and Wastes,” 300.

the privy would be located at the rear of buildings, either inside or immediately outside, and cesspits often near boundaries and near wells.⁶³ Stone-lined cesspits could be periodically cleaned out, whereas those not lined with stone would most likely be covered over when full and a new pit dug.⁶⁴ Cesspits had the potential to overflow or leak into the neighbour's property. As will be seen in the next chapter, there are surprisingly few complaints in the *Assize of Nuisance* about cesspits, so when adhered to this method of disposal seemed to satisfy the requirements of "out of sight, out of mind" for household waste. Waste from industries and food processing created more of a problem.

The key polluting industries in medieval London were related to processing animals for food, or hides for leather. Schofield and Vince describe medieval industries as "labour-intensive, smelly, and ... a fire risk" and despite this they were often located in residential areas.⁶⁵ The problem of disposing of butchers' waste is well documented, and is discussed in more detail in Chapter 5. Butcher's waste was particularly noxious, as it would contain animal faeces, paunch waste (stomach contents), blood and intestines, placing a very high pollutant load on any watercourse it entered. The biochemical oxygen demand (BOD) of blood is extremely high, in the order of 150,000 - 200,000 milligrams per litre (mg/l), and paunch waste 2.5kg of BOD per ton of live weight of animal (LWK).⁶⁶ This organic loading would have drastically reduced the available oxygen in the water and potentially resulted in fish kills, although none are mentioned in the documentary sources. The eels would have tolerated relatively high levels of organic pollution.⁶⁷ In terms of medieval Londoners' understanding of the health hazard associated with the butchers' waste, an important concern would have been the offensive smell.

⁶³ Schofield and Vince, *Medieval Towns*, 82–3.

⁶⁴ Magnusson, "Water and Wastes," 301. Magnusson notes that excavations have revealed rows of cesspits at the back of tenements, so the contents could be loaded directly onto carts in a service alleyway.

⁶⁵ Schofield and Vince, *Medieval Towns*, 121–3.

⁶⁶ FAO (1996) Management of Waste from Animal Product Processing: Chapter 2 Slaughterhouses <http://www.fao.org/wairdocs/lead/x6114e/x6114e04.htm> Biochemical Oxygen Demand is a measure of the potential of wastewater to pollute receiving water through depleting oxygen levels when oxygen dissolved in the water is consumed in the breakdown of organic material in the wastewater. Shock loading of high BOD waste results in fish kills, and lower level, long term pollution results in a degraded habitat.

⁶⁷ Hoffmann, "Aquatic Ecosystems," 52–3.

As well as butchers' waste, waste from other food processing would have contributed to pollution of the streets and watercourses, particularly waste from fish and poultry processing, which would generate similar waste streams to meat processing, but in smaller quantities. Cloth-making and leather-working were major industries and leather was an "essential and ubiquitous material" in an era without plastic.⁶⁸ These industries often used chemicals that ended up in the waste stream. The production of heavy leather required cow hides to be soaked in tanning solutions of oak bark and water, in pits, for about a year, after washing off the blood and dung and scraping fat and hair from the skin. The hide might be soaked in urine or lime to loosen the hair, and dog dung, bird droppings, and stale beer were also used in the preparation phase. Light leather from smaller animals was tawed with alum or oil.⁶⁹ Many tanners were located along the banks of the Fleet, close to the butchers' Shambles.⁷⁰

Fulling cloth involved pounding it in a solution of water, lye, soap and urine.⁷¹ The practice of using urine in the process of fulling cloth must have continued through the fourteenth century, as evidenced by a petition in 1376 to ban the use of "syge," and instead use earth and water.⁷² Although water-powered fulling mills had become widespread by the fourteenth century, there are numerous directives in the *Letter Books* forbidding sending cloth outside the city for mechanical fulling. The finished cloth would be stretched on tenter frames and then dyed in a dye bath, both processes that elicited complaints, and both dyeing and fulling required a supply of clean water.⁷³ Other industries such as bone-working would have generated solid waste, and industries consuming large amounts of fuel are discussed in the next section.

It is difficult to know the impact of these industrial discharges on the Thames. Hoffmann notes that medieval cities clearly had impacts on their surrounding environments through

⁶⁸ Maryanne Kowaleski, "Town and Country in Late Medieval England: The Hide and Leather Trade," in *Work in Towns, 850-1850*, ed. by Derek Keene and Penelope J. Cornfield, Leicester ; New York: Leicester University Press, 1990, 57.

⁶⁹ *Ibid.*, 58. For a detailed description of the production of leather and uses of see John Cherry, "Leather," in *English Medieval Industries: Craftsmen, Techniques, Products*, ed. by John Blair and Nigel Ramsay, London ; Rio Grande, Ohio, U.S.A: Hambledon Press, 1991, 295–319; Kowaleski, "Hide and Leather Trade."

⁷⁰ Magnusson, "Water and Wastes," 302.

⁷¹ Elspeth Whitney, *Medieval Science and Technology*, Westport, Conn: Greenwood Press, 2004, 122.

⁷² Sharpe, *LtrBkH*, 37.

⁷³ Penelope J. Walton, "Textiles," in *English Medieval Industries: Craftsmen, Techniques, Products*, ed. by John Blair and Nigel Ramsay, London ; Rio Grande, Ohio, U.S.A: Hambledon Press, 1991, 330–333.

concentration of population and associated demands and discharges.⁷⁴ Discharges would contribute to eutrophication of streams, particularly at summer low flow, and there are reports of the Seine in the early fifteenth century being *infectée et corrompue* every summer below Paris. Investigation of plant remains from the medieval period has shown replacement of clean water species with species associated with pollution and eutrophication.⁷⁵ In smaller local streams such as the Fleet and the Walbrook, flow would not have been sufficient to dilute the effluent, even after mixing, to an acceptable level.⁷⁶ Sediments from the Fleet River indicate a change in the mid fourteenth century between species found in clean water and those tolerant of polluted water, suggesting increasing levels of pollution around the time that Edward III was demanding the area be cleaned up.⁷⁷ However, as a fast-flowing tidal river, the Thames probably had the capacity to flush wastes out to sea, particularly if waste was dumped mid-stream when the tide was receding. If the flow in the river was sufficient, dilution may have worked as an abatement technology. However, there are numerous directives in the records to clean up solid waste in streams and on the banks of the Thames.

Solid waste from households and industrial processes had the potential to contaminate land and water. Whereas the volume of sewage is directly proportional to population size, the volume of solid waste also depends on levels of consumption, so is a better indicator of total population pressure. We have no way of estimating the volume of solid waste generated, but there is evidence that materials were reused. It was not a throw-away society and re-use of materials was likely to be high, particularly among the poor. Economic considerations and the labour input and hence cost of manufactured goods would have encouraged repair, reuse and recycling of goods. Recycling activities are discussed in chapter 5. Also there is evidence of the value placed on goods such as

⁷⁴ Hoffmann, "Footprint Metaphor," 310.

⁷⁵ *Ibid.*, 312.

⁷⁶ The first mention of measures to improve water quality, suggesting either a growing recognition or an increasing water quality problem, was in January 1288, when Edward I determined that Walbrook should be made free of dung and other nuisances and the "rakes" put back. Riley, *Memorials*, 23.

⁷⁷ John Schofield, *Medieval Towns: The Archaeology of British Towns in Their European Setting*, Studies in the Archaeology of Medieval Europe London: Equinox, 2005, 213. See Chapter 5 for a discussion of directives regarding the disposal of butchers' waste.

furniture, gowns, drapery, and bowls in wills.⁷⁸ Eventually products would have been beyond repair or rework and discarded.

Some solid waste from households and cottage industries such as bone working would have ended up in cesspits. This waste would include kitchen waste discarded sundry household objects and offcuts from manufacturing. The inert part of the waste is seldom the problem, and in fact provided useful fill at the Thames. It is the organic content that had the potential to pollute surface and underground waterways, although there is frequent reference to blocking gutters and watercourses (both within property boundaries and of watercourses) in the Assize and other sources.

In modern society, effective waste collection and treatment and environmentally sound disposal of waste can reduce the impacts on the environment even of large volumes of waste. In medieval London, the level of technology limited the treatment and disposal options available to burial and anaerobic breakdown, land application as fertilizer, or discharge to watercourses, as discussed above. Technology also dictated the type of waste produced, which was mostly biodegradable or inert. Burning wood as the sole source of heat would have generated large volumes of ash, and the lack of refrigeration dictated that killing of animals be done close to the centres of demand. Transport technology was limited to horses, either ridden or pulling carts, and this would have resulted in a significant generation of excrement.

Horses were important both as property and for transportation of people and goods to and within the city. The records contain ample references to the monetary value placed on horses, and their confiscation as property.⁷⁹ There are numerous references to stables, and in addition to the normal population of horses for transport resident or transient, and driving horse-mills, traded at the Smithfield horse fair, and at times there would have been large contingents of horses in or passing through the city in association

⁷⁸ Sharpe, *LtrBkG*, 160, 268.

⁷⁹ Robert C. Palmer, *English Law in the Age of the Black Death, 1348-1381: a Transformation of Governance and Law*, Chapel Hill: University of North Carolina Press, 1993, 356–7. There are numerous examples in the *Letter Books*, particularly *Letter Book A*.

with the marshalling of troops.⁸⁰ Horses would have contributed significantly to the waste deposited on the streets, particularly around the port area.⁸¹ Stable waste, a mix of straw and horse dung, would probably have been collected and transported out of the city to fertilize agricultural land, but much of the horse dung would have been deposited directly on the streets.⁸²

A medieval horse may have produced 10kg of dung and 8 litres of urine per day.⁸³ There are no reliable estimates of the horse population in London, but the majority of the population would not have been likely to be able to afford a horse, and would have hired a horse when required.⁸⁴ For every thousand horses, there would be ten tonnes of dung produced every day, perhaps half of it deposited on the streets, and there may have been up to 5,000 horses, generating 50 tonnes of waste per day, or 18,000 tonnes per year.⁸⁵ Although an entry in the *Letter Books* refers to 12,000 mounted citizens riding out to meet the king in 1431-32, medieval estimates of numbers tend to be highly inflated.⁸⁶ Jørgensen estimates that a city of 10,000 people, with 5% owning horses, would generate

⁸⁰ For example, in 1296 “the King was informed that forty horsemen, fully caparisoned, and fifty “ arbalesters,” or crossbow men, besides footmen (*absque peditibus*), had been dispatched for service under his son the Prince”. Reginald Sharpe, *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book C Circa 1291-1309*, London: The Corporation of London, 1901, iii. Clark describes the types of horses sold at the fair John Clark, ed., *The Medieval Horse and Its Equipment, c.1150 - C.1450*, 2nd ed Woodbridge, Suffolk, UK ; Rochester, NY: Boydell Press, 2004, 6–7.

⁸¹ Sabine, “City Cleaning,” 20.

⁸² For example, in Coventry, the council specified that no disposal stones or construction material was to be deposited at the Greyfriar waste heap so that local farmers could use the dung and muck deposited there to manure their fields. Jørgensen, “Cooperative Sanitation,” 564.

⁸³ Modern horses produce between 12 and 20kg of dung per day, and 8-11 litres of urine. Assuming that medieval horses were smaller, they may have produced 10kg of dung and 8 litres of urine per day. Leigh Webster, pers. comm. and [http://www1.agric.gov.ab.ca/\\$department/deptdocs.nsf/all/agdex7954](http://www1.agric.gov.ab.ca/$department/deptdocs.nsf/all/agdex7954) Also see Clark, *The Medieval Horse and Its Equipment, c.1150 - C.1450*, 11.

⁸⁴ Clark assesses the price of owning and maintaining a horse and finds it to be beyond the means of tradesmen on the wage rates specified in ordinances. Ibid., 8–9. The value of horses listed in the Early Mayor’s Rolls ranges from 1 mark to 60 marks, with a value of 10 marks being common. *Early Mayor’s Court Rolls*.

⁸⁵ Tucker estimates that before 1550, no more than 12% of residents were freemen. Penny Tucker, *Law Courts and Lawyers in the City of London 1300-1550*, Cambridge: Cambridge University Press, 2007, 23. An upper limit might be 9,600 horses at London’s population maximum, if each freeman could afford one horse, and a lower limit in 1400 of 2,400 if only half the freemen could afford a horse. However, in the more prosperous times post-plague, it is more likely that freemen on average could afford a horse each, and some are recorded as having more than one. Therefore the horse population in the later period may have been 4,800.

⁸⁶ Sharpe, *LtrBkl*, 138.

900 cubic metres of waste per year, or 5,390 cubic metres taking account of other animals. London would generate between four and eight times this estimated volume.⁸⁷ As discussed in Chapter 4, the numerous complaints about dung in the streets suggest that this was a significant problem, particularly in Portsoken and Farringdon wards and the lanes leading to the river.⁸⁸

Energy Consumption and Air Quality

Energy demand in medieval London was primarily for heat, for both domestic heating and cooking and industrial processes such as lime-burning, metalworking, brewing, and dyeing. The demand was met primarily from wood, largely from coppiced woodlands, and also from charcoal, and a small amount of coal. The production of wood is one area where it is possible to calculate the type of environmental footprint discussed in Chapter 3. Medieval London's footprint for fuel wood is the area required to satisfy the city's demand, and the shape is determined by the locations from which it is economic to transport the wood. It would have been economic to bring wood from 27 km away by land transport and up to 160 km by water from an area along the Thames from Henley down to Margate, and possibly along the coast.⁸⁹ A hectare of coppiced woodland could produce 4.5 tonnes of firewood per annum.⁹⁰ Galloway, Keene and Murphy estimate that London's population in 1300 would have consumed 128,000 tonnes of fuel wood from 28,000 hectares, and 80,000 tonnes in 1400.⁹¹ They conclude that supplying London with firewood was well within the capability of the surrounding region, but note that the burden would have fallen on those areas most accessible by land or water transport.⁹² About half of the wood would be for domestic use and the rest for industry. Wood consumption for baking and brewing is estimated to have consumed 21 to 27 per cent,

⁸⁷ Jørgensen, "Urban Sanitation," 35–36. In her estimate Jørgensen takes into account cattle, pigs, birds and other livestock and animals brought into town for slaughter.

⁸⁸ Magnusson, "Water and Wastes," 301.

⁸⁹ Galloway, Keene, and Murphy, "Fuelling the City," 468.

⁹⁰ Hoffmann, "Footprint Metaphor," 306.

⁹¹ Assuming a population of 80,000 and fuel consumption of 1.76 tons of dry wood per person per year. Galloway, Keene, and Murphy, "Fuelling the City," 455. Hoffman estimates that the land area required for fuel wood, a hundred times the area of the city itself, is 11 per cent of the land area of Surrey and Middlesex *Ibid.*, 455–6, 470.

⁹² Galloway, Keene, and Murphy, "Fuelling the City," 468–469. The total output of the London region estimated to be at least 518,000 acres in 1300 and 325,000 acres in 1400. Wood, probably for building, was also exported. For example, Kent woodlands would also have supplied Flanders and Zeeland.

and the remainder of industrial use for industries such as metalworking.⁹³ Hoffmann proposes that the domestic use of coal, with objectionable emissions and higher transport costs means that the sustainable limit of production was being reached in 1300.⁹⁴

Domestic use of coal was minor, but, coal had advantages over wood as a fuel for industrial use in late medieval London. Two early cases from the Mayor's Court suggest that coal was in regular use at the end of the thirteenth century and that the health risks of coal smoke were recognised, although not for the reasons we would acknowledge today. A case heard on 13 June 1298 concerning the seizure of a cartload of coal provides evidence that "sea coal" (shipped from Newcastle) was being used in the city at this date, and also indicates that a "Coal Meter" (a levy) was paid on coal delivered to London.⁹⁵ As early as 1299 the smiths were taken to court for making illegal ordinances aimed in part at preventing nuisance from coal smoke. This is discussed further in Chapter 4.

The most significant use of coal use was in the lime industry. Lime was an important building material and required heating limestone to convert the calcium carbonate to calcium oxide, usually done on-site. Ekwall suggests that the existence of Lime Street (Limstrate) by 1170-87 indicates that lime was burnt and sold there.⁹⁶ Brimblecombe reports that 2,000 tonnes of lime was used in the construction of Harlech Castle in a single month in 1285.⁹⁷ The production of other building materials also used large amounts of fuel in pottery and tile kilns, glass manufacturing, and iron and steel making. Low level industrial users were bakers, dyers, and chandlers.⁹⁸ Brimblecombe suggests that the use of coal increased in the latter half of the thirteenth century as the price of wood increased, and that the price of some commodities such as lime was fixed by ordinance, so finding a cheap source of energy would be important.⁹⁹ The wood shortage

⁹³ Ibid., 456.

⁹⁴ Hoffmann, "Footprint Metaphor," 306.

⁹⁵ *Early Mayor's Court Rolls*.

⁹⁶ Ekwall, *Street Names*, 74.

⁹⁷ Brimblecombe, "Industrial Air Pollution," 389.

⁹⁸ Ibid. Coal was available in London in the early thirteenth century, evidenced by the existence of Sacoles Lane (later Sea Coal Lane) by 1228 and in 1236 Robert le Portour fell into the Thames and drowned as he was unloading coal from a ship. Chew and Weinbaum, *1244 London Eyre*, No. 106.

⁹⁹ Brimblecombe, *The Big Smoke*, 16-17.

eased after the population decline mid-fourteenth century, but Brimblecombe shows that the quantity of coal used did not change significantly between 1307 and 1558.¹⁰⁰

The main impacts of burning coal in the city were the sulphurous smoke emitted, much more pungent than wood smoke. In later centuries, the combination of intensive coal use and atmospheric conditions resulted in an inversion layer trapping the smoke and causing killer “pea soup” smog. The same atmospheric conditions could be expected in medieval London on cold still nights, although the effects of trapped smoke would be very local and nothing suggests that it was a widespread problem. Although coal was only used by specific industries in the fourteenth and early fifteenth century, it contributed to the majority of the air quality complaints because the acrid and sulphurous smoke was thought to cause disease. Overall, air quality concerns arose from burning fossil fuels and industries using or producing foul-smelling substances or disposing of malodorous waste because of the medieval association between miasma, or foul air, and disease.

Although most complaints were about coal smoke, burning vast quantities of wood would have generated a large amount of smoke, contributing to localised air pollution and poor indoor air quality in poorly ventilated homes, particularly in the earlier period without chimneys.¹⁰¹ Indoor air pollution from wood smoke would be a significant health risk, with chimneys not common until the sixteenth century. In medieval London, houses were often several stories high and streets were narrow, creating canyons that would trap smoke and airborne contaminants. Industries were often carried out within homes, and many required a source of heat, as seen above, particularly bakers, brick-makers and metal workers.¹⁰² Using a conservative figure for emissions from burning wood fuel in fireplaces of 40 g/kg and Galloway’s estimate of wood consumption in 1400, 3,200 tonnes of particulate matter would be emitted per year, or around 9 tonnes per day.¹⁰³ This corresponds to a deposition of particulate matter of more than a kilogram per

¹⁰⁰ *Ibid.*, 17, 26.

¹⁰¹ Hoffmann, “Footprint Metaphor,” 305.

¹⁰² Brimblecombe, *The Big Smoke*, 4, 6.

¹⁰³ Dorothy L. Robinson, “Australian Wood Heaters Currently Increase Global Warming and Health Costs,” *Atmospheric Pollution Research* July 1, 2011: 268, <http://www.atmospolres.com/articles/Volume2/issue3/APR-11-033.pdf>. The estimate of 40 g/kg is for an older style modern woodburner, and is a very conservative estimate of the emissions rate that could be expected for a medieval open fireplace.

square metre per year on average.¹⁰⁴ Modelling of early climate and air quality shows that atmospheric levels of fine particles (PM₁₀) from burning fuel remained relatively low, and at slightly lower level than London in 2010, until they began to rise in the late sixteenth century.¹⁰⁵

Long term exposure to air pollution can contribute to respiratory infections including chronic sinusitis which causes the bone at the floor of the sinus to become roughened or pitted, and thus visible in skeletal remains.¹⁰⁶ Inflammation and infection can result from environmental conditions, including direct exposure to air pollution and dust, and crowded insanitary and poorly ventilated houses increasing susceptibility to transmitted disease, and hence lowering resistance to infection.¹⁰⁷ In a comparative study of late medieval rural and urban populations, Lewis found that 55% (134) of the individuals from the poor urban parish of St. Helen-on-the-Walls in York had evidence of sinusitis compared to 39% (106) of the individuals from the rural settlement of Wharram Percy. She suggests that the difference may be explained by occupational and industrial air pollution in the medieval city of York.¹⁰⁸ Other industrial activity would have given rise to human health effects. For example, huge amounts of lead were required for church roofs and windows, and it was produced on-site. It was melted down in indoor hearths (for shelter from the wind) and is likely to have been a significant health hazard, although there is no surviving evidence to support the probable health effects.¹⁰⁹ The archaeological evidence for poor air quality is insufficient to use as an indicator. As discussed in the next chapter, there are surprisingly few complaints about air quality, and those that are documented relate largely to the use of coal. It is difficult to find a suitable indicator for air quality problems arising from smoke, but complaints about odours can indicate poor waste disposal practices.

¹⁰⁴ When soils from the medieval period from Arles and Bologna were analysed, they were found to contain large quantities of ash. Makra and Brimblecombe, "Selections from the History of Environmental Pollution, with Special Attention to Air Pollution. Part 1," 352.

¹⁰⁵ Peter Brimblecombe and Carlota M. Grossi, "Millennium-long Damage to Building Materials in London," *Science of The Total Environment*, 407: 4 (2009), 1356.

¹⁰⁶ Brimblecombe, *The Big Smoke*, 3.

¹⁰⁷ M. E. Lewis, C. A. Roberts, and K. Manchester, "Comparative Study of the Prevalence of Maxillary Sinusitis in Later Medieval Urban and Rural Populations in Northern England," *American Journal of Physical Anthropology*, 98: 4 (1995), 498-9. Lewis gives a full description of the symptoms and occurrence of sinusitis in medieval populations

¹⁰⁸ *Ibid.*, 497.

¹⁰⁹ Pryor, Francis, *Britain in the Middle Ages*, 202.

Conclusion

This chapter investigated the potential for models used to describe present-day environmental systems to assist in interpreting information on the medieval environment. An overly complex model would simply highlight data deficiencies arising from the sporadic survival of both documentary and archaeological evidence from late medieval London and be unlikely to produce meaningful results. Caution is also needed in assuming causality simply because there was an issue and a response.¹¹⁰ There is little evidence of the local authority in medieval London using any formal environmental management system (EMS) but it is possible that some of the steps, such as having goals and acting to achieve them, were implicit in the way the city operated. Unlike the current environmental systems that environmental reporting models were designed to monitor, we cannot directly measure the medieval state of the environment. I have turned the Driver-Pressure-State-Impact-Response (DPSIR) model around to use information on the drivers, pressures and responses to assess the state of the environment. I have used the concepts embodied in a more complex framework (see Figure 6) to adapt my DPSIR model to take better account of the importance of human activity and the technology it encompasses, as shown in Figure 7.

The key drivers of environmental pressure in the medieval urban setting are population, population changes, population density and related demand for goods and services. These cannot be measured directly, but it is generally accepted that the population of London increased considerably through the thirteenth century, remained static or possibly declined slightly during the first half of the fourteenth century through a period of adverse climatic conditions, and then suffered a drastic reduction in the first plague epidemic mid-century. It is not clear the extent of population replenishment through migration, but migration had always been a feature of the London population and may have increased as opportunities for work and land ownership arose in the depopulated city. None of these factors can be measured directly, but researchers generally agree on estimated population trends and densities.

¹¹⁰ Whyte notes an unfortunate tendency of climatologists to assume causality because two events occur at the same time, without supporting evidence of a relationship between them. Ian Whyte, *World Without End?: Environmental Disaster and the Collapse of Empires*, London ; New York: Tauris, 2008, 9.

Indicators of the pressure on the environment created by the population drivers can be estimated using proxy values for consumption, such as the demand for fuel wood. The volume of human waste can be derived from population estimates and assumptions about diet and population age profile. The volume of animal waste can also be estimated on the basis of conservative estimates about the number of animals in the city. However, the volume of waste from industry and food processing can only be guessed at. The severity of the likely impact, for example of butchers' waste, can be estimated from the known properties of this waste and the disposal options available. The next chapter will look at complaints as an indicator of the pressures and impacts of waste disposal.

Political and cultural drivers have a less direct effect. Religious dietary restrictions stimulated demand for fish, but since there is no way of assessing fish consumption, the responses to pressure on the resource will be discussed in Chapter 5. Political drivers arise from the importance placed on self-governance. As will be discussed in later chapters, clean streets were a visible and tangible demonstration of the city's control over activities, particularly in times of unrest. Cleaning the streets of pollution was tied up with cleaning the streets of undesirable people and activities. In the next chapter I will use the model to assess the responses in terms of ordinances with environmental outcomes and complaints of environmental nuisance to provide further information on the pressures and responses.

CHAPTER 4: Responses

This chapter builds on the discussion in the previous chapter on drivers, environmental pressures and the resulting impacts, by looking at regulatory responses. While this chapter focusses on responses, the ordinances to control environmental problems cannot be studied in isolation from complaints of infringements of those ordinances, nor from follow up and enforcement. The ordinances describe a desired state, but taken alone provide no information on whether that state was achieved. To fully understand the response, it is necessary to look at complaints and how they were handled. In turn, these complaints provide further information on the pressures and impacts covered in the previous chapter. As well as regulating activities with environmental impacts, the city provided services such as waste collection and public latrines, and these are discussed in the next chapter.

Introduction

In modern times, responsibility for managing the urban environment rests with local authorities. We pay our rates and taxes, and we expect the local authority to take away our sewage, stormwater and garbage, and to deal with the nuisance actions of our neighbours. We also expect councils to provide well-maintained and well-lit roads and footpaths and other facilities. Local authorities develop plans that include objectives for managing the environment and detailed rules or regulations for activities that affect the environment. Permits are issued in accordance with these rules, and penalties are imposed for infringements. There is often a hierarchy of enforcement, with council officers dealing directly with minor complaints, and directing major complaints to the council or a national court. Most western countries have a system of this kind in place, although the allocation of responsibilities between local and national agencies and the degree of local decision-making will vary between countries.¹

We tend to think of medieval England as being lawless and poorly regulated, but in fact society was highly regulated by both Church and State, as can be seen from the very detailed and prescriptive statutes and ordinances governing the prices and quality of basic

¹ As discussed above in chapter 3, many local authorities world-wide use international Environmental Management Systems standards.

commodities, weights and measures, and how goods could be sold.² Another example of this prescriptive approach is the complex system of tolls to provide for the functions of local government.³ While the priorities of lawmakers and local authorities undoubtedly differed from those of modern governments, they used a very similar set of mechanisms to govern their physical, social and economic environment.

Some regulatory activities that were not a direct response to an environmental issue have been included in this analysis because one of the effects of the action would be to improve the state of the environment. For example, instructions to clear out the city fosse (ditch) may have been for defensive purposes, but suggest a waste problem and resulted in an environmental clean-up. The major court hearing environmental complaints between neighbours was the Assize of Nuisance court, and its primary purpose was maintaining property values and property rights. It may also have aimed to preserve the peace in an age where unresolved disputes could easily escalate into violence. It also served to control off-site effects of environmental nuisances like cesspits and latrines. The success of the environmental outcome was limited by the prevailing understanding of the transmission of disease. For example, regulations for cesspits aimed at controlling noxious odours, thought to be a source of disease, would have been effective at containing the waste but the on-site wastewater disposal is likely to have endangered groundwater quality and affected wells in the vicinity.

This chapter will discuss responses to the environmental impacts of activities, focussing on the legal and administrative responses, the making and enforcing ordinances and providing a vehicle for complaints. The city also provided services such as waste collection and public latrines, and these are discussed in the next chapter. This chapter will describe the local court system and the ordinances governing activities with potential environmental effects. It will focus on the activities of the Assize of Nuisance court, a special court set up to deal with complaints between neighbours. This valuable resource has been used as a source of information by various researchers, but I propose to

² Williams, *Medieval London*, 79. The *Liber Albus* and the *Letter Books* have page after page of regulations governing buying and selling goods, weights and measures, the activities of foreign merchants, fire prevention, taxes on goods and tolls on users of roads, rivers and marketplaces etc. Carpenter, *Liber Albus*.

³ Carpenter, *Liber Albus*, 126, 117.

interrogate the source to a much greater depth and extent than previous researchers to fully understand the role of the court in abating environmental nuisance.

Local government in medieval London

This section examines the roles, and responsibilities of the agencies responsible for environmental management in medieval London. Table 3 shows the hierarchy of increasing intervention in environmental issues. At the lowest level, minor environmental nuisances would have been dealt with at the ward level, and this day-to-day intervention and dispute resolution would probably not have been recorded. Hanawalt notes that cases came before the courts when non-adjudicated dispute settlement failed.⁴ At the next level, property owners could complain to the alderman at the ward level or demand to have their complaints about neighbours infringing their property rights heard at the Assize of Nuisance court by the mayor and aldermen. Nuisance activity that affected the wider community was investigated by the wardmote and reported to the Mayor's Court for action. The city courts were responsible for making and proclaiming city ordinances and responding to royal directives, whereas the Common Council was responsible for implementing those ordinances and directives through civic actions and public works.

Medieval London was proud of its longstanding self-governance and anxious to maintain control over its own affairs. William the Conqueror granted London a charter which upheld the laws "of King Edward's day" and an expanded charter granted by Henry I in 1132 granted London full county status and the right to elect its own mayor, aldermen and justices, the primary requirement for self-governance.⁵ Later, the Magna Carta confirmed the ancient liberties of the citizens of London.⁶ Wards were the first line of defence in managing environmental issues, through making citizens aware of the city and ward regulations; investigating and resolving infringements and complaints; and carrying out public services. Attendance at Wardmotes was compulsory for householders and

⁴ Barbara A. Hanawalt, *Of Good and Ill Repute: Gender and Social Control in Medieval England*, New York: Oxford University Press, 1998, 38. Rexroth also suggests that bringing matters to the attention of the alderman or wardmote was an admission of failure of neighbourly conflict resolution. Rexroth, *Deviance and Power*, 219.

⁵ The Corporation of London, *Origin and History*, 3; Bryce Dale Lyon, *A Constitutional and Legal History of Medieval England*, N.Y: Harper & Row, 1960, 179, 191. This is one of many instances of London being granted privileges in return for political support of a monarch under pressure, or an aspiring monarch. The charter of Henry I also confirms the authority of the local courts.

⁶ *Ibid.*, 6-7. Confirmed by charters of Edward III in 1341 and Richard II in 1377 and 1383

males over the age of 15 years except for knights and clerks.⁷ A summary of the ward and civic regulations was read at the Wardmotes annually, and in an age of low literacy this would be an important way of promulgating regulations. Tucker suggests that lesser offences may have been dealt with informally by the Aldermen simply ordering the offender to fix the problem, although the wardmote had no power to determine cases.⁸ A special inquest jury was appointed annually to report on infringements and complaints of the inhabitants, and to refer these to the Mayor for action on Plough Mondays.⁹

Table 3: Organisations dealing with environmental issues in late medieval London

Authority	Coverage	Jurisdiction	Activities
Alderman	Ward	Private and public nuisance	Informal resolution of complaints
Assize of Nuisance	City	Private nuisance	Hearing complaints about infringement of Assize of Buildings and some wider nuisance issues
Wardmote	Ward	Public nuisance	Annual presentment of infringements of wardmote articles to Mayor's court
Mayor's court	City	Public and private nuisance	Proclaiming and enforcing city ordinances relating to street cleaning and public health Hearing cases of public nuisance
Court of Aldermen	City	Public and private nuisance	Making city ordinances
Common Council	City	City administration	Authorising expenditure on public works, street cleaning and public health
King	National	Public and private nuisance	Statutes governing activities with environmental effects Directives to local government to clean up pollution

⁷ Thrupp, *The Merchant Class of Medieval London*, 69. In 1206 London had 24 wards, increased to 25 in 1394. Barron, *London in the Later Middle Ages*, 121.; The Corporation of London, *Origin and History*, 28. In 1419 the names of freemen and non-freemen attending the Wardmote were recorded separately and only freemen elected the Aldermen. It was not until 1920, that women, but only those who were occupiers in their own right, were admitted to the Ward list of voters. *Ibid.*, 31. However, as at 1953, the question of the eligibility of women to serve as Common Councillors had "yet to be argued". *Ibid.*, 32.

⁸ Penny Tucker, "Relationships Between London's Courts and the Westminster Courts in the Reign of Edward IV," in *Courts, Counties, and the Capital in the Later Middle Ages*, ed. by Diana E. S. Dunn, New York: St. Martin's Press, 1996, 117, 119.

⁹ The Corporation of London, *Origin and History*, 28; Barron, *London in the Later Middle Ages*, 122–3.

The Mayor's Court enforced the city ordinances made by the Court of Aldermen.¹⁰ The Mayor's Court developed in the thirteenth century, possibly as a judicial arm of the Court of Hustings that met daily to deal with urgent cases. It dealt with personal complaints, gradually taking business from the Sheriff's Court and the Husting to become the most active court.¹¹ It is likely that the Court of Aldermen developed from the administrative side of the Husting. The Court of Aldermen, meeting almost daily, developed ordinances for preserving the peace and regulating trade, and these were enforced in the Mayor's Court. On Plough Mondays the Court of Aldermen received the returns of the elections by the wards of Common Councilmen.¹²

Established in 1322, the Common Council and "substantial citizens from the wards" elected the mayor, sheriffs and aldermen.¹³ The Common Council met quarterly, and from 1376 twice per quarter, or as summoned by the Mayor.¹⁴ Initially two people were elected by each Ward but from 1346 between four and eight were elected, depending on Ward size.¹⁵ The scope of the Common Council was broad, including managing all common land, authorising taxes imposed on Londoners, approving expenditure on public works and resolving disputes between guilds and regulating the granting of freedom of the city.¹⁶

¹⁰The Mayor and Aldermen in their administrative role in the inner chamber of the Guildhall, made up the Court of Aldermen and in their judicial role in the outer chamber they acted as the Mayor's Court. The Corporation of London, *Origin and History*, 87.

¹¹ Cam, *1321 London Eyre*, lv.

¹² The Corporation of London, *Origin and History*, 37, 42–4, 85. The surviving wardmote presentments are discussed in chapter 5.

¹³ Ibid., 9.

¹⁴ Ibid., 40. In 1419 the names of freemen and non-freemen attending the Wardmote were recorded separately and only freemen elected the Aldermen. It was not until 1920, that women, but only those who were occupiers in their own right, were admitted to the Ward list of voters. Ibid., 31. However, as at 1953, the question of the eligibility of women to serve as Common Councillors had "yet to be argued". Ibid., 32.

¹⁵ Other than a brief period from 1376 to 1384 the Common Council was elected by the Wards. For these eight years when commercial interests predominated, each guild providing from two to six men. Nicholas notes that London was the only major northern city to have this kind of geographical representation. Numbers of Common Councilmen varied from 40 in 1285 to 156 in 1376 and 96 in 1384. The Corporation of London, *Origin and History*, 50–52; Lyon, *A Constitutional and Legal History of Medieval England*, 533; Nicholas, *The Later Medieval City, 1300-1500*, 6.

¹⁶ Although not specifically mentioned until 1638, it appears that watercourses, gutters and easements and the banks, shores and waters of the Thames were within the jurisdiction granted by the original charter. The Corporation of London, *Origin and History*, 55; Barron, *London in the Later Middle Ages*, 133–4.

The Court of Hustings can be traced back to the tenth century, gradually taking over as the principal court for settling disputes between citizens and court of record. It sat weekly on Mondays or Tuesdays, and sittings alternated between Pleas of Land and Common Pleas. The Husting was a court of record for wills, deeds and other important documents and required the presence of the mayor, sheriffs and aldermen. The Husting was the Court of Appeal for the Sheriffs' Courts and cases related to Law Merchant, debt cases, personal actions, trespass and covenant were transferred from the Husting to the Sheriffs' Court.¹⁷ The two sheriffs were elected annually by ward representatives.¹⁸ The sheriffs also attended the Husting and the Courts of Aldermen and Common Council, and had a role in enforcing summonses, for example to attend assizes.¹⁹

Regulating private and public nuisance activities

Records of the way local environmental issues were managed provide valuable information on what those issues were, what the likely state of the environment was, and the effectiveness of regulatory action. Regulations and complaints about private and public nuisance are an important source of information because many of these "nuisance" cases concerned activities with environmental impacts. Many of these complaints were for infringements of ordinances, statutes, and proclamations governing activities that could have environmental impacts. The way the cases were dealt with also gives some insight into the prevailing attitudes towards the environment. They provide complementary information on the civic response, the environmental issues they may have been addressing (intentionally or otherwise), the likely state of the environment, and attitudes to the environment and public health.

This section looks at the way that "nuisance" behaviour with environmental impacts, such as discharging waste, was regulated in late medieval London. Different remedies were available for private nuisance, where the impact would be felt by the perpetrator's immediate neighbours; and for public nuisance where the impact was on streets, streams

¹⁷ The Corporation of London, *Origin and History*, 82–84; Barron, *London in the Later Middle Ages*, 128.A. L. Brown, *The Governance of Late Medieval England 1272-1461*, 3, London: Edward Arnold, 1989, 219, 85–86; Cam, *1321 London Eyre*, liii.

¹⁸ The sheriffs were also sheriffs of Middlesex. Brown, *The Governance of Late Medieval England 1272-1461*, 153.

¹⁹ The Corporation of London, *Origin and History*, 69, 85; Barron, *London in the Later Middle Ages*, 128–9.

and the wider environment or a wider section of the population.²⁰ The analysis below focuses on cases heard by the Assize of Nuisance court, an assize comprising the mayor and a quorum of aldermen to consider complaints of infringements of the Assize of Buildings ordinances.²¹ These highly prescriptive ordinances set out the operation of the Assize of Nuisance court and the rights and obligations of property owners. The records of the Assize court have been translated and published as the *Assize of Nuisance* and made available in digital format.²²

While there are many secondary sources on the development of law and local government in London most do not include a detailed discussion of the Assize of Nuisance. Legal historians seem to have little interest in the details of the court, for example Palmer in *English Law in the Age of the Black Death* only mentions the Assize of Nuisance once, in a footnote.²³ The only paper to discuss it in detail is Janet Loengard, and she talks about the theory rather than the operation of the court.²⁴ An MA thesis in Norwegian misrepresents the data through misleading visual presentation, and seems to misunderstand much of the context of the Assize.²⁵ Schofield presents a breakdown of the cases, as discussed below.²⁶ However, nobody seems to have looked at how the Assize worked and how it fitted in with other ordinances, and other courts. Various authors have examined a single aspect of the Assize court or used information from the

²⁰ Halper describes private nuisance as a “non-invasive injury to plaintiff’s rights to use and enjoyment of real property” and public nuisance as “the injury a private use inflicts on public rights, which may occasionally mean harm to real property owned by the public, but is more often an injury to common pool

resources, like silence, clean air or water, or species diversity.” Louise A. Halper, “Untangling the Nuisance Knot,” *Boston College Environmental Affairs Law Review*, 26: 1 (1998), 97–98.

²¹The original meaning of “assize” was “company of assessors brought together to determine something W. C. Bolland, “The Book of Assizes,” *The Cambridge Law Journal*, 2: 2 (1925), 193. The term is also used to describe the ordinances specifying the requirements for buildings and avoiding related “nuisance”. The meeting of the mayor and aldermen to consider complaints will be referred to as “the Assize of Nuisance court”, the published records of that court as the *Assize of Nuisance*, and the specifications in the Assize of Buildings and Nuisances related to Buildings as the “Assize of Buildings”.

²² Chew and Kellaway, *Assize of Nuisance*. This book has been digitised and is available on-line at www.british-history.ac.uk. These court records will be referred to as *The Assize of Nuisance*.

²³ Palmer, *English Law*.

²⁴ Loengard, “The Assize of Nuisance.”

²⁵ Elverhøi, “Making Cities Habitable.” For example, Elverhøi says that the ordinances it relates to need to be inferred from the cases, whereas they are set out in the *Liber Albus*. The only primary sources referenced are the Assize of Nuisance, the York Ordinances and a Norwegian source. This thesis is discussed in more detail below.

²⁶ Schofield, *Medieval London Houses*, 59.

Assize of Nuisance (or directly from the rolls) to assess specific issues. I have undertaken an in-depth analysis of the cases presented to the Assize of Nuisance court.

The majority of the cases considered by the Assize of Nuisance court were private nuisance, namely issues between neighbours that infringed the Assize of Buildings or rights to light, air, or water guaranteed by a lease or contract.²⁷ The Assize of Buildings ordinances predate the Assize of Nuisance court by at least a hundred years, yet there is very little surviving evidence of formal enforcement of the ordinances before the records of the Assize of Nuisance court started in 1301. The Mayor's court handled public nuisance cases, either arising from the Wardmote presentments or complaints from the king, and some private nuisance cases. The records of these cases are incomplete, scattered throughout the extant sources, and much of the information is in collections that were assembled to demonstrate the customs of the day, so don't represent a random selection of surviving cases. However, the cases that do survive provide additional valuable information on the likely environmental issues faced by the city, supplementing the more complete time-series of records of cases in the *Assize of Nuisance*.

Common law provisions for nuisance afforded medieval landowners some protection against environmental disturbance. A neighbour's bad behaviour became a legal nuisance when it affected the enjoyment of a landowner's natural expectation of property ownership or a "property right" specifically granted or prescribed, but falling short of forcible trespass.²⁸ Baker considers that nuisance was "Where noxious matter came onto the plaintiff's land indirectly by reason of the dilapidated state of the defendant's premises, the collapse or putrefaction of something placed near the boundary, the flowing of water, force of wind, or the permeation of damp and mould, it was not a trespass by force of arms." He notes that these were the commonest forms of nuisance complaints at a time where there were few public health regulations and low standards of hygiene.²⁹

²⁷ Bolland considers the nuisance remedy as "for the abatement of outside obstructions to a man's right to enjoyment of his own lands". Bolland, "The Book of Assizes," 194.

²⁸ J. H. Baker, *An Introduction to English Legal History*, 2nd ed., London: Butterworths, 1979, 351, 355.

²⁹ *Ibid.*, 356.

The remedies for private nuisance offered by the Assize focussed on abating the nuisance but did not provide for compensation to the affected party or punish the perpetrator, other than paying the cost of abatement. Baker notes that it was usually on-going activities that constituted a nuisance affecting the enjoyment of property, and cases were not brought for past wrongs.³⁰ There is a presumption of strict liability in the *Assize of Nuisance* cases, as lack of intention or understanding of the consequences is not regarded as a defence in any of the cases and there is no requirement to prove negligence.³¹ If the Assize found a nuisance, the defendant was simply required to remedy it. The only punishment was a fine if the defendant did not abate the nuisance. Societal expectations of landowner behaviour toward neighbours were codified in a set of ordinances referred to as the Assize of Buildings, whereas the obligations to the wider community were set out in the Wardmote Articles and city ordinances.

Assize of Buildings

The Assize of Buildings is a highly prescriptive set of ordinances specifying landowner rights and obligations, clear guidelines as to rights to build, and obligation to deal appropriately with stormwater and several environmental matters. Booth describes the Assize of Buildings as a “codification of rules for building that were designed to ensure that neighbours’ property rights were not infringed.”³² It also clarified the extent of those property rights. Key ordinances for this study are the requirements that cesspits be placed a minimum distance from the boundary, depending on whether the pit is lined with stone. As well, they include the requirements about the placement of windows, and specify how the assize hearing should be conducted. A comprehensive list of “The Assizes of Buildings and Nuisances as to Buildings” is reproduced in the *Liber Albus*, and a summary of these ordinances is set out in Appendix 1.³³

The ordinances regulating buildings and nuisance were attributed to the first year of the reign of Richard I, 1189, in the mayoralty of the first mayor of London. This date is

³⁰ Ibid., 360. It was not until 1704 that there was recognition of a single catastrophe as causing nuisance. Ultimately the principles of strict liability for nuisance were confirmed in the much-quoted *Rylands vs Fletcher* case in 1866-68 concerning the escape of water from a reservoir damaging the plaintiff’s land.

³¹ Halper, “Nuisance Knot,” 100.

³² Philip Booth, “The Control of Discretion: Planning and the Common-Law Tradition,” *Planning Theory*, 6: 2 (2007), 130.

³³ Carpenter, *Liber Albus*, 223–226.

provided by Carpenter, the compiler of the 1419 *Liber Albus*, which contains the most accessible compilation of the ordinances.³⁴ This may be accurate, or it may be a case of giving credence to the ordinances by associating them with a popular and revered warrior king Richard Lionheart, in the reign of another popular warrior king Henry V who had achieved victory at Agincourt in 1415 shortly before the *Liber Albus* was written.³⁵ Booth suggests that the ordinances would have developed through generations of practice and experience, emphasising “remedies, procedures and cases.”³⁶ Keene suggests that such matters may have been regulated even before the Norman Conquest.³⁷ The ordinances were certainly in place by 1290, as case 283 reports that “an assize of nuisance was held in 1290–1 before Henry le Galeys, mayor”.³⁸ Judging by descriptions of the early cases, the ordinances in 1300 were the same as the ordinances set out in the *Liber Albus* in 1419.

The Assize of Buildings ordinances set out the rights and obligations of landowners and acceptable building practices, and provide for the Assize of Nuisance court as a forum for “*allaying of the contentions that at times arise between neighbours in the City*”. This was a forum for dispute resolution between neighbours, rather than being directed at maintaining public health, controlling pollution or punishing wrongdoers. The ordinances also specify procedures for holding an Assize, who must attend, procedures for essoins (formal apologies for non-attendance), and procedures for presenting evidence. The plaintiff would be given a hearing date within eight days of requesting an Assize at the Husting, or from the Mayor and Aldermen if no Husting was available. This suggests that complaints of nuisance were addressed with some urgency.

The main ordinance with environmental implications relates to privies or “necessary-chambers”, specifying that cesspits and other pits should be located three and a half feet

³⁴ Ibid., 276–7. Riley, translator of the *Liber Albus*, refers to the earliest known copy of these ordinances in the *Liber de Antiquis* preserved at the Guildhall: Ibid., 277 fn 1.

³⁵ Claiming ancient origins for customs and practices was common in the middle ages. For example Stow, quotes Geoffrey of Monmouth’s introduction rooting the origins of Britain in classical times (see Geoffrey of Monmouth, *The History of the Kings of Britain*, trans. by Lewis Thorpe, London ; New York: Penguin Books, 1966, 54–57.

³⁶ Booth, “The Control of Discretion,” 130, 141.

³⁷ Derek Keene, “Rubbish in Medieval Towns,” in *Environmental Archaeology in the Urban Context*, Research Report No 43 London: The Council for British Archaeology, 1982, 26–30.

³⁸ Chew and Kellaway, *Assize of Nuisance*, Case 283.

from the neighbour's land, or two and a half feet if lined with stone. It applied to all privies and cesspits constructed since the first year of the reign of Richard I, and to "any kinds of pits made for receiving water, whether clean or foul".³⁹ Keene suggests that these regulations were to prevent softening of the ground and undermining or rotting adjacent walls rather than to prevent pollution.⁴⁰ However, the complaints often refer to odour, and given the contemporary view on causes of disease, this ordinance was certainly used to control of off-site odour and insanitary seepage.

Other ordinances in the Assize of Buildings set out responsibility for building and maintaining walls and the rights of property holders to use the walls. Walls generally were to be 3 feet thick and 16 feet high. It was common building practice to insert corbels into walls to support structures, referred to as building "on the wall". The right to use a wall carried obligations such as conveying away the stormwater or rainwater from buildings (one's own, or under specified circumstances one's neighbour's). There are several very specific ordinances setting out responsibilities for conveying stormwater to soakage or to the street, and not blocking gutters.⁴¹ Provisions for windows allowed neighbours to "obstruct the view from another's windows, by building opposite to such windows" unless the plaintiff could show "any writing by reason whereof his neighbour may not obstruct the view from those windows".⁴²

Wardmote articles and city ordinances

Both public and private nuisance were dealt with at the ward (district) level through proclaiming and enforcing wardmote Articles. The articles are set out in the *Liber Albus*, and those related to environmental issues are collated in Appendix 2.⁴³ It is not clear whether these Articles were developed earlier or later than the proposed date of 1189 for the Assize of Buildings. However, it is likely that the articles evolved and adapted over time. For example, several of the 1419 Articles refer to rakers, but the first appearance

³⁹ Carpenter, *Liber Albus*, 280.

⁴⁰ Derek Keene, "Issues of Water in Medieval London to c. 1300," *Urban History*, 28:2 (2001), 172.

⁴¹ Carpenter, *Liber Albus*, 279, 286. The gutters referred to could have carried stormwater, or could be waste gutters, above or below ground.

⁴² *Ibid.*, 280.

⁴³ The Wardmote Articles are reproduced in the *Liber Albus*: *Ibid.*, 289ff. An earlier version was included in the *Liber Horn* in 1311. A. H. Thomas, ed., *Calendar of Plea and Memoranda Rolls Preserved Among the Archives of the Corporation of the City of London at the Guildhall, Volume 4, A.D. 1413-1437*, Cambridge: Cambridge University Press, 1943, xxvi.

of rakers in the records is in 1357 and would not have appeared in earlier versions of the Articles.⁴⁴ There was some overlap with type of offences heard by the Assize of Nuisance court, such as purprestures (encroachment into the highway) and other encroachments.

The focus of the ward Articles is controlling public nuisance and keeping the king's peace and several articles prohibit courtesans, bawds, common scolds, strangers of ill repute, hucksters, night-walkers and lepers.⁴⁵ The Articles also cover prevention of fire, including control of ovens and furnaces, building of chimneys and roofs, and requirements for major householders to have equipment and water available for fire fighting. The majority of these matters came within the definition of public nuisance, and demonstrate a theory proposed by Rexroth that there were strong connections between these different types of nuisance activities in the medieval mind-set.⁴⁶

Articles relating to public health prohibit polluting or obstructing the streets, require that sufficient rakers be available for cleaning, and prohibit the rearing of "swine, oxen, or cows, within their houses".⁴⁷ The Articles also prohibit placing rubbish in the streets, including "straw, dust, dung, sawdust or other refuse" suggesting that the key problems were probably straw and sweepings from floors and stables. Although human waste is not included in the definition of rubbish, complaints of human waste being thrown into the streets in the extant wardmote returns demonstrate that this was a problem on occasions. The Articles require this "dung and other filth" to be taken by the rakers to the "places ordained", and also require the wards to ensure that they have sufficient rakers "for cleansing the Wards of divers refuse", their salary to be collected from the residents of the ward.⁴⁸

The Articles also require each ward to hold an inquisition annually and report on infringements of the Articles and whether "the peace of his lordship the King has been broken". Although only two of these reports survive, they give a flavour of the types of problems dealt with by the wardmote that could not be resolved by informal means. The

⁴⁴ Riley, *Memorials*, 299; Barron, "Government of London," 126. For further information on the operation of the wardmote, see *Ibid.*, 39–48.

⁴⁵ Carpenter, *Liber Albus*, 226–8 and 287–291.

⁴⁶ Rexroth, *Deviance and Power*.

⁴⁷ Carpenter, *Liber Albus*, 289.

⁴⁸ *Ibid.*, 289–90.

local Alderman, constables, bedels and rakers would have had daily contact with the inhabitants and probably dealt with infringements and complaints as they arose, using negotiation and informal enforcement techniques to abate nuisances.

The city ordinances are set out in the *Liber Albus*, and were proclaimed as each new mayor took office.⁴⁹ Relevant ordinances are reproduced in Appendix 3. The ordinances include “keeping the peace and of keeping clean the streets and lanes”, again demonstrating a close connection between cleanliness and order. The association in medieval minds between nuisance pollutants and nuisance people is demonstrated by the requirement for “keeping clean the streets and lanes between the Tower and Castle Baynard; and also, that no courtesans shall dwell within the walls of the City.”⁵⁰ The city ordinances specifically cover keeping streets leading to the Thames, and watercourses, particularly the Walbrook, clear of “dung and other filth”. Taken together, the wardmote Articles, city ordinances and the Assize of Building provide a wide range of regulations governing behaviour with environmental implications.

Implementing the Assize of Buildings and City Ordinances

The previous section looked at the response to environmental issues through the making of local ordinances governing private and public nuisance. This section will examine how those ordinances were implemented, at the ward level and by the city. It will focus on the Assize of Nuisance court, for which there is a continuous record of cases throughout the fourteenth century and some cases in the early fifteenth century. This section looks at why this special Assize of Nuisance court was established and why the cases dropped off from the late fourteenth century and ceased in the early fifteenth century.

The main court dealing with private nuisance in the fourteenth century was the Assize of Nuisance court, whereas public nuisance was primarily dealt with in the wards and at the Mayor’s court. The latter are discussed in conjunction with the discussion of the Assize of Nuisance cases. Prior to the establishment of the Assize of Nuisance court the early records of the Mayor’s court contain some nuisance cases.⁵¹ In the thirteenth century,

⁴⁹ *Ibid.*, 218ff.

⁵⁰ *Ibid.*, 239.

⁵¹ *Early Mayor’s Court Rolls*.

two London Eyres (special sessions of royal justices sitting at the Tower of London) dealt with public nuisance cases, mostly relating to encroachments into the king's highway.

The issue of nuisance was considered of sufficient importance in the mid-thirteenth century that the London Eyre of 1244 conducted a special inquest into purprestures (encroachments) and another special London Eyre in 1276 considered nuisance cases.⁵² The majority of the cases considered at both these Eyres concern encroachments into the "king's highway" or other street or lane by parts of buildings, stalls, posts etc. The "nuisance" being addressed in the earlier inquest is almost exclusively encroachment into the roadway, with the only exception being the complaints about noise, vibration and fumes from one of the forges, (discussed below in the discussion of Assize of Nuisance cases). The majority of structures were to be amended or removed, although some were permitted to remain, subject to payment of a fee.⁵³ Cases about gutters and privies only appear in the later Eyre. The focus on encroachment suggests that the city was crowded and space was at a premium.⁵⁴

The published records of the early Mayor's court cover the period from May 1298 to August 1307, and are the only extant late medieval rolls of this Court other than a few fragmentary membranes from 1377.⁵⁵ However, many cases from the Mayor's court are documented in the *Plea and Memoranda Rolls* and the *Letter Books*. The matters considered ranged from petty theft and defaulting on contracts to governance of the craft guilds and their right to make ordinances. In addition, 24 cases directly relate to activities giving rise to nuisance complaints and several other cases illustrate relevant matters. Some of these cases were for the type of nuisance complaint later to be heard by the Assize of Nuisance court, and are discussed below.

⁵² Chew and Weinbaum, *1244 London Eyre*. Thirty five of the 138 entries in the records of the 1244 London Eyre relate to encroachments into the king's highway (purprestures) or other lane or street by pentices, jetties and solars. Another seven refer to steps, which are a nuisance to passers-by on the street. Forty eight specifically mention "nuisance", and it is implied for other entries that use a short form that someone also built a pentice, solar etc. The London Eyre of 1276 listed 125 cases relating to purprestures, and fifty eight of the cases refer explicitly to "nuisance". Weinbaum, "1276 London Eyre."

⁵³ A total of 17 structures were allowed to remain subject to a fee in 1244, including, seven of the eight horse enclosures examined.

⁵⁴ Barron, *London in the Later Middle Ages*, 238.

⁵⁵ *Early Mayor's Court Rolls* Introduction.

The Assize of Nuisance court began operating in 1301 during the reign of Edward I, at a time when London's population is generally regarded as having peaked after a steady expansion throughout the thirteenth century (see Chapter 3). The increasing workload of the Husting in the late thirteenth century and delegation of business to other courts, as described above, may explain why the special Assize of Nuisance court was established.⁵⁶ Cheren suggests that in the early medieval period, neighbours' disputes would be settled by their common lord, but with increasing urbanisation this role fell to local authorities.⁵⁷ Loengard notes the potential for neighbours' disputes to escalate into violence and that, coming to power in 1154 after the turbulence of Stephen's reign, Henry II provided a solution in the Assize of Novel Disseisin.⁵⁸ Bolland views the Assize of Nuisance provisions as an extension of the Assize of Novel Disseisin to cover cases where the occupier remained in possession of their land, but a neighbour "might do something which would deprive your possession of much of its worth".⁵⁹ Loengard notes that nuisance cases are scarce in thirteenth-century records and even rarer still in the sparser records of the twelfth, even though, as Tucker notes, the legal records best preserved relate to real property and associated rights.⁶⁰

Cheren also suggests that the early Assize relating to building, with a focus on control of fire and a requirement to build large stone party walls, encouraged building up to the boundary. The subsequent crowding of tenement buildings exacerbated problems from overflowing privies and in these crowded conditions with little room for outdoor privies and inadequate indoor plumbing, as Cheren delicately puts it "human waste was often

⁵⁶ Ibid., Introduction. The Hustings Court, dating from at least the tenth century, met on Mondays and considered a wide range of business including demands for Assizes, personal pleas, actions related to land and offences against the city ordinances.

⁵⁷ Robert D. Cheren, "Tragic Parlor Pigs and Comedic Rascally Rabbits: Why Common Law Nuisance Exceptions Refute Coase's Economic Analysis of the Law," *Case Western Reserve Law Review*, 63: 2 (2012), 566–7.

⁵⁸ Loengard, "The Assize of Nuisance," 145. Loengard states that the generally acceptable date that the Assize of Novel Disseisin started is 1166. (p. 154)

⁵⁹ Bolland, "The Book of Assizes," 194. The Statute of Westminster II 1285 extended the Assize of Novel Disseisin to cover situations that did not involve physical eviction from the land, but rather interference with enjoyment of it.

⁶⁰ Tucker, *Law Courts and Lawyers in the City of London 1300-1550*, 13. Loengard, "The Assize of Nuisance," 147.

eliminated indoors and subsequently defenestrated”.⁶¹ This coupled with the increase in population, and hence crowding, through the thirteenth century would have increased complaints of nuisance and may explain why a separate court was set up.

An important question in considering the value of the *Assize of Nuisance* records is whether the record itself is complete, and whether it represents the entire operation of the court. It is possible, although unlikely, that the Assize of Nuisance court may have started before the commencement of the records, and that the records are not complete. Chew and Kellaway, in their translation of the Assize rolls, assume that the record is complete.⁶² However, there are variations in the way records were kept by different clerks, for example essoins were only recorded in the earlier records. The translators have carefully documented their exclusion of purely procedural entries and have included the original Latin word or phrase where this is open to interpretations. Without ready access to the original rolls, this published translation is an extremely reliable source of information on cases considered by the Assize court. However, it does not give the full picture of environmental nuisance cases as many were dealt with through other procedures.

As will be seen in the analysis below, recorded cases brought to the Assize of Nuisance court declined steadily from the early years of the reign of Richard II. The last record in *The Assize of Nuisance* is in 1431, with a six year gap to the two previous cases in 1425. It is not clear why the record of the Assize of Nuisance court ends, nor whether cases continued to be heard but the records were lost.⁶³ There are five requests for an assize of nuisance recorded in the Calendar of Plea and Memoranda Rolls (representing those sought at the Mayor’s Court rather than the Husting) after the end of the Assize of Nuisance court records in 1431.⁶⁴ Given the low workload it seems likely that these

⁶¹ Cheren, “Parlour Pigs,” 560–1. Cheren is referring to an earlier assize relating to fire prevention, and it seems that the requirements for large stone party wall were replicated in the later Assize of Buildings discussed in this thesis.

⁶² Chew and Kellaway, *Assize of Nuisance*, Introduction.

⁶³ Palmer notes that “the assize of nuisance was not abolished until 1833 by the Real Property Limitations Act, 3 & 4 Wm 4, c 27. para 36.” Robert C. Palmer, “Personal Injury in Private Nuisance: The Historical Truth About Actionability of ‘Bodily Security’,” *Environmental Law and Management* 21 2009: 306, n62.

⁶⁴ Philip E. Jones, ed., *Calendar of Plea and Memoranda Rolls Preserved Among the Archives of the Corporation of the City of London at the Guildhall, Volume 5, A.D. 1437-1457*, Cambridge: Cambridge University Press, 1954, 20, 28, 59, 59, 78, 153.

occasional cases were simply heard by the Mayor's court. During the years the Assize of Nuisance court was operating there are six documented cases of the sworn Masons and Carpenters (viewers) reporting directly to the Mayor's Court on nuisance complaints, suggesting that the Assize of Nuisance was not the only court dealing with building-related nuisance complaints.⁶⁵ There are numerous viewers' reports after the end of the Assize of Nuisance court records, some indicating that a decision was made by the masons and carpenters or that, as in a case in 1440, they facilitated an arbitration process.⁶⁶

The most likely reasons that the Assize of Nuisance court ceased to operate are that cases were heard in other courts, there were more settlements out of court and more complaints being resolved directly by the carpenters and masons. Other courts could provide more flexibility, possibly freed up by a reduction in workload with decreasing population. It would have been cheaper to hear the nuisance cases at courts that did not need to be specifically convened for the purpose.⁶⁷ Loengard concluded that "the assize of nuisance can no longer have met the needs of Londoners, if only because it was limited to freeholders at a time when more and more citizens were tenants." Instead, cases of nuisance may have been brought as actions of trespass in the Mayor's Court. However, the Mayor's Court records are largely missing for the period between Henry VI and Elizabeth I.⁶⁸

A second avenue for nuisance complaints, negotiated settlements, may have become more common, at the ward level or by the sworn carpenters and masons. Through the fifteenth century the sworn carpenters and masons were devolved increasing

⁶⁵ There are two in 1373, one in 1377, two in 1391, and one in 1412. Thomas, *CPMR Vol2*, 150, 163, 245; A. H. Thomas, ed., *Calendar of Plea and Memoranda Rolls Preserved Among the Archives of the Corporation of the City of London at the Guildhall, Volume 3, 1381 to 1412*, Cambridge: Cambridge University Press, 1932, 317.

⁶⁶ Jones, *CPMR Vol5*, 23; Loengard, *London Viewers*.

⁶⁷ Cheren proposes that the assize of nuisance was replaced by "an action on the case for nuisance that became the sole common law remedy" and that this was a more convenient procedure. Cheren, "Parlour Pigs," 576. Harding notes that in the later middle ages there was a "multiplication of civil remedies and the conceptual development of private law. Alan Harding, *The Law Courts of Medieval England*, Historical Problems: Studies and Documents 18 London, New York: Allen & Unwin; Barnes and Noble, 1973, 111.

⁶⁸ Loengard, *London Viewers*. Baker notes that by the fifteenth century, the assize of nuisance "had gone the way of all the old actions and was being replaced by trespass" Baker, *An Introduction to English Legal History*, 352-3.

responsibility for undertaking investigations and resolving disputes, reporting to the mayor when necessary.⁶⁹ For example, viewer Edward Stone, who took office in 1455, swore that he would “well and faithfully oversee judicial investigation of nuisance between neighbours and do and carry out all and singular other things which pertained to his office, reporting to the mayor for the time being.”⁷⁰ The increasingly proactive role of the viewers is in line with the increasing responsibility taken by the city for public health and waste disposal discussed in Chapter 5.

The operation of the Assize of Nuisance court is set out in the Assize of Building ordinances, described above. Most of the cases are private nuisance cases, affecting one or more neighbours, and were brought by individuals or groups of individuals, but 52 were public nuisance cases initiated by the City. The Assize court officials, the mayor and six or more aldermen inspected the property before making a decision. Where necessary, sworn masons and carpenters assessed the works and reported to the court. The Assize court decided whether the activity contravened the ordinances, and if so what remedial action was to be taken. In general the defendant was allowed forty days to fix the problem, otherwise it would be done at their expense and in addition a fine of 40 shillings would be imposed.

Analysis of nuisance complaints

The previous section set out the avenues available for implementing city and ward requirements for environmentally responsible behaviour. This section looks in more detail at infringements, primarily cases of private nuisance. This section focusses on the Assize of Nuisance court, and includes a breakdown of cases presented. To make the best use of this information on private nuisance, it is supplemented by archaeological information, where available. Information on public nuisance from the Mayor’s court, the Wardmotes and from London Eyres is also included.

⁶⁹ The records of the London viewers demonstrate the progression of the viewers’ responsibilities from simply advising the Assize of Nuisance court on technical building matters when requested in the early fourteenth century to the sixteenth century where they reported to the Chamberlain and “The expectation was that London would be under the watchful surveillance of its sworn masons and carpenters, whether or not there had been a specific complaint.” There was also provision for user-pays private requests for inspections and reports. Loengard, *London Viewers*.

⁷⁰ *Ibid.*, Introduction, n65. The footnote is referring to an entry in Journal 5, f. 226.

Overview of cases heard by the Assize of Nuisance court

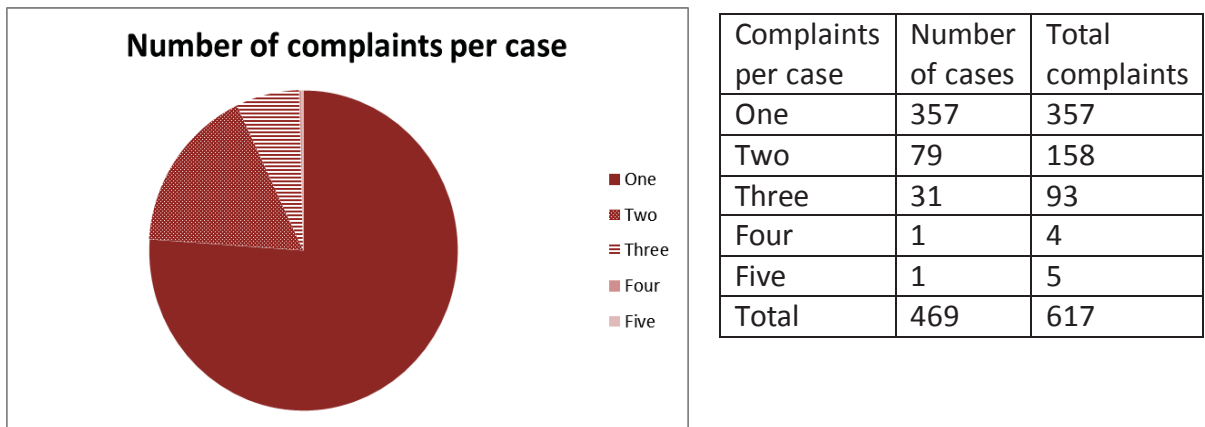
The type of complaint covered by the Assize of Buildings and dealt with by the Assize court will sound familiar to anyone who has worked for a local authority. These issues are still very much the subject of complaints by neighbours today: boundary fences and walls; poorly maintained buildings and encroachment; overflow and odours from cesspits or septic tanks; stormwater from the neighbour's property; blocking of light; and nuisance from offensive trades. The modern equivalents of the medieval butchers, tanners and smiths are food premises, vehicle repairers, and spray painters.⁷¹ Privacy is less of a concern today, but local plans specify setbacks from boundaries and light planes, and noise complaints about licensed premises and private parties are so frequent that urban councils often employ a noise control officer. Public nuisance complaints dealt with by local authorities are also similar: illegal structures in and discharges into streams; roadside dumping of waste, although generally household refuse rather than "night soil"; discharges of smoke and fumes, odours and wastewater from factory farming, abattoirs and tanneries, illegal dumping of carcasses, and these days car bodies.⁷²

The *Assize of Nuisance* records contain details of cases heard by the Assize of Nuisance court, and the administrative proceedings of the court. To analyse the nuisance cases, I have removed these procedural entries, as set out in Appendix 4. Although there are 661 numbered records in the *Assize of Nuisance*, 172 can be eliminated from the analysis as being procedural matters, including entries noting that only essoins (excuses) were heard. For the purpose of this analysis, I have defined a "case" as a complaint or group of complaints brought to the Assize by one or a group of affected parties (plaintiffs) or the Commonality. A complaint is defined as a single issue forming part of a case. For example two neighbours (plaintiffs) might bring a "case" against a third neighbour (the defendant) complaining of a privy too close to the party wall and apertures overlooking the plaintiff's tenement (two complaints). Figure 8 shows the number of complaints per case.

⁷¹ This similarity between medieval and modern nuisance complaints has also been noted by Loengard in Loengard, "The Assize of Nuisance." and in the introduction to Loengard, *London Viewers*.

⁷² There are still instances of illegal dumping of human waste: when working as a pollution control officer for a regional council I was called to a complaint of illegal dumping on a river bank of several loads of septic tank waste from a septic tank cleaning truck.

Figure 8: Number of nuisance complaints per case



The number of cases heard varies considerably from year to year, as shown by the annual totals presented in Figure 9. Graphing by year produces too much “noise” in the data, so I have elected to plot the remainder of the data by subtotalling the cases heard in five year periods to give a better visual representation of the trends within the data. This also takes account of the fact that some cases were adjourned and therefore were heard up to two years after the first appearance of the plaintiff. Figure 10 shows the number of cases heard for each five year period, starting at 1301-05. It shows that after an initial surge of complaints, peaking at 14 sittings in 1310, cases reduced steadily until a low at the end of the second decade of the 1300s, with one to four cases per year between 1319 and 1326.

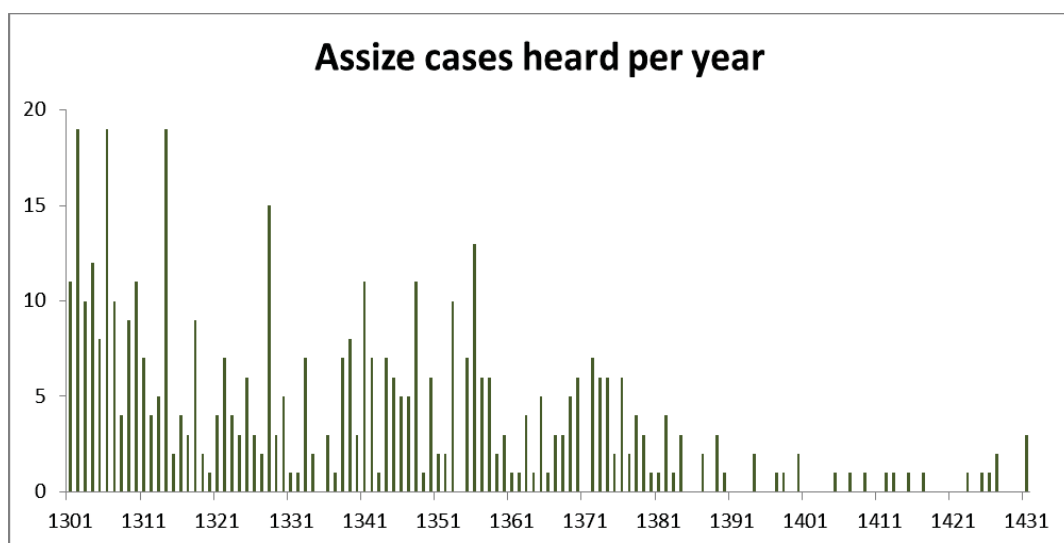


Figure 9: Assize cases heard per year

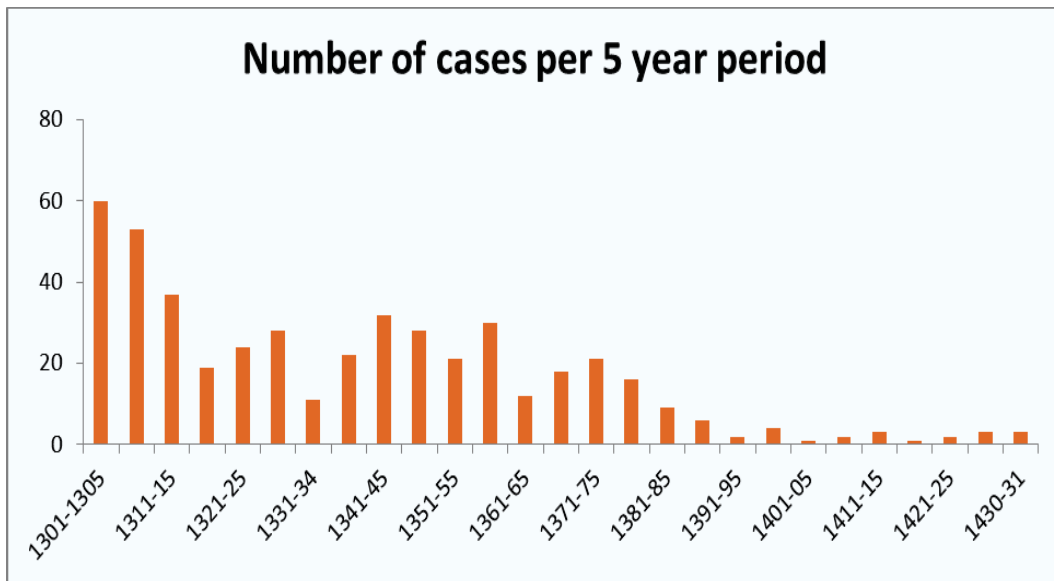


Figure 10: Cases heard per five year period

This early caseload may represent dealing with a backlog of complaints previously submitted to courts that were too busy to deal with them quickly. After a brief resurgence in the 1320s, complaints dropped to a low in the mid-1330s, with no cases heard in 1335. Then there is a steady increase in cases through the late 1330s and 1340s, apart from a hiatus in court activity in the first year of the Black Death. This was followed by a peak of activity around 1356 with 16 sessions that year, and 1369 with 13 cases. There was a significant drop in cases following the second outbreak of plague in 1361, and after a brief resurgence, the cases heard per year had dropped away to a trickle by the end of the century. In the peak years, the number of occasions where an Assize was planned but didn't sit due to non-attendance by the parties was correspondingly high. After 1374 the number of cases per year dropped to four or less, and the sittings had more or less petered out by the early fifteenth century.

The availability of the mayor and aldermen to conduct Assizes would have been restricted in the first half of 1321, by their involvement in the London Eyre and is mentioned in the Assize records as being a reason for adjourning the Assize court sittings. The Eyre was conducted by the King's Justicars at the Tower, and common pleas and pleas of the Crown were heard.⁷³ The city was taken into the King's hands between January 1321 and

⁷³ Item 254 states that "*Memorandum quod anno xiiii° nulle assise de nocumenta presente fuerunt, quia illo anno sedebant justiciarii itinerantes apud Turrim London' ad placita corone.* (Memorandum year 14 [14 Edward II, 1321] there was no assize of nuisance held, because that year the itinerant justices sat at the

the following May, and then taken into the King's hands again until restored by Edward III in November 1326.⁷⁴ Only four cases were heard by the Assize court in 1321, otherwise the business of the Assize, while light, continued throughout this period. A peak in 1328 may represent a catch-up of a backlog after the city's liberties were restored.

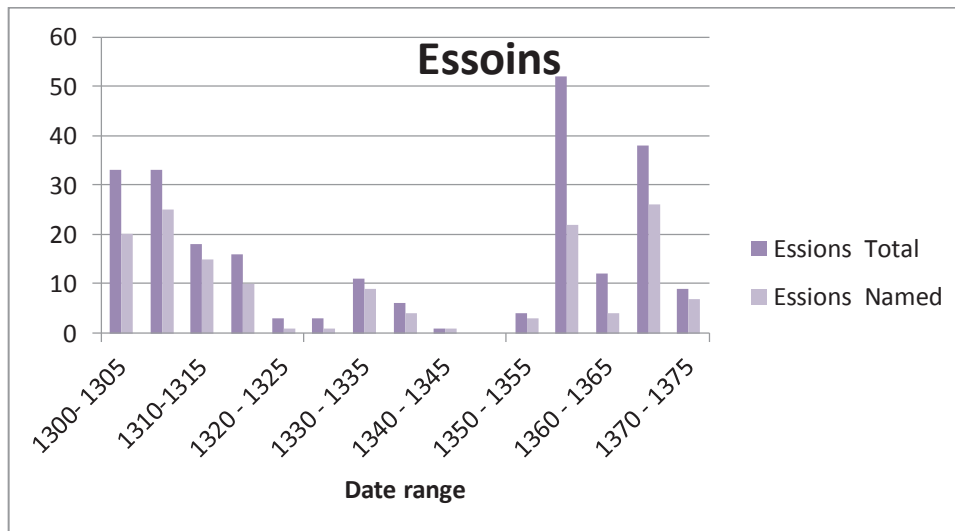


Figure 11: Total essoins and named essoins per five year period

While the essoins are excluded from the analysis of cases, they provide an indication of how busy the court was. Figure 11 shows the total number of essoins recorded in the *Assize of Nuisance* in each five-year period. Named essoins are cases that were presented to the Assize but do not reappear in the court records as heard and resolved, Un-named essoins reappear as cases, but represent court business additional to directly hearing cases. Between one third and two thirds of those excusing themselves resolved their disputes through another forum, perhaps resolved via voluntary action, negotiated settlement, or another court. The remainder of the essoins either did not have names listed or the names can be traced to later cases heard by the Assize.⁷⁵ Recording essoins

Tower of London to hear pleas of the Crown.) The records of the 1321 London Eyre are published in Cam, *1321 London Eyre*. The mayor, alderman and other officials were required to be in constant attendance at the Eyre for the first six months of 1321. Reginald Robinson Sharpe, *London and the Kingdom: A History Derived Mainly from the Archives at Guildhall in the Custody ...*, Longmans, Green & co., 1894, <http://archive.org/details/londonandkingdo02shargoog>.

⁷⁴ Sharpe, *LtrBkF*, 214.

⁷⁵ An "essoins" is defined in footnote 23-2 to the *Early Mayor's Court Rolls* as "'Signifies an excuse for him that is summoned to appear and answer to an action, by reason of sickness or infirmity or other just cause of absence.'" Sickness was the common essoin. Other causes were: absence overseas or in the Holy Land, sickness whereby a man was bedridden, the King's service, constraint of enemies, falling among thieves, floods, the breaking down of bridges. *Early Mayor's Court Rolls*, n 23-2. Chew and Kellaway state that in

seems to have made up a high proportion of the court records in some years, but for years with few essoins, it may simply be a different policy on recording them.

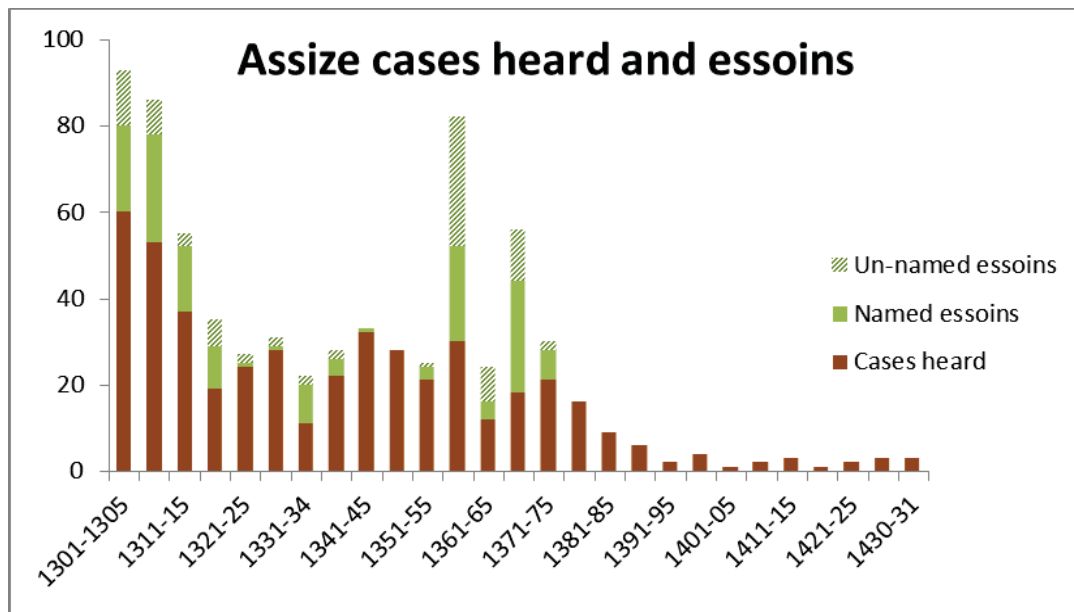


Figure 12: Cases heard, named essoins and un-named essoins

Figure 12 shows the essoins recorded, in five-yearly groupings with the cases actually heard. No essoins were recorded after 1375. The Assize of Buildings clearly provides for essoins, and it seems unlikely that nobody excused themselves, so this seems to be simply a change in recording practice. Likewise, the dearth of recorded essoins in the 1320s and 1340s may simply be due to recording practices. There is no apparent reason for the exceptionally high number of essoins in the period 1356 to 1360. Most of these essoins were in 1356 and 1357, and may have been due to absences on the Poitiers campaign. This assessment of essoins demonstrates some of the drawbacks of the *Assize of Nuisance* as a source. As well as potential bias introduced in the translation, the editors have ordered and selected from the original records, leaving out many procedural entries, although this selectivity does not affect my analysis. More serious are the difficulties assessing gaps in the record, as seen above. They could simply arise as a result of different policies on what to record by different scribes, and additional information is necessary to interpret them.

the interests of compressing the records into a single volume, "Separately entered essoins and respites have been calendared only when they are the sole evidence that a plaint had been raised: where proceedings of the assize appear elsewhere on the roll essoins and respites have been omitted" Chew and Kellaway, *Assize of Nuisance*, xxxiv.

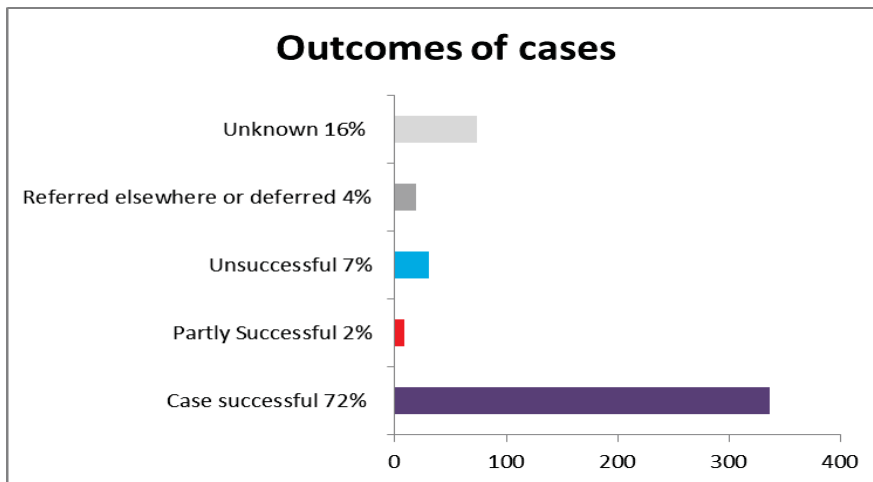


Figure 13: Outcomes of cases heard by the Assize

Even though over eighty per cent of the records specify the decision made, I have not found any other breakdowns of the success of the cases reported in the literature. The judgement of the Assize in successful case followed the formula “It is therefore adjudged that they repair it at their own charges within 40 days otherwise the sheriff is to have the work carried out at their expense and fine them 40s. In addition for contempt.” In general if there were several complaints, the whole was upheld, and as shown in Figure 13, 72% of cases were wholly successful. In 2% of the cases, only some of the complaints were upheld and only 7% of cases were entirely unsuccessful. One of the actions backfired, and the plaintiff was ordered to abate the nuisance. The unsuccessful cases are spread across the spectrum of complaint types.

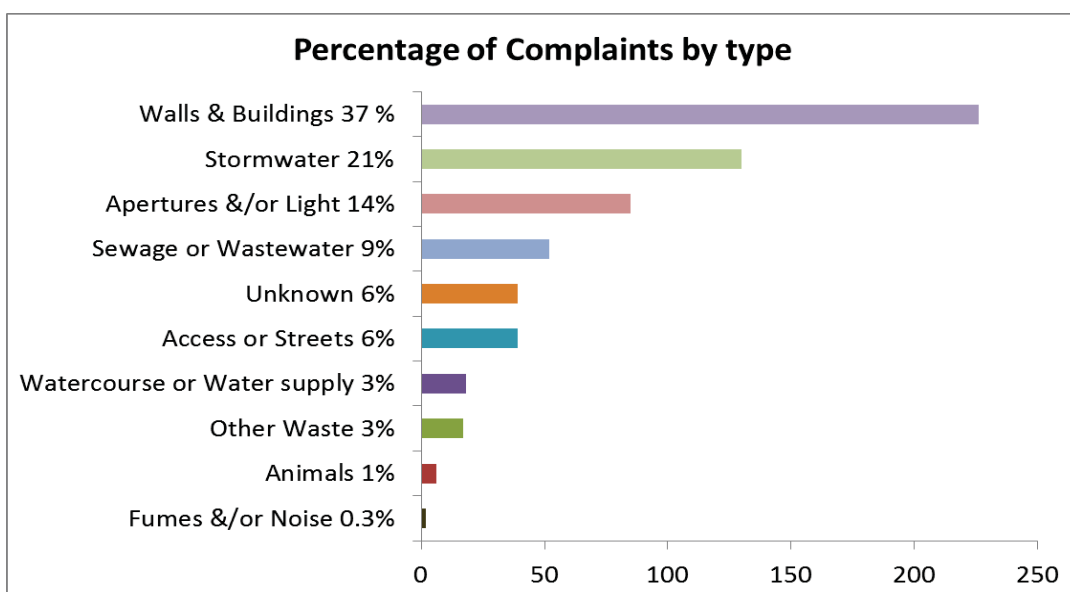


Figure 14: Complaints by type

I have grouped the complaints that were heard by the Assize into the general categories shown in Figure 14. Complaints about walls and buildings infringing the Assize of Buildings dominate the records, reflecting the focus of the assize on protecting property rights. Stormwater, covered in detail in the Assize of Buildings, was the next most frequent complaint. Apertures and light were the next most frequent complaint group, followed by sewage and other wastewater and encroachments into streets. Other types of complaint, many of them public nuisance matters, represented less than 10% of the total complaints.

Table 4: Comparison of breakdown of complaint types with similar analysis by Schofield⁷⁶

Type	Schofield		Rouse		Comments
	Count	Per cent	Count	Per cent	
Stormwater etc.	138	24%	130	21%	My count 148 if streams included
Windows, apertures, privacy	79	14%	85	14%	
Streets, landowner obligations	49	8.5%	39	6.4%	
Privies, sewage	34	6%	52	8.5%	I have included other wastewater in Privies and sewage
Other – industry, chimneys, animals	70	12%	64	10%	
Encroachments	33	6%			Schofield may have grouped some under streets and landowner obligations or stormwater
Ruin, decay of property	41	7%			
Fences & Walls	36	6%			
Buildings	94	16%			
Subtotal building related	204	36%	226	37%	

I have found only one other breakdown of all complaint into types, as seen in Table 4. The introduction to the *Assize of Nuisance* contains an overview of the types of cases but does not provide a numerical breakdown.⁷⁷ In the only published detailed breakdown of the Assize records by type, Schofield identified at least 574 specific complaints.⁷⁸ I counted 617, but may have teased out more of the separate types of complaint, for example if waste is deposited onto the street through an illegal aperture, I have counted this as two complaints. Schofield was interested in what the Assize record could reveal about the buildings and building works compromising the “safety and privacy of adjacent

⁷⁶ Schofield, *Medieval London Houses*, 59.

⁷⁷ Chew and Kellaway, *Assize of Nuisance*, xx – xxx.

⁷⁸ Schofield, *Medieval London Houses*, 59.

properties” rather than the environment. This focus is reflected in his breakdown of complaints into categories. Schofield interprets the Assize as being concerned with effects along the boundaries of properties rather than standards within the properties, reflecting crowded living conditions. Given the difference in method and emphasis, the percentage breakdowns are comparable, but demonstrate how the framework used for the analysis can influence the categorisation of the cases, and thus the conclusions.

An MA thesis by a Norwegian student analysed the assize complaints, but assumed that the total number of complaints was 833 contained in 661 cases without removing the nearly 200 numbered entries that relate to procedural matters, essoins, respites, continuations or duplicate entries.⁷⁹ Elverhøi’s thesis (2003) does not reference Schofield’s breakdown in *Medieval London Houses* (1994). She does not present a full breakdown of the complaints by type, but counts 108 cases relating to shared structures, compared with over 200 building related complaints in my analysis and Schofield’s. She counts 152 complaints of stormwater compared to my 130 and Schofield’s 138, at least 32 related to sewage, comparable with Schofield’s assessment, and 73 complaints related to windows, less than my count of 85.

My biggest concern with Elverhøi’s analysis is that she has graphed the discrete events, i.e. court sessions, using line graphs as if they were a continuous data series (such as temperature). Joining up the dots of discrete events on a graph gives the misleading impression that there were events occurring continuously in between the plotted points (which is suitable for continuous variables like temperature, for example, because there will always be an ambient temperature occurring between measurement points). In many of the graphs this method gives the misleading impression that there was always at least one case per year, whereas there were many years with no cases.⁸⁰ I have used column and bar charts in this analysis, because they give a more accurate visual representation of a time-series of discrete events.

⁷⁹ Elverhøi, “Making Cities Habitable,” 49. I have not counted essoins or procedural matters as cases and neither did Schofield.

⁸⁰ *Ibid.*, 50, 52, 53.

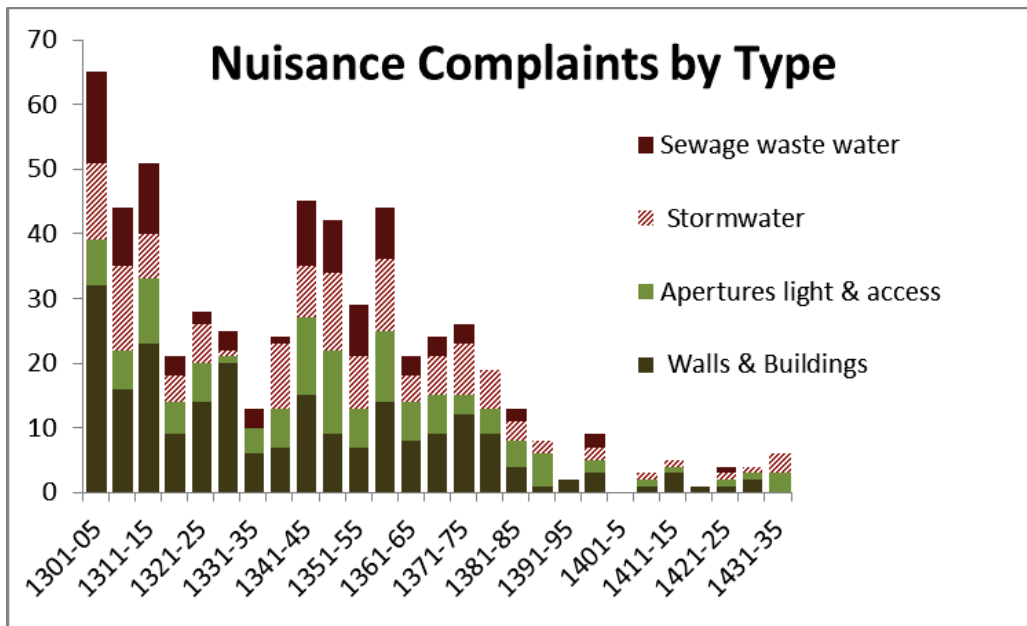


Figure 15: Nuisance complaints grouped into types, in 5 yearly periods

Figure 15 shows the complaints by type for each five year period, amalgamated into broader groups. As might be expected, up until 1385 building-related complaints are present in all 5-yearly groupings, sometimes dominating the complaints and at other times as little as a third of the total complaints for the period. Apertures and light are fairly constant, increasing through the 1340s and 1350s. Sewage complaints form up to a quarter of complaints up to 1315 and through the 1340s and 1350s, but are virtually absent in other periods. A more complete analysis of these complaint types is presented in the following section.

Analysis of Assize of Nuisance complaint types

The previous section took an overview of the operation of the Assize of Nuisance court and the types of complaints it dealt with to give a broad understanding of how the court worked. This section will look in detail at the key complaint types that could provide indicators of the state of the environment. First it will look at sewage and wastewater, and then at complaints about pollution and blocking of watercourses as indicators of the state of the environment. Complaints about stormwater, apertures and light will be investigated as possible indicators of crowding.

Sewage and wastewater

Even in modern times, with well-designed septic tanks and specifications for disposal fields, local authorities receive complaints about poorly maintained on-site disposal systems overflowing and generating odours. It is something that neighbours are very quick to complain about. The medieval equivalent was the cesspit, a hole in the ground for human waste, originally lined with wattle but increasingly with stone (as promoted by the Assize of Buildings) during the fourteenth century. While many tenements had individual privies, many did not, and the occupants would need to use the public privies. Chapter 3 looked at the amount of waste generated and the potential for pollution from on-site wastewater disposal. This section looks at the specifics of the on-site systems and the complaints made about cesspits and sewage.

The usual privy design was a seat built over joists with a garderobe chute one to two feet wide and cut into the masonry of an adjacent wall leading to a disposal system, usually a cesspit. Sabine notes that many privies, especially of poorer people would have been directly over cesspools, worsening the stench. Privies were located off the kitchen, in cellars, gardens and on upper floors, often off the solar, with a chute leading down to a cesspit. A single cesspit may have served several privies and privies may have been placed back-to-back on a boundary. Along the waterfront, privy waste may have directly discharged into the river, and there are cases of privies built over the Walbrook and the Fleet (discussed below). To the great annoyance of archaeologists, privies were cleaned out at intervals by “gongfermers”, requiring breaking open the masonry of the vault and re-sealing it.⁸¹

The earliest London case concerning privies in the published sources is the sole case in the 1276 Eyre, in which “the Earl Marshal made four privies (*cloacas*) next to his house to the nuisance”.⁸² In a case determined at the Mayor’s court on 25 March 1305, notably after the start of the Assize of Nuisance court, “Margery de Rothing was summoned to answer Margery, relict of John Somery, in a plea of trespass, wherein the latter complained that the defendant had a pit dug in her free tenement in the parish of

⁸¹ Schofield, *Medieval London Houses*, 86–90; Sabine, “Latrines,” 317. Sabine gives the example from the Coroner’s Rolls of Richard the Raker, drowned when the rotten planks of a privy gave way and he fell into the cess pit.

⁸² Weinbaum, “1276 London Eyre”, entry 456.

St Michael of Wodestrete, and had it filled with filth from the privy...in contempt of the King and to her damage 100s". A jury found her guilty and awarded 5 marks damages (around 65s). This would have been outside the jurisdiction of the Assize of Nuisance court because it is a case of actual trespass, placing waste on someone else's land.

There are 52 complaints to the Assize of Nuisance court relating to nuisance from the disposal of human waste or other wastewater. One complaint on average every two years, and a maximum of four complaints in a single year, does not suggest that the streets and back yards were awash with ordure and other foul waste. It does suggest that pollution from one's neighbour's privy was not regarded as being acceptable behaviour. As shown in Figure 16, complaints are concentrated in the early years of the assize, possible because it was a new and convenient avenue for addressing such issues. There is another concentration of complaints in the years 1340 to 1360, although this does not appear to be related to the plague (discussed further in Chapter 5). There are no wastewater complaints between August 1348 and July 1351, although as seen above, there were very few complaints at all in this period. The next complaint is in July 1353, and then three complaints in mid-1357. There are no wastewater complaints in the five year period following the second plague in 1361.

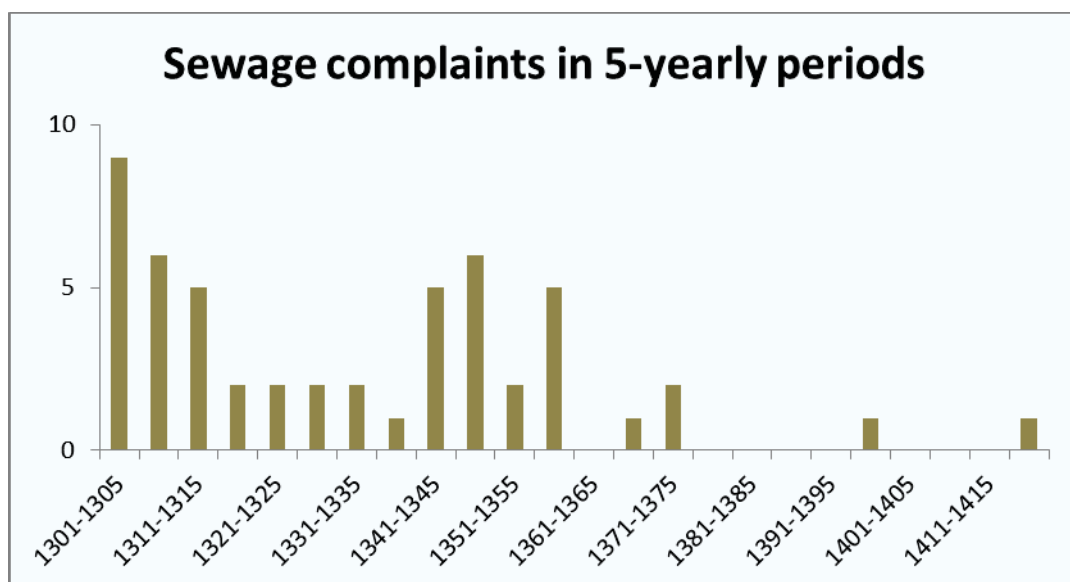


Figure 16: Cesspit, privy and wastewater complaints per five year period

The majority of these cases relate to a privy or cesspit located too close to a neighbouring property, resulting in seepage, rotting of timbers, odours, and in some cases flooding of

cellars. As shown in Table 5, 46 of the 52 complaints refer to disposal of human waste: 23 to cesspits, 11 to latrines and seven to privies, and five to “sewage” (although in total, 14 use the term sewage in the complaint). The *Assize* refers to “latrine” (*latrinum*) and “privy” (*garderoba*) and these terms seem to be used interchangeable.⁸³ The usual complaint about human waste is that the cesspit of the privy or latrine is closer to the boundary than the ordinance specifies, with effects including flooding of the neighbour’s property, seepage, property damage from rotting timbers. In other complaints the privy seems to be discharging directly to a gutter or stream, which is causing the problem, often blocking the kennel. The seven complaints about other types of wastewater do not suggest that the *Assize* was used to address discharges from industry.

Table 5: Breakdown of complaints about sewage and wastewater

Type of complaint	Number of complaints	
Cesspit	20	
Cesspit privacy	1	
Cesspit stench	1	
Cesspit, other pit	1	
Sewage	5	
Cesspits and sewage total		28
Latrine	10	
Latrine, cesspit	1	
Privy	6	
Privy; gutter blocked	1	
Privies and latrines total		18
Scaldinghouse waste	1	
Soakaway	1	
Dyeworks runoff	1	
Greywater	1	
Tanner's pit	1	
Waste pit	1	
Other waste total		6
Grand Total		52

Of the 54 complaints related to human waste (latrines, privies, cesspits) and other wastewater, 43 were successful (83%, compared with 72% overall), four were unsuccessful, and five unknown. Thirty one of the cases (around half) contain a single

⁸³ “Latrine” is used 11 times, but only after 1341, whereas “privy” is used 31 times, and sometimes both terms are used to describe the same “necessary chamber”.

complaint, suggesting the issue was serious enough to address in its own right. Fifteen cases contain two complaints each, seven cases contain three complaints, the sewage complaints being combined with apertures, stormwater, solid waste, and complaints about walls and buildings. It may be in these cases that the wastewater issue was not sufficiently serious to complain about it until annoyance with other behaviour of the neighbour had built up, or conversely that the other complaints were not serious enough to pursue until a nuisance from a privy arose.

Complaints about wastewater were often combined with complaints about stormwater (nine instances). For example, in a successful case (257) John de Kyngeston and Sabine his wife complain that the cess-pit of the privy of John Mounde, baker, and Avice his wife, is too close to their party-wall and rots it; and that the defective eaves of their house cause rainwater to fall onto the wall. The Assize directed that the cess-pit be removed to a proper distance from the plaintiff's wall, and that the defendant's eaves be repaired and roofed. In another successful combined complaint (395). Hugh le Blount, knight, complains about stormwater from the tenement of Simon de Wenlok rotting his walls; that the sewage and other refuse which they throw outside his tenement rot the foundations of his walls and that the def. and his tenants draw water from his well. While the defendant is ordered to "remove the nuisances", i.e. the sewage and refuse thrown outside his tenement, the main concern expressed is the rotting of the plaintiff's walls, rather than any concern that the sewage may pollute the well.

While the Assize was concerned to enforce the distances that cesspits, privies and latrines should be from the neighbour's property, there is no evidence of any connection made between seepage from privies and groundwater contamination or public health, the main concerns are property damage and stench. However, pollution of wells is mentioned in the inquisition of the Walbrook: "Nicholas Hay, baker, is accustomed to bake his bread with water from a horrible well in his house, to the great danger and nuisance of all men who eat of it."⁸⁴ Why the well is "horrible" is not explained and there is no record of any link between seeping privies and contamination of the well, but the danger to health is clearly understood. Some cesspits would have been deep enough to penetrate the gravels underlying the city and hence seep into groundwater and

⁸⁴ Thomas, *CPMR Vol4*, 135.

contaminate wells. Sabine gives one example of a relatively modest cesspit being twenty feet deep. Cesspits became more common as ordinances were made banning discharging privy waste into streams.⁸⁵

It is not certain what removing a cesspit further from a party wall entailed. It is likely that pits lined with wood would simply be filled in and another pit dug, perhaps lined with stone. The waste in the old pit would still have the potential to contaminate groundwater. Stone pits represent a greater investment in time and money, so the builders would have been more likely to make sure they were the correct distance from the boundary. The nuisance from stone-lined pits may have arisen from not cleaning them out often enough, and overflowing when full. Sabine quotes numerous examples of deep cess-pits and substantial amounts paid for cleaning them out, and suggests that this work would have been done at night.⁸⁶

While the majority of the Assize cases involve the effects of privies and overflowing cesspits on neighbours, some of the complaints relate to a reduction in the value of the property. For example, in case 585 the rector and chaplain of St Augustine by St Paul's Gate complain that the neighbour's cess pit "emits so great a stench that the pl[aintiff]s can have no profit from their stable" Six cases claim that due to the effects, usually of flooding from stormwater, the plaintiff can "have no profit" from their property. Case 160 shows that internal privies were regarded as an asset worth fighting for: William Busshe complains that Maud, a widow, and a couple have broken down the party walls and laid claim to a privy which he claims is his. Maud loses and is ordered to rebuild the wall.

These cases in the *Assize of Nuisance* also provide information about the physical arrangement of sanitary systems to supplement the archaeological evidence discussed above. For example, both cases 585 and 614 refer to underground gutters carrying away water and waste. Sabine suggests that there may have been such underground "sewers" and cites as evidence a 1367 case investigated by the Mayor's court where a gutter

⁸⁵ Sabine, "Latrines," 317.

⁸⁶ *Ibid.*, 314–6. For example, thirteen men worked for five nights cleaning the cesspit of the Newgate Gaol in 1281.

carrying waste from the palace of the Bishop of London became blocked.⁸⁷ Sabine infers that this was an enclosed underground stream or “sewer” flushing away the waste from the internal privies of rich inhabitants. This case also demonstrates the overlap between the Mayor’s Court and the Assize of Nuisance court. The gutter was described as a great nuisance to “the King, the Bishop, and diverse others” and was therefore public nuisance. If there had been a single plaintiff it would have been private nuisance and have been heard by the Assize. The Assize did hear several cases of public nuisance, such as case, 487, brought the commonality against Ralph, rector of St. Botolph without Aldersgate, who built a latrine adjoining Houndesdych (the city fosse), and allowed “all kinds of filth accumulate, to the damage of passers-by, and the nuisance of the commonalty.” This is one of several cases of individuals having privies over running water. Others, such as Alice Wade, in case 214, connected their privies to stormwater gutters. Alice was forced to remove a pipe she had installed connecting her privy to a gutter for rainwater, frequently blocking it with filth.

Overall, the small number of sewage complaints does not suggest that the city was awash with human waste, but the existence of complaints and the language used suggests that polluting with sewage was not acceptable behaviour. Although most of the complaints refer to property damage, they may have been presented this way to increase the chances of success in a court that dealt primarily with protecting tangible property rights. Despite the primitive disposal system of a deep pit, provided the cesspits were placed a suitable distance from the boundary and cleaned out when full, there were few problems. Problems occurred when privy waste was directed into gutters to be washed into the kennels in the street, as the solids tended to block the gutters with unsavoury results. Complaints about waste disposal provide information about disposal practices and can be used as a quantitative indicator, but there are too few recorded cases to use as a qualitative indicator.

Water and watercourses

Most of the 23 cases concerning watercourses heard by the Assize court are complaints of public nuisance, and concern obstructing or polluting watercourses or wells. Four cases refer to water supply, one a charge of interfering with the conduit (458), and the

⁸⁷ *Ibid.*, 306; Sharpe, *LtrBkG*, 216.

other three to blocking access to wells or polluting them with rubbish. The five cases that refer to the Thames are public nuisances. One involves a building, “impeding the course of the Thames” and this is referred to other processes of law. Four cases involve wharves that encroach on the Thames, are ruinous and present a public danger. Eleven cases were identified by the mayor and aldermen on a “perambulation” of the Walbrook (discussed in chapter 5), demonstrating the overlapping jurisdictions between these city courts and with the wardmote. In this perambulation, the Assize court is performing the same role as the wardmote inquest, presumably in response to complaints.

Watercourses were seen as essential for both taking water, and disposing of waste, and this is discussed further in Chapter 5. There seems to have been no concern at water being drawn from the same location that waste was disposed of. As seen above, case 219 refers to a well and the neighbour’s cesspit being too close to the boundary, yet no connection is made to the possibility of the cesspit polluting the well. Although not a matter considered by the Assize, considerable quantities of waste would have been washed into the streams via the kennels in the streets by rainfall.

Intensification of settlement in the city, with a higher proportion of roofs and paved areas, would make dealing with stormwater increasingly important. It would be even more important in wet years, for example in the second decade of the fourteenth century. Downpipes were not common; instead gutters ejected the water via a spout, sometimes onto the adjacent property, or into a gutter that ran through a neighbour’s property.⁸⁸ A neighbour’s stormwater falling on the plaintiff’s property is the most common complaint, and as discussed above may be a useful indicator of crowding. The ordinances are very specific about the responsibility for carrying away ones’ own, and sometimes one’s neighbour’s stormwater onto one’s own property or the street. Many of the complaints arise from inadequate or defective guttering.

Five of the cases in the 1276 London Eyre deal with nuisance gutters, and one case refers to the stench from the gutter and includes a directive that the gutter be closed in [357].⁸⁹

⁸⁸ Schofield, *London Archaeology*, 75.

⁸⁹ “357. Gilbert de Clare earl of Gloucester and Hertford made a gutter (*gutteram*) through the middle of his kitchen, so that many people were offended by the stench (*putredinem*). So it is adjudged that the gutter should be closed in at the earl's expense, insofar as it is a nuisance.”

The type of nuisance in the other three cases is not specified. It could be that the contents of the gutter were offensive or that the gutter delivered stormwater onto a neighbour's property – a frequent complaint to the Assize of Nuisance. One case [428] specifically refers to a gutter made near a privy where “Geoffrey de Basingge made a gutter near his privy (*cloacam*) which the heir of Hugh de Eston holds to the nuisance”, but we are left to imagine the exact nature of the nuisance. Stormwater complaints also appear in the Mayor's court rolls. For example, on 16 December 1300 “Ralph Hardel was summoned to answer Henry le Galeys, who complained that the defendant took away the gutter between their houses which had received the water from the plaintiff's roof for 20 years and more.”⁹⁰

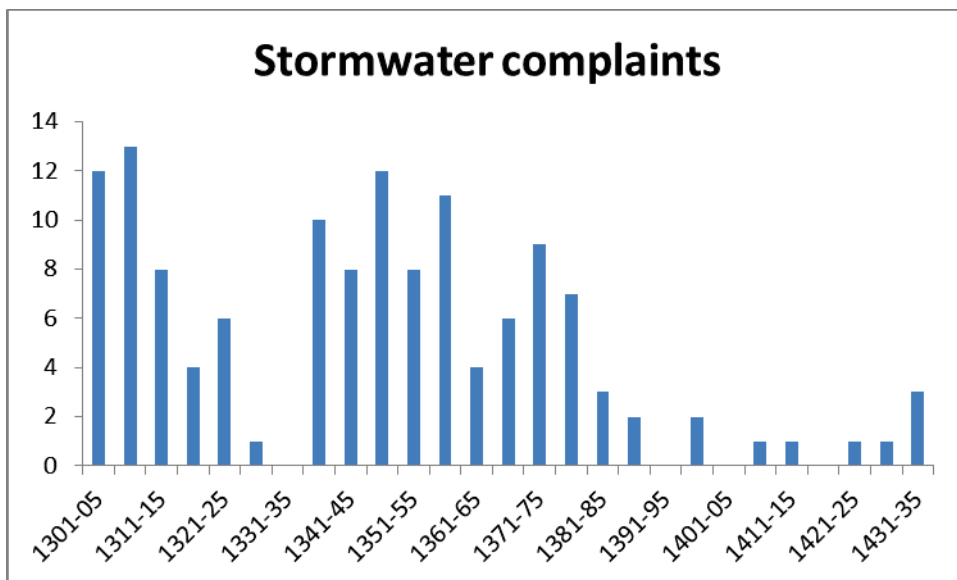


Figure 17: Stormwater complaints, number of complaints in each five year period

Figure 17 shows that there was a peak of stormwater complaints in the early years of the operation of the Assize, possibly a backlog from before the establishment of the Assize court. The absence of complaints between 1328 and 1338 does not have any obvious explanation. Stormwater complaints were consistent in the period from 1336 to 1380, and then tapered off. There is no reduction in stormwater complaints immediately following the drastic reduction in population, hence in crowding, and in fact complaints increase after the second plague episode in 1361. Complaints tail off from the 1380s, in line with the general tapering off of the number of complaints dealt with by the Assize of

⁹⁰ *Early Mayor's Court Rolls.*

Nuisance court. This tapering off could reflect a reduction in population pressure or that complaints were being dealt with in a different forum.

During what is generally acknowledged as being the seven years of extremely high rainfall (1315-22), stormwater complaints were slightly lower than in the earlier and later periods, as shown in Figure 17. Figure 18 shows stormwater complaints for the wet years. The peak of eight complaints in 1306 was before the wet period, as were the four in 1314. There were five complaints in 1339, 1348, 1350 and 1353 four complaints in several other years.

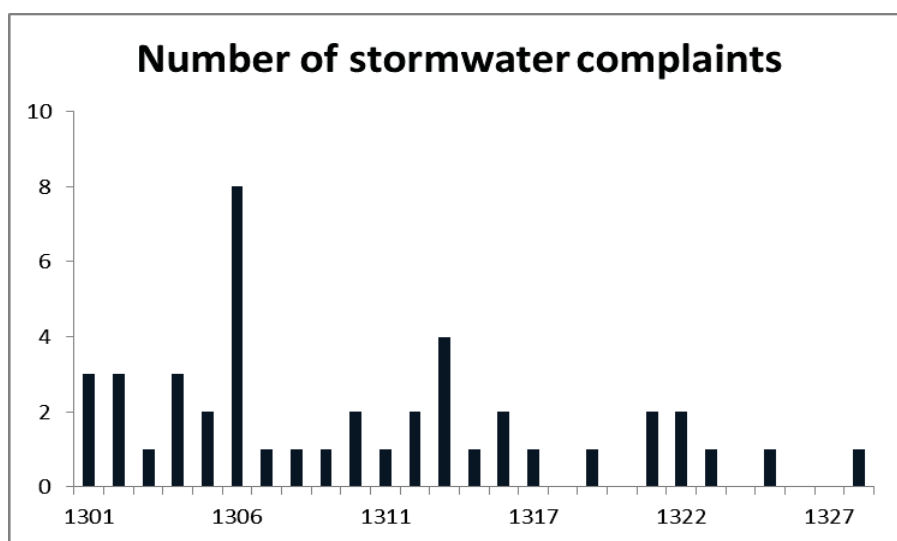


Figure 18: Stormwater complaints per year 1301 to 1327

The weakness of stormwater complaints as an indicator, common to any indicators selected for the medieval period, is that the records are not a complete time series. While the *Assize of Nuisance* records used to examine stormwater complaints between neighbours are a complete record of a single court, there were numerous other ways of dealing with the issue, through informal dispute resolution or complaint to another court. It is possible that during the wet years, immediate stormwater issues were dealt with at the wardmote level and we have no record of this. Stormwater complaints do not follow the pattern expected if they are a response to crowding, so are not a useful indicator of population density.

Apertures and light

Another possible indicator of population density is complaints about illegal apertures and blocking light. Daylight would have been very important in medieval houses with small

windows of opaque glass lit by malodorous tallow candles. The Assize of Buildings makes it clear that access to light is not a natural right, but a property right to be granted by contract. Baker suggests that light, air and flow of water were regarded as being easements specifically granted to the property owner rather than natural rights, and these aspects are sometimes specifically recorded in leases.⁹¹ For example, in 1424, draper John Boteler leased a small piece of land roughly seven feet by fifteen feet, on which he had built his parlour, and the lessors committed not to block his light.⁹²

Eleven cases heard by the Assize of Nuisance court deal with light, and treat the right to light as a property right. In case 312, the plaintiff relies on her rights granted to the “the view, opening, light, air and clarity” from a specific window, case 317 where the plaintiff says she was “peacefully seised of the light in question until it was obscured by the pl.'s building operations” but the plaintiff “denies that any light was reserved” when the tenement was granted to the plaintiff’s predecessor. Case 654 also refers to the right granted by deed to the light and flow of water⁹³

Eighty three cases include complaints about apertures or windows, as shown in Figure 19. Issues raised included access to light, privacy violated, and people throwing waste out of apertures, and often these were included within a mixed bag of complaints. Of the 83 complaints involving light or apertures, 46, or just over half, also involved complaints about stormwater and of these a further 14 included complaints about walls or building matters, another seven included complaints about general waste, and three of these included additional complaints about cesspits and privies. Of the ten complaints about throwing refuse through apertures onto private property, none involve the stereotypical emptying of chamber pots out windows onto the street; these complaints are dealt with in the wardmote presentments (see below). Generally the waste was referred to as “refuse” but complaints include “dung”, “sewage”, “urine”, “excrement” and “other scandalous things”.⁹⁴

⁹¹ Baker, *An Introduction to English Legal History*, 355.

⁹² Thomas, *CPMR Vol4*, 171.

⁹³ Chew and Kellaway, *Assize of Nuisance*, Cases 312, 417, 430, 574 and 654.

⁹⁴ Cases 81 (1305), 407, 426, 434, 445, 493, 514, 525, 566, 592 (dated between 1348 and 1373) Chew and Kellaway, *Assize of Nuisance*.

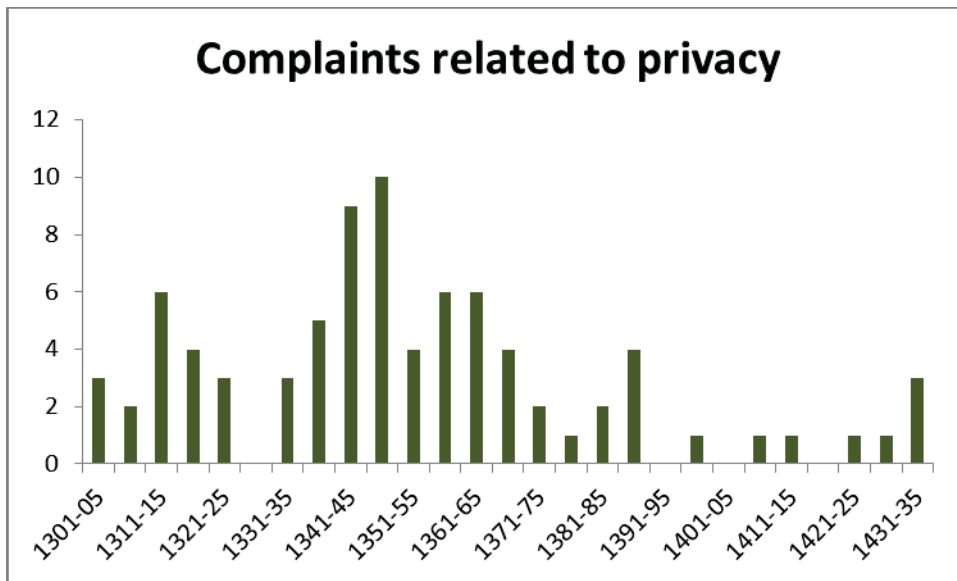


Figure 19: Complaints related to privacy

The pattern of complaints over time does not support the use of privacy-related complaints as an indicator of crowding. After an early peak in the 1311-15 period, there is a lull between 1326 and 1330, and then complaints increase in the absence of any population increase, until a peak in 1346 to 1350. There is a drop after the first plague episode, but no corresponding drop after the second episode. After 1365 complaints declined in line with the general decline in complaints. While the halving of privacy complaints after the first plague episode could be related to a decrease in crowding, the lack of a drop after the second epidemic may reflect a change in attitude to crowding, with the population more conscious of the risk posed by close proximity to their neighbours.

Noise and fumes

Perceptions of air quality and odour are subjective and complaints about these issues may indicate attitudes towards the environment, particularly given the contemporary view of corrupt air causing disease. Complaints of odour related to waste and privies are discussed above. The first recorded complaint about coal smoke was in 1257, when Queen complained about the “air so full of the stench of sea-coal smoke” that she was forced to leave Nottingham Castle “to preserve her health”, an early statement of the perceived connection between foul smells and perceptions of risk of disease.”⁹⁵ A

⁹⁵ Brimblecombe, *The Big Smoke*, 8–9.

commission was set up to investigate pollution from coal smoke in London in 1285, reconvened in 1288 and in 1306 a proclamation banned the use of sea-coal. Brimblecombe suggests this prohibition was largely ignored, even though enforcement should have been straightforward as the ban only affected a small group of tradespersons, lime burners and metalworker.⁹⁶

Previously, the 1244 London Eyre took three forges “into the king’s hand” because they were located in the king’s highway, even though two were already paying a fee.⁹⁷ The Eyre was concerned to recover the king’s rental for use of the highway rather than any environmental concerns of noise, fumes, or fire risk. Similarly, of three complaints about forges in the *Assize of Nuisance* records, one relates to a pentice above the forge blocking the plaintiff’s light [548], and one to obstructing the highway to the nuisance of passers-by [547]. Only one relates to noise and vibration, and the stench of sea coal issuing from a chimney 12 feet lower than it should be, thus reducing the rental value of the plaintiff’s property [617, March 1378].⁹⁸ In a case brought to the Mayor’s Court in 1373, William Grene, plasterer, was accused of having burnt plaster of Paris in his house so that the fumes were obnoxious to Sir John de Foxton, knight, and other neighbours. He denied that the fumes were obnoxious, and said that if it could be proved that they were, he was willing to abate the nuisance.⁹⁹

It is surprising that there weren’t more complaints of this type if industries requiring the use of a forge, burning of coal, and constant hammering of iron were located in crowded residential areas. They may have been dealt with at the wardmote or directly by the sheriffs or aldermen as they didn’t usually involve effects on physical structures and strictly speaking were public nuisance issues. This case discussed above may have been heard at the Assize because it includes a complaint about damage to physical structures from the vibration from hammering, and a reduction in the rental value of the property because of smoke from sea coal. The defendants deny the obligation not to cause a nuisance and maintain that tradesmen have the right to carry on their trade anywhere in

⁹⁶ *Ibid.*, 10; Brimblecombe, “Attitudes and Responses,” 942.

⁹⁷ Chew and Weinbaum, *1244 London Eyre*, Items 350, 351, 470.

⁹⁸ Brimblecombe, *The Big Smoke*, 14. Brimblecombe notes that this Assize of Nuisance complaint refers to a minimum acceptable chimney height although I have not found any record of ordinances about height, only being of fireproof materials.

⁹⁹ Thomas, *CPMR Vol2*, 166.

the city. They also claim that the plaintiffs cannot complain about the chimney, smoke or the noise and vibration, because their messuage was built in 1349–50, is much higher than the house it replaced, and has new windows facing the forge. This demonstrates that the concept of reverse sensitivity was understood in the fourteenth century, at least as a defence of “we were here first”. Reverse sensitivity is a serious issue in modern resource management, with encroachment of urban areas and lifestyle blocks into rural or industrial areas where the new residents complain of noise, odour and spray drift from industry, agriculture and orchards.

Buildings and appeals against prohibition on building

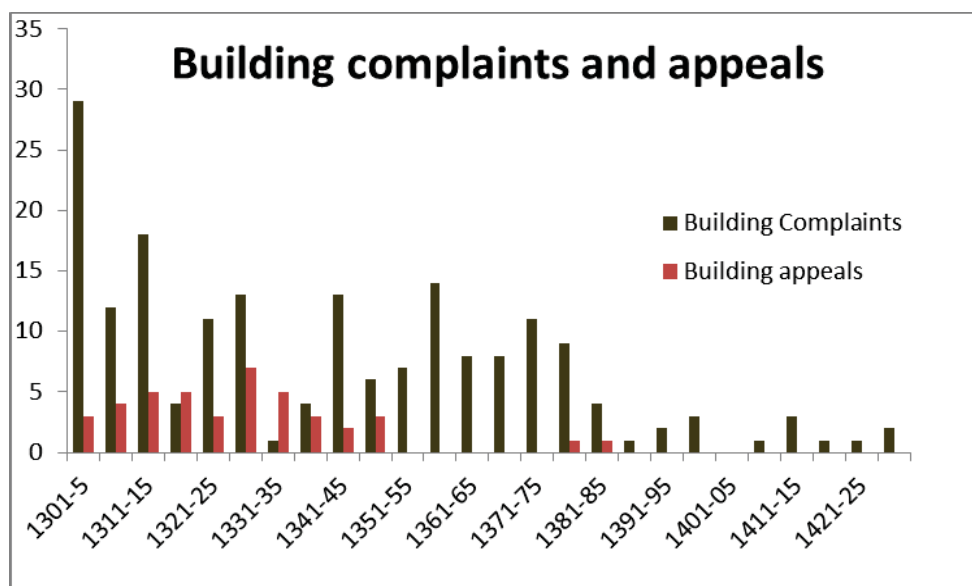


Figure 20: Complaints and appeals related to buildings

Building complaints, shown in Figure 20, represent the majority of complaints and like the other types of complaints, show an early peak of complaints, probably representing clearing a backlog, and a general tapering off after 1375. While there is a drop in complaints at the times of the first two plagues, there is also a big drop in complaints in the early 1330s (but no drop in appeals) with no clear explanation. Therefore building complaints are not a reliable indicator of declining population or change in attitudes. The decrease in complaints after 1380 is likely to be due to complaints being resolved in other courts, at the ward level, or by the sworn carpenters and masons.

In the case of building work contrary to the Assize ordinances, the building and nuisance ordinances specify that if an Assize is requested then the relevant work should cease. There are forty two appeals against a neighbour prohibiting someone from continuing

building a structure. The outcome is often that the person may continue building (i.e. the structure was not contrary to the ordinance) and occasionally that the structure be removed or a demolished structure restored. Thirty two appeals were successful, one was partly successful, and five were unsuccessful or resolved in favour of the defendant. As with building complaints, the reason that these appeals disappear from the record is likely to be that they were resolved by the sworn carpenters and masons.

Enforcement

If the defendant did not abate the nuisance as directed, the plaintiff could ask the Assize to take enforcement action at the defendant's expense and levy a fine of 40s. That there were only a handful of follow up enforcement actions could suggest that the penalty was sufficiently severe, and the "neighbourhood watch" sufficiently active, that most directives were complied with. It could indicate that enforcement was lax, but this is unlikely as enforcement was initiated by a further complaint from the plaintiff. There are 22 actions of enforcement of Assize decisions and ten address multiple complaints. This represents less than five per cent of the cases brought to the Assize. Directives to the sheriffs to enforce an earlier decision were expressed in the following format:

Precept of the mayor and aldermen to the sheriffs dated 31 Aug. 1339, reciting the judgment in the assize brought by the master of St. Thomas of Acon against Richard de Betoigne on Fri. 30 Apr. [343] and the failure of the def. to execute it, and ordering them to put it into effect at his expense, and to exact from him 40s. to their own use for his contempt.[347]¹⁰⁰

Table 6: Enforcement actions

Complaint type	Number Enforced	Complaints enforced, %	Type as proportion of total complaints, %
Apertures	10	31.3%	13.8%
Stormwater	9	28.1%	21.2%
Structures	8	25.0%	36.8%
Refuse	3	9.4%	2.8%
Sewage	2	6.3%	8.5%
Total	32	100%	

¹⁰⁰40 shillings represents up to two weeks wages for a tradesman

A breakdown of the complaints for which enforcement was required compared with the percentage of total cases is shown in Table 6. This demonstrates that those convicted of having illegal apertures and general refuse are more likely to ignore a directive to abate the nuisance than other types of complaint.

How accessible was the Assize court?

The effectiveness of the Assize of Buildings and Assize of Nuisance court as a response to environmental nuisance activities is limited by only being accessible to property owners complaining about other property owners, as discussed above. But was the accessibility further reduced by restricting access based on other factors such as gender, class and status? No other researchers have assessed the gender and class breakdown of those making use of the Assize of Nuisance court. Gender is a useful indicator of accessibility, as it can always be determined for named parties. Other indicators that I examined are the occupation or status of the parties, where stated, and whether they were born and bred Londoners or outsiders. This data has not been analysed previously.

I have assessed the gender profile of plaintiffs and defendants appearing before the Assize court, and whether women appeared at the court as *femmes sole*, widows, wives or religious women. I have also looked at the occupations of those appearing, and where the information is available, the likely class of the attendees. Named persons appear before the Assize on 590 occasions, either for a case to be heard or for an essoin to be recorded. There were 531 plaintiffs (individuals or groupings of plaintiffs) and 526 defendants.¹⁰¹ Fifty four (12%) of the cases were brought by the City, showing that the city was proactive in seeking out offenders.¹⁰² As I am interested in access to the court, I have expressed plaintiffs as a percentage excluding complaints brought by the City.¹⁰³ Where possible I have compared my results with a breakdown from 1508 to 1558 of the

¹⁰¹ This analysis is based on the characteristics of those bringing each case. Where there are several plaintiffs or defendants in a case, an overall estimate is made of the place of origin or trade of that group or couple. Note that while there were 590 occasions where named persons appeared, some individuals appeared up to six times in different cases.

¹⁰² i.e. cases where named persons appeared before the Assize as defendants on a nuisance complaint and the case was brought by the Mayor and Aldermen, described variously as the “Mayor and Aldermen”, the “Commonality”, the “Assize”, or combinations of these terms.

¹⁰³ The cases brought by the commonality have been excluded from the “plaintiff” totals, but the defendants in these cases have been included in the tally.

plaintiffs and defendants using the services of the sworn carpenters and masons for a viewing, a service available to anyone who could afford the fee.¹⁰⁴

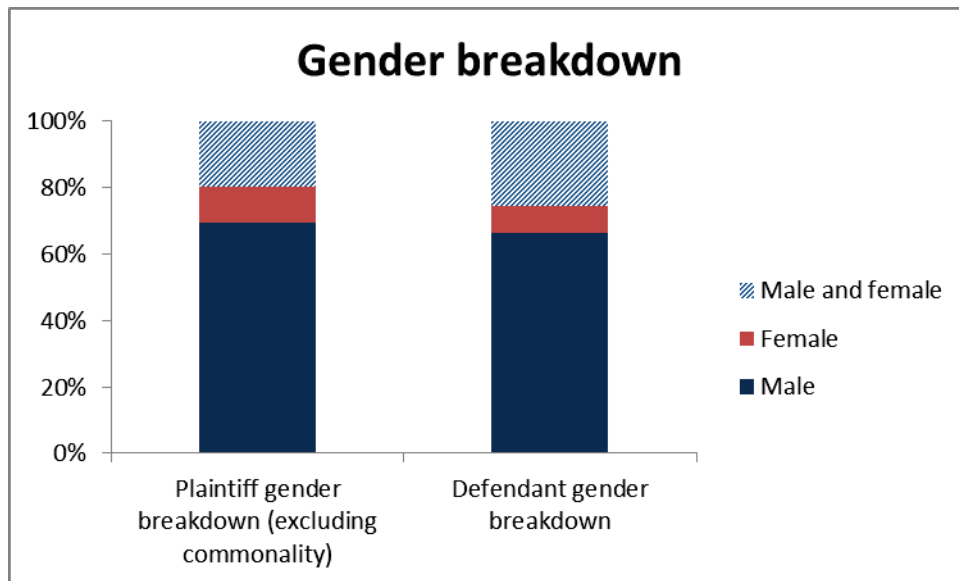


Figure 21: Gender breakdown of plaintiffs and defendants.

The gender breakdown of plaintiffs and defendants is shown in Figure 21. The majority of those accessing the court were male: 69% of plaintiffs and 67% of the defendants. Women appeared in conjunction with men in cases in another 20% of the cases as plaintiffs and 26% as defendants. This leaves 64 (11%) women plaintiffs in their own right and 50 (8%) defendants so overall women were mentioned in 31% of cases as a plaintiff, and 34% as a defendant. By comparison with the total population of householders, the 1381 poll tax return for Southwark shows 314 married householders (55%), 137 single female householders (24%) and 119 single male householders (20%).¹⁰⁵ That single men are over-represented in the Assize records is partly due to the high proportion of cases brought by or against clergy (17 % of plaintiffs and 19% of defendants).

Figure 22 is a breakdown of the women identified in their own right as sole women (22% of women plaintiffs and 15% of defendants); widows (relicts, 29% of women plaintiffs and 22% of defendants); religious women as heads of religious houses (12% and 8%

¹⁰⁴ Loengard, *London Viewers*. Interpreting this breakdown is complicated by the author sometimes combining data from the reigns of Henry VIII, Edward VI and Mary I, and sometimes separating these periods. The most comparable period is the reign on Henry VIII, as the proportion of religious men and women in the records plummeted after the Reformation privatised a great proportion of church land.

¹⁰⁵ Carlin, *Medieval Southwark*, 177. Noting that Southwark, like London had a very high proportion of single householders compared with the rest of England.

respectively).¹⁰⁶ Women are described as a “wife” (but where the husband does not appear) in one case as plaintiff and five as defendant. Overall, single women were more likely to appear as plaintiffs than as defendants, particularly sole women and religious women, and this may be because they held multiple tenements. In London, widows were entitled to occupy the home until she remarried, a more generous provision than the forty days occupancy allowed elsewhere, and this in part accounts for the high proportion of widows appearing at the court.¹⁰⁷

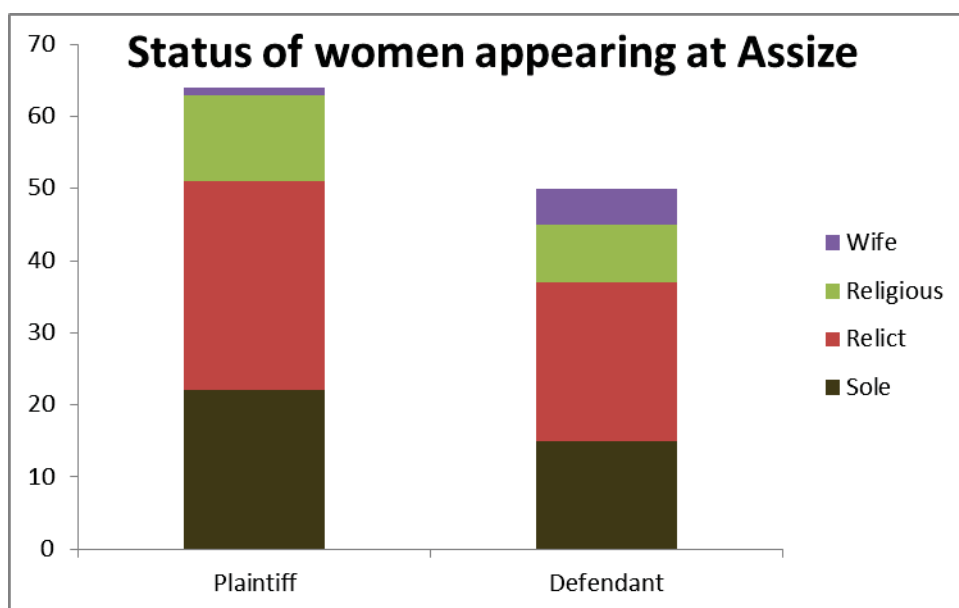


Figure 22: Status of the women appearing before the Assize

By comparison with other courts, women were well represented at the Assize of Nuisance court. The introduction to the *London Possessory Assizes: a Calendar* notes that the women who appeared as parties in pleas of land were “heads of religious houses... spinsters or widows who, as 'femes soles', were capable of suing and being sued in as full a sense as any man”, and that married women were required to appear with their husbands. However, if the husband made default, the wife might be admitted to defend her right.¹⁰⁸ Hawkes looked at the number of women (including women mentioned as

¹⁰⁶ Note that the women listed as “sole” were almost certainly unmarried women, and were often referred to as “daughter of”. Although it is possible that some were widows, this is unlikely.

¹⁰⁷ Caroline M. Barron and Anne F. Sutton, eds., *Medieval London Widows, 1300-1500*, London ; Rio Grande, Ohio, U.S.A: Hambledon Press, 1994, xvii.

¹⁰⁸ Helena M. Chew, *London Possessory Assizes: a Calendar*, 1965, xi–xxvii, <http://www.british-history.ac.uk/report.aspx?compid=64178>. In contrast, Cooper states that modern-day nuisance law presumes that plaintiff in a nuisance action are a single household represented by a household head,

part of a married couple) in records of the common law courts of Common Pleas for session in 1479, 1500 and 1520 and found that women were listed in around 5% of cases, and comprised 15% of Chancery litigants.¹⁰⁹ The equivalent figure for the Assize of Nuisance court is that women were involved in 31% of cases as plaintiffs and 34% as defendants. Overall, women seem to have had good access to the Assize of Nuisance court.

The case of one female complaining demonstrates the ready accessibility to the court for wealthy women. On 13 July 1341, Isabel relict (widow) of John Luter complained that four different neighbours, all with windows overlooking her tenements, could see into her property or garden. In one case she also complained that the stench of her neighbour's cesspit penetrated her tenement via the apertures. In a fifth case she complained that her neighbour had a watch tower which he used to watch her private affairs. Isabel is clearly wealthy, as one of the complaints refers to her servants, and likewise two cases refer to her neighbours having servants and one neighbour is a fishmonger, suggesting he was wealthy.¹¹⁰ Three of the cases refer to property in St Antonin parish, and this is presumably her main residence.¹¹¹ Another tenement and the garden are in different parishes in Walbrook, and those neighbours are skimmers, suggesting these were rented

usually male, seeking to protect his spouse and children. The presumption in the Assize of Nuisance is protection of property. Davina Cooper, "Far Beyond 'The Early Morning Crowing of a Farmyard Cock': Revisiting the Place of Nuisance Within Legal and Political Discourse," *Social & Legal Studies*, 11: 1 (2002), 20–21.

¹⁰⁹ Emma Hawkes, "[S]he Will ... Protect and Defend Her Rights Boldly by Law and Reason...' Women's Knowledge of Common Law and Equity Courts in Late-Medieval England," in *Medieval Women and the Law*, ed. by Noël James Menuge, Woodbridge: Boydell Press, 2000, 148, 153.

¹¹⁰ Williams notes that the fishmongers were "perhaps the strongest single mercantile interest, in terms of numbers and local political power, in the city". Williams, *Medieval London*, 165. Isabel's late husband John Leutour, described as a "king's yeoman" and as a vintner, first appears of in the Assize records on 16 June 1307, when he appears but the other parties esoin themselves. The next mention is of John Le Luter, 4 December 1310, complaining that his neighbour Robert de Chiggewelle's privy is too close to the boundary of a property in the parish of St John Zachary "so that his house is inundated and his wall rotted by the sewage. The next mention of John Luter, this time accompanied by his wife Isabel, is on 6 July 1313, where the defendant essoins himself.

¹¹¹ Isabel was the daughter of Roger Beyvin, and was left property in the parishes of Saint Stephen on Walbrook and in the parishes of Saint Antonin and Saint John de Walbrook in his will of 25 January 1277: Wills: 6 Edward I (1277-8)', Reginald Sharpe, *Calendar of Wills Proved and Enrolled in the Court of Husting, London: Part 1 - 1258-1358*, 1889, 29–36, <http://www.british-history.ac.uk/source.aspx?pubid=570>. pp. 29-36. URL: <http://www.british-history.ac.uk/report.aspx?compid=66814&strquery=roger+beyvin> Date accessed: 29 April 2013.

tenements in a less prosperous area.¹¹² Two of the cases (362 and 366) required enforcement action to rectify the problem.

I assessed the class of those appearing at the court as clerical, aristocracy, or those having an occupation listed, largely citizen members of craft and trade guilds. Where no information on trade is given, it could simply be that the recorder didn't think it relevant. It appears that the occupation of clerics (identified as "clerk" and presumably occupied in an occupation requiring reading and writing skills) and religious men and women (i.e. men and women in religious orders or holding a benefice or position in the church) were recorded regularly.

Eighty one (17%) plaintiffs and 87 (19%) defendants, both men and women, are identified as either clerks or holding a position in a religious order or institution. Around twice as many viewings were requested by this sector from masons and carpenters recorded in the time of Henry VIII when 34% of plaintiffs and 30% of defendants were religious houses.¹¹³ The figures may not be strictly comparable, as a fee was demanded for the later viewings, but it may be that religious houses had become more active in the property market. Twenty of the plaintiffs are identified as the gentry (5%), i.e. knights or those with specific titles such as "earl", compared with fifteen of the defendants (4%). By comparison, 12% of plaintiffs and 11% of defendants were aristocratic in the time of Henry VIII.

One hundred and twenty nine of the defendants are associated with a trade or occupation, ranging from carter and street vendor at one end of the social scale to members of recognised guilds such as skimmers, goldsmiths, fishmongers that were frequently mentioned in lists of aldermen. I have assumed that those identified as "citizen", had a recognised but unspecified occupation, and in some cases deduced the

¹¹² **Case 362** against John Trappe, 'skynnere', who has a tenement adjoining her garden in the par. of St. John de Walbrok; **Case 363** John de Thorp, 'skynnere', has seven windows overlooking her adjoining tenement in the par. of St. Stephen de Walbrok less than 16 ft. from the ground; **Case 364** Henry de Ware has a window and four apertures (*foramina*) overlooking her adjoining tenement in the par. of St. Antonin, through which the stench from his cess-pit penetrates her tenement. **Case 365.** John le Leche, fishmonger, has a leaden watch-tower (*garritam*) upon the wall of his tenement adjoining hers in the same par. upon which he and his household (*familiares*) stand daily, watching the private affairs of the pl. and her servants; **Case 366.** Simon Corp has twelve apertures (*foramina*) overlooking her adjoining tenement in the same par.

¹¹³ Loengard, *London Viewers*, Introduction Part III.

occupation from the name. By comparison 96 of the plaintiffs are listed as having a trade, but this does not include the 52 cases brought by the “commonality.

Table 7: Most frequent occupations of plaintiffs and defendants

Plaintiff Occupation	Number	Defendant occupation	Number
Mercer	10	Goldsmith	10
Fishmonger	8	Fishmonger	7
Tailor	7	Tailor	6
Goldsmith	7	Skinner	6
Draper	4	Brewer	6
Tawer	4	Chandler	5
Grocer	3	Wine merchant	5
		Potter	4
		Draper	4
		Butcher	4
		Armourer	4

Table 7 shows the predominant trades among the plaintiffs were mercer (10), fishmonger (8), tailor (7) and goldsmith (7), followed by draper (4), tawer (4) and grocer (3), with another 49 trades represented by one or two each. The predominant trades recorded for defendants were goldsmith (10), fishmonger (7), tailor (6), skinner (6), brewer (6), chandler (5) and wine merchant (5), with another 58 trades represented by between one and four defendants. While the offensive trades of skinner and butcher are in the top ten of trades for defendants, overall the low numbers of offensive and nuisance trades listed suggests that the complaints related to residential issues rather than workplaces. This is also the conclusion reached by the editor of the later viewers’ certificates.¹¹⁴

I was able to estimate the place of origin of 157 of the individual plaintiffs (38%) and 132 defendants (25%) from their surnames.¹¹⁵ This is a very rough measure of origin, as from the middle of the fourteenth-century, surnames started to be inherited as a family name, rather than based on location or occupation. Only seven of the plaintiffs could be identified as coming from medieval London (i.e. the wards within or the walls or those immediately outside that were within the jurisdiction of the city). A further eleven had

¹¹⁴ Ibid., Introduction, Part III.

¹¹⁵ Sara Uckleman has researched the surnames of people listed in the 1319 subsidy roll supplemented by information from the subsidy rolls of 1292 and 1332. Where a single case was brought by a group of plaintiffs, then if the location of any of the group could be identified, that location was listed as the plaintiff location.

names indicating origins in the greater London area (including Fulham, Kingston, Cobham and Uxbridge). The majority, 139 (90% of cases where origin of plaintiff identified), had names indicating an origin outside the greater London area, with origins ranging from Essex and Kent to Yorkshire, Lancashire and Westmorland, and as far afield as France. Similarly, eight of the defendants were identified as being from London, a further 16 from greater London, and 182 (87%) from outside the greater London area. There is no difference between the place of origin of the plaintiffs and defendants, within the limits of accuracy of these estimates, with around 90% originating further afield than the greater London area.

By comparison, Carlin found that 38% of property holders in Southwark were from outside greater London, but the survey period was from 1000 to 1350 and would not take full account of the increase in immigration following the 1349 Black Death.¹¹⁶ The results are comparable with Rosser's estimate that London's immigration catchment was more than 60 miles, with around 90% migrating from more than 20 miles.¹¹⁷ It is also comparable Besant surveyed London mayors to 1633, and found that only 34 out of 203 (17%) were born in London.¹¹⁸

Overall, the Assize of Nuisance court was relatively accessible to women, and sole women were more likely to appear as plaintiffs than defendants. While open to all landowners, the court may have been used more often by the wealthy and by religious houses. The majority of users of the court came from outside London, but the proportion may only be slightly higher than the proportion of outsiders in the general population, given the highly mobile population following the first plague epidemic.

Ward presentments

As discussed above, the wardmotes were required to investigate and report on infringements of the wardmote Articles annually. The only presentments of the wards surviving are from 1422 and 1423, other a few scattered entries preserved in the *Plea*

¹¹⁶ Carlin, *Medieval Southwark*, 146.

¹¹⁷ Rosser, *Westminster*, 186.

¹¹⁸ Besant, *The Survey of London*, 220. It is not clear whether Besant's definition of "London" included the suburbs, Westminster and Southwark.

and Memoranda Rolls.¹¹⁹ Many of the articles presented in 1422 are presented again in 1423, and Thomas suggests that this indicates that the problem was not resolved. He notes that there is no evidence of these complaints being addressed at the wardmote level, and that most of the evidence of activities at the ward level comes from prosecutions against people who assaulted officials.¹²⁰ For example, a later *Plea and Memoranda Roll* on 18 July 1343 Simon de Warfeld, "dieghere," was charged with throwing "stinking trade-refuse" into the street near "Fanchirche," despite frequent warnings, and also of calling John Causton, Alderman, "opprobrious names".¹²¹

The ward presentments are a mixture of complaints about infringing the wardmote articles including polluting the streets with human waste, dung and other waste and complaints about ruinous buildings, encroachments and the state of the pavements, trade violations disturbers of the peace and fornication. Dung, presumably horse dung, is often mentioned as being cast out onto highways, blocking them, and causing a nuisance. William atte Wode in Farndon Within is cited for "throwing out horrible filth on to the highway, the stench of which is so odious and infectious that none of his neighbours can remain in their shops, which is a great reproof to all this honourable city, because of the lords and other gentlemen and men of the court" who go and pass there.¹²² This indictment demonstrates the public concern with infectious odour, and also an element of civic pride and concern that the king's officials not be offended by the smell.

An example from the Parish of *Seint Sepulcris* in Farringdon Without shows the diversity of environmental complaints, the concern with watercourses and pavements, and the associations made between disreputable characters (also regarded as a "nuisance and dumping waste in public places. It also demonstrates the longstanding nature of some of the problems:

The Cachepolle [tax collector] in Smithfield is a nightwalker and throws dung on the field. Maud Hoke is a leper. John Bukstone is a common

¹¹⁹ Thomas, *CPMR Vol4*, xxiv.¹¹⁹ In particular extracts from the 1373 presentments of the wards of Langbourn, Portsoken, Aldgate, Queenhithe and Castle Baynaird, relating to unlawful enclosures, obstructions of the streets and insanitary conditions are preserved in Corporation of London, *CPMR Vol2*, 156–7. There are also 15 membranes of presentments from the Portsoken Ward for the years 5–22 Edward IV and 23 Henry VII, and occasional excerpts in other rolls.

¹²⁰ *Ibid.*, xxvii.

¹²¹ Thomas, *CPMR Vol 1*.

¹²² Thomas, *CPMR Vol4*, 129.

regrater. Flete, esquire, throws out dung and his pavement in Hosier Lane is defective. Halywelle throws dung on the field on both sides of horspole. John Tuke throws dung on the field. Stephen Rakere and Norton do the same, so that men, horses and carts cannot pass. The pavement in Secole Lane is defective and covered with dung from one end to the other. The stream of Trynmylbroke is obstructed by ... tanners, because of their hides tied to stakes in the stream, and because of deep weirs made by them. Richard Spray is presented for cloyng the stream with wylowes set there. The jurors complain greatly of the dung about the horspole, which is a right grievous nuisance, and no remedy has been done, though it has been indicted and complained about for 16 years past, "wherfore we beseke yow, atte reverence of god, in salvacione of the kyngis pepul & in worshipe of the Citee that it mowe be amendid." [English]¹²³

This presentment also confirms that, even in the fifteenth century, an individual was responsible for the pavement outside his own property. The returns also illustrate the difficulties the wards faced in keeping the streets clear of waste. For example, non-payment of officials could mean the streets were not cleaned, despite frequent directives from the city to the Aldermen to keep the streets clear of rubbish and dung. For example, in 1421 a raker was hired in Colmanstrete ward "to keep and cleanse the grates at London Wall and Lothbury, and because of non-payment [by the Chamberlain] the said grates are evilly and horribly stopped up with mud and ordure to the great nuisance of all the ward".¹²⁴ Other problems were caused by rakers of one ward simply depositing the waste in another ward.¹²⁵

The presentments also indicate the connection made between pollution and unsavoury characters: in 1421, Margery a tenant living in Colmanstrete, was accused as "a common scold and by day and night throws out of her house stinking ordure, to the very great nuisance of the neighbours dwelling there."¹²⁶ Casting waste out into the street was a frequent complaint by the wardmotes, for example fourteen houses and chambers in Aldersgate were cited as having "windows for casting out of ordure and urine which

¹²³ *Ibid.*, 125.

¹²⁴ Jones, *CPMR Vol5*, 117.

¹²⁵ "In 1384, Richard Mayllour, rakyere of Chepe ward, entered into a bond of 20s to the chamberlain not to cast or cause to be cast any dung or other ordure belonging to his own ward into the ward of Colmanstrete, or to throw such ordure into the kennels during rainy weather in order that the force of the water might carry it into Colmanstrete ward, and further to lead away and remove all ordure belonging to Chepe ward which was then in Colmanstrete ward" Thomas, *CPMR Vol4*, 71.

¹²⁶ Jones, *CPMR Vol5*, 117.

annoys all the people of the ward".¹²⁷ Numerous streets are described as being stopped up with filth, and in the Walbrook, the butchers, fishmongers and hucksters are indicted for throwing entrails and offal out of the Stocks onto the king's highway to the "horribility" of the ward and the city.¹²⁸

It is not possible on the basis of only two years' records from the wardmotes to determine whether they were simply complaining about hotspots and occasional transgressions, or whether they indicate widespread pollution of the streets. They certainly indicate that pollution of the streets was not tolerated, and was often linked with other antisocial behaviour. These presentments may also be a reflection on the difficulties faced by medieval householders in disposing of their own waste, through lack of privies and inadequate public latrines.

Conclusion

This chapter looked at the regulatory responses to environmental issues, both the making and enforcing of ordinances and regulations. The first and simplest way of dealing with environmental nuisance would have been a mix of direction and persuasion at the ward level, by the local alderman or other officials. More serious or repeat infringements of ward articles or ordinances were reported annually to the Mayor's court for further action. The city also had a very detailed set of ordinances in place setting out the rights and obligations of property owners (the Assize of Buildings) and a special Assize of Nuisance court for responding quickly to complaints of infringements.

The cases in the *Assize of Nuisance* that provide information about environmental conditions and the responses to them relate to sewage, air, water, light and encroachment. Some of the *Assize of Nuisance* cases affect the wider community, and were brought by "the commonality".¹²⁹ The majority of cases considered were presented before the 1380s, with a tapering off of complaint from the 1370s as these complaints

¹²⁷ Thomas, *CPMR Vol4*, 127.

¹²⁸ *Ibid.*, 135.

¹²⁹ Baker, *An Introduction to English Legal History*, 361. Baker says that no private actions could be taken in cases of public nuisance until the mid-sixteenth century, but there are instances in the *Assize of Nuisances* where a private plaintiff complains about what could be regarded as a public nuisance. However, Baker is referring to private actions seeking not just abatement of the public nuisance but also compensation for damage. The Assize of Nuisance court did not provide an avenue for seeking compensation, only abatement of the nuisance.

were progressively dealt with through other courts and processes. The majority of complaints were related to buildings and structures (37%) and stormwater (21%). Only 9% related to sewage and wastewater, and at the rate of one complaint every two years, and a maximum of four complaints in a single year, it does not suggest that the streets were awash with waste, but it does suggest that inappropriate waste disposal was not tolerated. The compliant types that could have been indicators of crowding do not follow the known population trends, and this may be because more complaints were dealt with informally at some times than others, or that plague survivors were more sensitive to the activities of their neighbours. Overall, the analysis of the Assize of Nuisance court records is complicated by movement of complaints to other courts where records are not as systematically preserved. The Assize records and related records from the Mayor's court and wardmotes do provide a very useful insight into how medieval people lived, their expectations of sanitation and undisturbed enjoyment of their property, and the systems in place to deal with waste. Overall, the Assize of Nuisance court was accessible to a wide range of property owners, with a much greater proportion of women appearing before the court, both as plaintiffs and defendants, than other courts of the period.

Public nuisance cases, such as when householders deposited waste into the street or pollution of a stream were usually dealt with through the wardmotes or directives from the king to abate a nuisance, as discussed below. Activities such as keeping bawdy houses, nightwalking, and gambling were considered to be public nuisances, and were often mentioned in the Plea and Memoranda rolls and Wardmote returns alongside injunctions about throwing rubbish into the streets, cleaning up ditches. For example, city ordinances proclaimed on 11 November 1354 include prohibitions on wandering the streets after curfew, maintaining or joining outlaws, pigs wandering the streets, and a requirement that "all filth deposited before houses be removed within a week".¹³⁰

In this chapter we have looked primarily at the way the city controlled the behaviour of its inhabitants that could have environmental consequences, recognising that the controls may have been imposed for other reasons. The next chapter will examine the public services, public works and infrastructure provided by the city, and management of the Thames and its fishery. It will also look at the external drivers, in particular plague,

¹³⁰ Rexroth, *Deviance and Power*, 123; Sharpe, *LtrBkG*, 33.

and the steps taken to control malodorous waste, particularly latrines and butchers' waste, in times of plague.

CHAPTER 5: Public goods and private initiatives

The previous chapter looked at the response to pollution and the avenues available to complain about and rectify environmental problems, through examining city and ward ordinances and complaints about infringements of those ordinances. It also looked at early fifteenth century wardmote inquests into environmental and other nuisance activities as an indication of the impact on the environment. This chapter will look at the city response in terms of providing public services, ranging from providing fresh water via the Conduit, to street cleaning services and waste disposal.

This chapter will examine the extent to which the city expected householders to take responsibility for directly maintaining the system, and whether the city took more responsibility for providing sanitary services after the appearance of the Black Death in 1349. In addition this chapter will look at wider resource management issues with a focus on management of the Thames and the freshwater fishery. This chapter will also examine the control of recycling activities in the city and self-regulation by city guilds.

Water supply Conduit

The first clear evidence of the city providing public infrastructure with public health benefits was the provision of a water supply piped to a central location in the city. A clean water supply was essential to the public health of medieval London. Wells and springs, fed from water-bearing gravels underlying the city, would have provided water for some residents, but these were mostly on private property owned by the more affluent residents. In the confined spaces of back yards, wells would be close to cesspits with a high probability of being contaminated.¹ In 1237 the water supply system referred to as the Conduit was established by a deed from the king that granted rights to pipe water from springs at Tyburn for the use of the city.² The Conduit was extended at various times throughout the fourteenth and fifteenth centuries, piping water to other parts of the city and using additional springs.³ For example, Stow describes a Conduit cistern “of stone and lead” near “old Fishstreete”, built and paid for by the fishmongers.⁴

¹ Keene, “Issues of Water,” 172.

² Sharpe, *LtrBkA*, 14–15. By comparison, Paris constructed a public water system in the 1190s. Whitney, *Medieval Science and Technology*, xxxiv.

³ Keene, “Issues of Water,” 176.

⁴ Stow, *A Survey of London*, 3.

The priority for the use of the water is not explicitly stated in records describing its establishment, but it seems to have been a public service to meet domestic needs only. *Memorials* records a statement from 1345 that “the conduit had been built so that rich and middling persons therein might there have water for preparing food, and the poor for their drink.”⁵ Keene suggests that the location of the Conduit in front of St Thomas of Canterbury’s birthplace gave the charitable provision of water “a profound religious and symbolic significance”.⁶ This special status of the charitable giving of water is also suggested by an indenture in 1436 to convey superfluous water from the Priory and Hospital of St Bartholomew to Newgate and Ludgate prisons for the relief of poor prisoners.⁷ Prisons themselves were considered worthy of support by charitable bequests.⁸ For example the executors of Richard Whittington devoted part of his estate to the rebuilding of Newgate gaol in 1423 as well as money for a public latrine, and in 1464 “Dame” Agnes Foster, widow of a fishmonger, made a bequest for enlarging Ludgate prison.⁹ In 1379 a bequest made by William Ivory was used to repair highways.¹⁰

Other citizens bequeathed money for the upkeep and extension of the Conduit, for example on 2 February 1328, the will of William Love contained a bequest of 10s.¹¹ In 1378, a Royal Inquiry considered the best way to repair the conduit in Chepe and extend it the top of Cornhill, using a 500 mark bequest from Adam Fraunceys, but the proposed extension did not go ahead for another century.¹² In 1385 a bequest of £10 from the will of Simon Derlyng was used for the Conduit.¹³ Even though Barron considers that

⁵ Keene, “Issues of Water,” 178. This statement is made in *Memorials*, but the equivalent entry in the *Letter Books* does not state the purpose of the Conduit. Riley, *Memorials*, 225; Sharpe, *LtrBkF*, 128.

⁶ Keene, “Issues of Water,” 179.

⁷ Reginald Sharpe, ed., *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book L: Temp Edward IV- Henry VII*, London: The Corporation of London, 1912, 4. Prisoners had to provide their own food and drink and other necessities. Hanawalt, “London’s Poor,” 1079.

⁸ Hanawalt notes the religious teaching that giving to the poor, including supporting them in prison and giving food and drink, was a pathway to salvation, as set out for example in a description of the Day of Judgment in the Gospel of Mathew (25.34-40) Hanawalt, “London’s Poor,” 1068.

⁹ Sharpe, *LtrBkK*, 19; Sharpe, *LtrBkL*, 40–41; Hanawalt, *Growing Up*, 29.

¹⁰ Sharpe, *LtrBkH*, 134, 79.

¹¹ Reginald Sharpe, ed., *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book E: Circa A. D. 1314-1337*, London: The Corporation of London, 1903, 268.

¹² Barron, “Government of London,” 268.

¹³ Sharpe, *LtrBkH*, 134, 79.

bequests for water supply made only a small contribution to its costs, these donations of money and land suggest that the conduit was seen as a public water supply for personal and household use.¹⁴

That the Conduit water was intended for personal use is also suggested by the steps the city took to prevent commercial use of the water. In November 1310, an official was sworn to guard the Conduit “so that brewers and fishmongers shall not use the water thereof; nor would he sell water to any one by night or day on pain of losing- his freedom”.¹⁵ In 1337 those living near the Conduit complained that they were unable to get water because the brewers carried it away in vessels called “tynes” and this practice was forbidden, and in 1378 bakers were forbidden to bake with the conduit water.¹⁶ That the Conduit was intended as a public water supply is further borne out by a creative punishment inflicted on William Campion in 1478 for unlawfully tapping a conduit pipe. He was paraded on horseback through the streets with “a vessell like unto a conduyt full of water uppon his hede, the same water Rennyng by smale pipes oute of the same vessell, and that when the water is wasted newe water to be put in the saide vessell ayein” and his crime proclaimed at various locations.¹⁷

Despite the effort spent on it, Keene suggests that only about one per cent of London households would have been served by the Conduit, based on its design and those listed as paying for the water. However, this may be an underestimate because if the Conduit was intended as a charitable service, including providing water for poor people to drink, it seems reasonable to assume that poor people were not expected to pay for the water. Of those listed in *Memorials* as paying for water in 1350, two appear to be brewers and one is a Dame, suggesting payment was expected from wealthy households or

¹⁴ Barron, “Government of London,” 268.

¹⁵ Reginald Sharpe, *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book D Circa 1309-1314*, London: The Corporation of London, 1902, 236–7.

¹⁶ Sharpe, *LtrBkF*, 29.; prohibition on brewers restated in 1345 *Ibid.*, 128.. Sharpe, *LtrBkH*, 107. Sharpe suggests the water was too hard for the “proper kneading of bread”, but I think it was a prohibition on the commercial use of the Conduit water, similar to the prohibition on brewers.

¹⁷ Sharpe, *LtrBkL*, 160. Many examples in the Letter Books show the punishment fitting the crime, e.g. being put in the stocks for selling bad meat, and the putrid flesh burnt under one’s nose.

commercial users.¹⁸ Usage would therefore be expected to be much higher than Keene's estimate based only on those paying for the water.

The city used funding from tolls, taxes and bequests for public works like the Conduit, street cleaning and waste disposal, and for providing for the services of officials. There was an elaborate system of tolls such as murage, pavage and portage levied on goods brought into the city used to fund maintenance and cleaning of the walls, streets and docks.¹⁹ Sometimes taxes were levied for specific purposes. For example, in 1321 the Mayor and Aldermen were asked to approve murage for the repair of the city's walls and the cleansing of the ditches.²⁰ In 1367 the wardens of Fleet Bridge were authorised to levy householders to fund a clean-up of the streets and banks of the Fleet.²¹ In 1445 a local tax of "a fourth part of a fifteenth" was granted by the Common Council "for the use of the common aqueduct."²² Taxes, tolls and levies were also supplemented by charitable giving, as discussed above. Donating and making bequests in wills for public works was seen as "charitable works" in the late middle ages.

In the early fifteenth century there seems to have been a change in attitude and increasing acceptance of responsibility for maintaining public works by the city, particularly the Conduit. Earlier, in 1379, householders were required to "provide a labourer to work, or else work themselves, on the Conduit and the ditches of the said City, when summoned, for one day in five weeks".²³ However, in, 29 September 1430 an ordinance proclaimed that the "new conduit in Westchepe near the east end of the church of St. Michael le Quern should in future be repaired at the City's expense, and that parishioners of the said church, or those living around the said conduit, should not be forced to contribute."²⁴ While the tax raised in 1445 for work on the conduit appears to contradict the trend towards the city taking responsibility, in fact securing funding for

¹⁸ Keene, "Issues of Water," 178. Keene does not provide a reference for his estimate of 45 householders paying for water. However, payments for water are listed in *Memorials* {Citation}

¹⁹ Tolls charged respectively on horses and carts for repair and maintenance of the walls and pavement, and on those passing over or under bridges for their repair. Carpenter, *Liber Albus*, 126, 117.

²⁰ Sharpe, *LtrBkE*, 146.

²¹ Thomas, *CPMR Vol2*, 85.

²² Sharpe, *LtrBkK*, 318.

²³ Sharpe, *LtrBkH*, 127.

²⁴ Sharpe, *LtrBkK*, 110.

public works could be interpreted as part of the trend to civic responsibility and “user pays”.

Public services and infrastructure

Medieval sanitation was in a sense a public-private partnership with expectations that householders would actively participate in maintenance of the system, or pay taxes for the city to do so. The pavements of medieval London were an important part of the waste disposal system, containing a gutter or “kennel” in the middle or at each side of the street for the disposal of wastewater.²⁵ Flushing with rainwater, overflow from wells or channelling of small streams, moved the waste through to the nearest watercourse and ultimately the Thames. The system required maintenance of the paving and gradient, and keeping the channel clear of solid waste and obstructions.²⁶ Street repair and cleaning was organised at the ward level and it was the responsibility of the householder to maintain from his frontage to the kennel in the centre of the road. The role of the city initially was to oversee and direct householder actions, and the records contain numerous directives for householders to fix broken and defective pavements, remove waste clogging the system and prohibiting the deposition of waste and dung in the streets.²⁷

Numerous city ordinances from the late thirteenth and fourteenth century place the responsibility firmly at the feet of London householders to deal with their own waste, and maintain and clean the pavement outside their own properties.²⁸ London ordinances made in 1276-78 require that all lanes be cleared of dung, rubbish and pigs; that lanes leading to the Thames be cleared of all impediments; and no one throw any filth into the highway.²⁹ A restatement of the ordinances in 1297 required everyone to “keep clean the front of his tenement”.³⁰ Proclamations concerning cleaning the streets were made

²⁵ Sabine, “City Cleaning,” 21.

²⁶ For a description of typical medieval paving and guttering systems see Jørgensen, “Cooperative Sanitation.”

²⁷ *Ibid.*, 558.

²⁸ Street lighting and fire preparedness were also seen as the responsibility of the householder. There were frequent proclamations of ordinances requiring householders to keep tubs of water, hooks and ladders on hand during the summer months, and to provide lighting outside their houses during dark nights. Sharpe, *LtrBkH*, 28.

²⁹ Sharpe, *LtrBkA*, 216, 218–9.

³⁰ Riley, *Memorials*, 34.

by newly elected mayors, and sometimes in response to a writ from the king.³¹ Instructions to citizens were sometimes even more explicit. For example a lease on 4 September 1348 to John de Gildesburgh, fishmonger of "Desebournelane", included a requirement to make a gutter the length of the lane to convey water from adjacent highways to the Thames.³²

As well as regularly issuing edicts requiring London citizens to maintain pavements, the city appointed officials to supervise pavements. In 1285 London aldermen were instructed to appoint four men for each ward to supervise the pavements and ensure that the streets were kept clear of dung.³³ In 1301 four London pavoirs were sworn "to make the pavement throughout the streets and places of the City only in the manner most commodious for the public" and according to the ordinances.³⁴ This suggests that they carried out paving work rather than supervise public actions, but the difference could be in the wording of the records rather than the functions of the officials, as later entries are clear that the officials were overseers. For example, an entry in 1310 lists four overseers elected "to survey pavements and divers disturbances (*perturbaciones*) in the City of London" and "to survey pavements and disturbances of filth (*de fimis*) in the Ward of Langebourne."³⁵

While officials responsible for overseeing paving and cleaning the streets were appointed by early in the fourteenth century, it was not until the 1370s that officials are clearly recorded as being directly responsible for undertaking street cleaning. Rakers are first mentioned in the Letter Books in November 1372, when the sworn "beadles, constables and rakers" were given authority to fine any offender responsible for "ordure" within or

³¹ The *Letter Books* record a selection of these annual announcements, for example in 1309 Sharpe, *LtrBk C*, 166., in 1356, 1357, 1362, 1366, 1370 Sharpe, *LtrBkG*, 75, 92, 145, 208, 270. Similar proclamations were made in response to royal writs, for example in 1315 Sharpe, *LtrBkE*, 116.

³² Sharpe, *LtrBkF*, 184–5.

³³ The regulations of 1285, made the year that the city was taken into the king's hands for 13 years, make it clear that the officials are to cause pavements to be repaired and cleaned, and levy distress on those who fail to comply. Sharpe, *LtrBkA*, xi, 183.

³⁴ Sharpe, *LtrBk C*, 115.

³⁵ Sharpe, *LtrBkD*, 312. It is not clear how this supervisory position of pavements and waste relates to the pavoirs elected in 1301 (describe above) to make pavements. Sabine thinks that the officials appointed in 1310 may have later been called "serjeants of the wards". Sabine, "City Cleaning," 22.

in front of their houses.³⁶ The rakers cleaned the streets and carted away waste to laystalls or to the Thames where it would be loaded onto dungboats.³⁷ That they used carts to remove the rubbish is supported by a proclamation in 1405 requires rubbish carts to have backboards to stop the rubbish falling off onto the streets.³⁸

The first specific mention of the title of “serjeant of the channels” was in 1385 and his duties included keeping the streets free of rubbish.³⁹ By 1422 the duty of this serjeant included not only cleaning the streets but also the banks of the Thames.⁴⁰ By the time of the *Liber Albus* in 1419 the overseeing of work on the pavements and street cleaning by the pavoirs and rakers was the responsibility of the scavengers. The number of scavengers varied depending on the size of the ward.⁴¹ Scavengers swore the following oath:

*You shall swear, that you shall diligently oversee that the pavements within your Ward are well and rightly repaired, and not made too high in nuisance of the neighbours; and that the ways, streets, and lanes are cleansed of dung and all manner of filth, for the decency of the City; ... And this you shall not fail to do.—So God you help, and the Saints.*⁴²

The officials appointed and the duties assigned to them suggest a progression over time, at least for street cleaning, from householder responsibility to officials directly undertaking sanitary services, and charging residents accordingly.

While the city assumed some responsibility for collection and disposal of waste, funding this service by collecting fees from householders, some responsibility still rested with the householder for maintaining the pavement. Even as late as 1422, Wardmote returns complaining about specific pavements and channels being in disrepair imply that the

³⁶ Thomas, *CPMR Vol2*, 150. Sabine notes that there is frequent mention of the rakers from the thirteenth century on, but the reference he gives to *Letter Book* (p. 131) is to the election of a raker in 1414 and the 1299 reference in *Memorials* (p. 41) is to a “sweeper of litter” and this is taken from *Letter Book* (p. 85) where he is described as a “scavenger” (*mundator fenorum*).

³⁷ Sabine, “City Cleaning,” 23.

³⁸ Sharpe, *LtrBkI*, 45.

³⁹ Sharpe, *LtrBkH*, 275. However, see above, this may be an equivalent position to that referred to earlier.

⁴⁰ Sharpe, *LtrBkK*, 5.

⁴¹ Barron, “Government of London,” 46.

⁴² Carpenter, *Liber Albus*, 272. The oaths in English sworn by the city officials are reproduced in *Letter Book D*. Sharpe, *LtrBkD*, 192 ff.

responsibility for pavements was devolved to the householder.⁴³ Similarly, Coventry and York residents were explicitly expected to repair their own sections of pavement or pay for the services of professional “pavoirs”.⁴⁴ The 1421 Coventry Mayor’s proclamation required every man to clean the street in front of his place weekly or pay a twelve pence fine, and a similar edict in 1423 to repair pavements carried a much higher fine of three shillings and fourpence.⁴⁵ However, Jørgensen argues that city governments provided city-wide services to counteract the uncontrollable actions of the inhabitants and the low-tech solutions available.⁴⁶ While the city of London assumed some responsibility for pavements and street cleaning, and appointed an increasing number of officials appointed with responsibility for cleaning the streets, the repeated proclaiming of the ordinances requiring citizen responsibility suggest that the move to city-wide cleaning services proceeded in fits and starts.

Even though increasing city resources were devoted to keeping the streets clean, the city and ward ordinances concerning public hygiene were reiterated regularly. One way of interpreting the frequent proclamation of the ordinances is that efforts to keep the city clean were unsuccessful, but it could also be that the pro-forma repeating of the directives indicates that pollution was not tolerated. An indicator of the failure of these regulations is the intervention of the king in directing that streets and streams be cleaned, indicating a local or city-wide problem. For example in September 1321, while the city was in the hands of the king, a major clean-up of the city ditches was organised, with taxes collected and each ward to provide men for cleansing the ditch.⁴⁷ In general, the king intervened when an issue impinged on his jurisdiction, or during times of plague,

⁴³ Thomas, *CPMR Vol4*, 121–4.

⁴⁴ Jørgensen, “Cooperative Sanitation,” 555–6, 558, 561..

⁴⁵ *Ibid.*, 558.

⁴⁶ *Ibid.*, 551. Dolly Jørgensen has reviewed documentary and archaeological evidence to build up a picture of late medieval sanitation technology. Although she focuses on provincial towns, her findings are equally relevant to medieval London

⁴⁷ Sharpe, *LtrBkE*, 146–47. This was a time of dissention and strife, shortly after the London Eyre of 1321, and may have been partly to consolidate the city’s defences. Sharpe notes that in July Edward II summoned the mayor and aldermen seeking an assurance of the city’s loyalty, and a scheme was drawn up for the city’s defence against the dissident “contrarians” intent upon overthrowing the Despensers. Although the Despensers were exiled in August, just before the September clean-up of the ditches, the king issued subsequent instruction to the city to punish any “contrarians” found in the city and to provide forces to assist his capture of other dissidents. *Ibid.*, x–xiii.

and directives from the king became more frequent after the first plague episode in 1349. Interventions immediately following plague episodes are discussed below.

Did Plague result in more proactive environmental management?

The previous section examined the city's response to environmental issues in terms of providing city services such as street cleaning and water supply. This section looks at whether the response became more concerted after the first plague epidemic in 1349, and subsequent plague episodes.

Plague reached London in early November 1348 and had city firmly in its grip by early 1349.⁴⁸ As a result, in January 1349 the number of wills enrolled in the Husting increased dramatically, and the glovers sought ordinances preventing head-hunting of their servants and capping the wages their servants could demand. High enrolments of wills continued through February and March, and then following the Easter recess the record resumes on 1 May 1349, when the Husting dealt with 83 wills in a single session.⁴⁹ Pressure placed on the courts to deal with wills, orphans and abandoned properties would have diverted officials from dealing with the usual range of issues in the courts. The first and each subsequent plague epidemic would have created an immediate public health problem, requiring urgent action to dispose of bodies, placing pressure on the ability of the city to provide waste disposal services and deal with complaints and prosecutions.⁵⁰ While the emphasis in most work investigating the relationship between disease and urban sanitation has been on plague, Boyden notes that the most important diseases of early urban societies include not only plague but also dysentery, smallpox, and in the later period cholera.⁵¹

At the height of the epidemic, householders and rakers or equivalent officials would have been diverted from their usual duties to assist with removal and burial of the dead and it

⁴⁸ Gummer, *The Scourging Angel*, 102–05.

⁴⁹ *Ibid.*, 104–5, 109.

⁵⁰ Plague first appeared in London in November 1348, and had taken hold by January 1349. Abating by late 1349, it recurred in 1361, 1369, 1379, 1382, 1390, and 1391 and 1407. Gummer, *The Scourging Angel*; William Naphy and Andrew Spicer, *Plague: Black Death & Pestilence in Europe*, Stroud: Tempus, 2004; Sabine, "Butchering," 342. Later dates from Barron, "Government of London," 261.

⁵¹ Stephen Vickers Boyden, *The Biology of Civilisation: Understanding Human Culture as a Force in Nature*, Sydney: UNSW Press, 2004, 43. Boyden also notes that many pathogenic micro-organisms need a large population to exist, particularly those that confer lasting immunity on the survivors. Boyden, *Western Civilization in Biological Perspective*, 144–5.

is likely that the streets became polluted with waste.⁵² The directives issued by the king, particularly regarding street cleaning and butchers waste may be an indication of high levels of pollution in the city. For example, on 8 April 1349, while the plague was still raging the king issued a directive for the city to clean up the streets.⁵³ This is one of many examples of the king supplanting the city's jurisdiction over public health issues, mostly after the first plague epidemic. However it is important to determine whether these directives were a response to environmental conditions or other external pressures.

Looking first at the response of the city, Sabine argues that as a result of the plague the city made increasingly stringent public health regulations according to the contemporary understanding of the causes of disease, and there was a marked improvement in sanitary conditions after the mid-fourteenth-century.⁵⁴ However, there is no evidence of the city imposing quarantine or restricting travel, as some of the northern Italian states did. As seen above, there was a gradual increase in assumption of civic responsibility rather than a concerted response to plague, even within the constraints of medieval understanding of disease. Given the city's precarious hold on its self-governance during the late thirteenth and early fourteenth century, the interventions of the king may have been a stronger motivating force in city responses.

One of the causes proposed for plague was God's punishment for sin, just as leprosy was seen as punishment for sin, especially sexual misconduct. The records show how the city authorities sometimes attempted combat epidemics by prohibiting activities such as gambling and other lewd behaviours as well as addressing malodorous wastes.⁵⁵ Both the *Liber Albus* p 238 and the *Letter Books* list ordinances for cleaning the streets of dirt with keeping them clear of other forms of uncleanness such as pigs, prostitutes, and nightwalkers. For example, on 21 Dec 1343, following an epidemic that preceded the plague, the city issued a bill to the wards to clean up the streets and ensure they were

⁵² Gummer, *The Scourging Angel*, 107. Note that the first actual mention of rakers by that name is in 1372, as discussed above, but presumably there were city officials responsible for ensuring streets were kept clean from the late thirteenth century.

⁵³ *Cal Close Rolls Edward III* vol IX 1349-54 pp. 65-6, quoted in *Ibid.*, 110 and p. 430 fn. 18; Hanawalt, *Growing Up*, 29.

⁵⁴ Sabine, "City Cleaning," 43.

⁵⁵ Simon Carter, "Disease and Infection in the City," in *The New Blackwell Companion to the City*, ed. by Gary Bridge and Sophie Watson, Malden, MA: Wiley-Blackwell, 2011, 248.

maintained, within a proclamation concerning hostel-keeping and suspicious characters.⁵⁶

If there was greater concern by the public about sanitation after the first episode of plague, this should show up in the records of the Assize of Nuisance court for that period. Figure 23 shows the breakdown of the main types of complaint to the Assize of Nuisance court from nine years prior to the 1349 Black Death outbreak in London to six years after the second plague epidemic in 1361. This demonstrates the diversion of court resources discussed above, as there was only one case considered by the Assize of Nuisance court in 1349 and none in 1361. There no cases or essoins in 1343, when there was an epidemic, nor in 1354.⁵⁷ Although 1354 was not a plague year, the king ordered the city to clean up the Tower ditch and complaints were made about the stench from the butchers' operations on the Fleet.⁵⁸

In the year before the first plague episode (1348), a relatively high number of complaints were received, and in the year following (1350) a moderate level of complaints, similar to the year before the plague struck, but with no complaints about sewage and wastewater. This is consistent with a combination of a reduced population and clearing the backlog from the previous year and does not suggest a knee-jerk reaction to plague. There were only two cases presented in 1351, one containing a mixed bag of complaints including throwing waste and other filth out the windows and sewage penetrating the adjoining tenement. Again the following year only two complaints were made, the year after that (1353) complaints return to normal, apart from the absence of complaints in 1354. Complaints remain at this level until a sharp drop in 1359.

The pattern of complaints around the second plague episode in 1361 is different to the first, with low levels of complaints in the two years before the plague and relatively low levels in the three years following the outbreak. It suggests that the court was not dealing

⁵⁶ Thomas, *CPMR Vol 1*. A further example in 1357 is a proclamation for "order and cleanliness" of the city, regulating filth in the street, nightwalkers and armed foreigners. Henry Thomas Riley, ed., *Memorials of London and London Life, XIIIth, XIVth, and XVth Centuries*, London: Longmans, Green & Co., 1848, 298.

⁵⁷ In other years with low numbers of complaints there were correspondingly low numbers of essoins.

⁵⁸ Sharpe, *LtrBkG*, 27, 31.

with a backlog, and it may indicate that with the drop in population, speculators were purchasing rental properties and unwilling to bring complaints on behalf of their tenants.

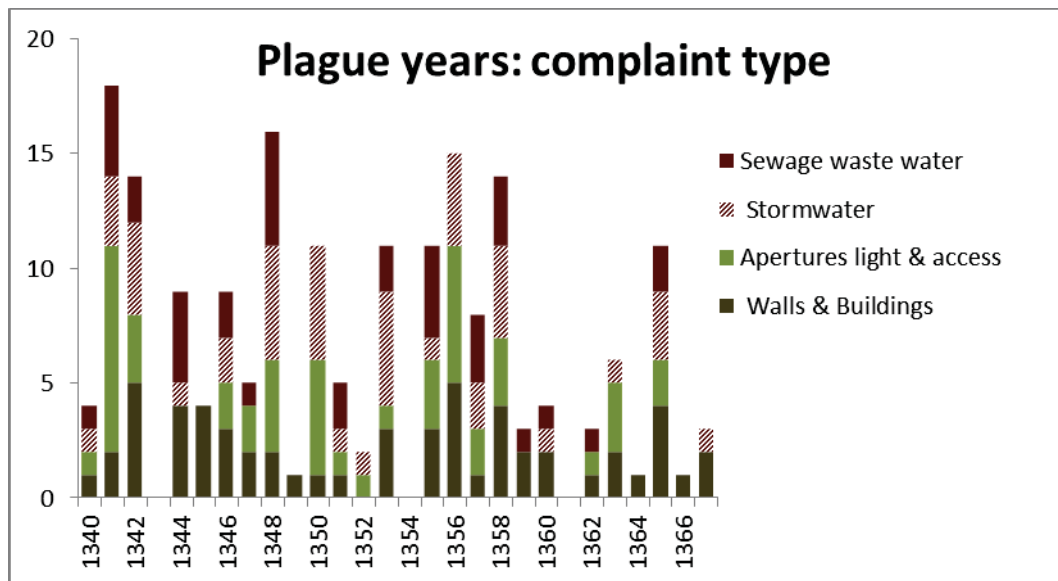


Figure 23: Complaints during the time of plague

This analysis of private nuisance complaints does not support Sabine's assertion that there was a greater concern for sanitation following the Black Death, nor that regulations were more strictly enforced.⁵⁹ However, complaints to the Assize court provide only part of the picture, because complaints were also dealt with in other courts or directly by the sworn masons and carpenters (viewers). There is no way of assessing the complaints dealt with by the viewers as the earliest extant records are from the sixteenth century. While it is reasonable to suppose that a large number of environmental nuisance issues would have been dealt with at the ward level, this also cannot be assessed as the extant records of the wardmote returns only provide a snapshot for 1422 and 1423. Like the annual proclamation of city ordinances, annual directives to the wards tend to be *pro forma*. It is also difficult to determine when regulations were made, because often they were repeated annually in a *pro forma* way, and the only evidence of the details of regulations is in compilations like the *Liber Albus* as they were when the compilation was written. Therefore we must turn to other evidence, and I will look at interventions from the king and the way butchers waste was dealt with.

⁵⁹ Sabine, "City Cleaning," 35–6.

While there does not seem to have been an immediate response from the city to the recurring outbreaks of plague that can be tracked through the making of new regulations or appointing new officials, there is correlation between the complaints by the king about pollution, particularly from the butchers waste. Even while the plague was raging, on 8 April 1349 the king directed the city to clean up the streets.⁶⁰

*To the mayor of London. Order to cause the human feces and other filth lying in the streets and lanes of that city and its suburbs to be removed with all speed to places far distant from that city and to cause the city and suburbs to be cleansed from all odour and to be kept clean as it used to be in the time of preceding mayors, so that no greater cause of mortality may arise from such smells, as the king has learned how the city and suburbs, which are under the mayor's care and rule, are so foul by the filth thrown out of the houses both by day and night into the streets and lanes where there is a common passage of men that the air is infected, the city is poisoned to the danger of men passing, especially in the mortality by the contagious sickness which increases daily. By K.*⁶¹

This directive stresses the connection made in the medieval mind between odour, infected or poisoned air, and mortality. Directives to clean up towns and cities and concern about foul odours causing illness are recorded from at least the early fourteenth century. For example, in 1301 Edward I ordered the streets of Oxford to be cleaned because the air was “corrupted and infected by dung and dunghills and many other sorts of filth placed in the streets” which was injurious to health.⁶² The London directive lays the problem firmly at the feet of the mayor subtly suggesting negligence in carrying out his duty, and is all-encompassing, suggesting that the problem was city-wide.

In 1354 the king issued a writ to the mayor and aldermen to “remove the filth which had accumulated in the Tower ditch owing to the City's ditch in the vicinity not having been kept clean, contrary to former repeated orders” and taxes were collected for the clean-up.⁶³ In 1355, Edward III complained that the Fleet ditch near the prison was “so

⁶⁰ *Cal Close Rolls Edward III* vol IX 1349-54 pp. 65-6, quoted in Gummer, *The Scourging Angel*, 110 and p. 430 fn. 18; Hanawalt, *Growing Up*, 29.

⁶¹ H. C. Maxwell Lyte, *Close Rolls, Edward III - March 1349*, 1906, 65-66, <http://www.british-history.ac.uk/report.aspx?compid=101316>.

⁶² *Calendar of Close Rolls, Edward I: Volume 4: 1296-130*, n.d., 487-88.

⁶³ Sharpe, *LtrBkG*, 27, 31; Corporation of London, *CPMR Vol 1*, 245.

obstructed and choked up by filth from latrines built thereon, and divers other refuse thrown therein” that the inmates, “by reason of the infection of the air, and the abominable stench which there prevails”, were “often affected with various diseases and grievous maladies, not without serious peril unto them”. The king ordered the ditch to be cleaned up and an inquiry made into whether the latrines on the fosse should be removed. At the time of this inquiry, there was a call to arms to relieve the siege of Calais and a writ to the mayor and sheriffs to defend the city, so there may have also been a defensive element to this clean-up to make the Fleet navigable, and the width and navigability of the river is mentioned in the inquiry.⁶⁴

Continuing to act on concerns about the state of the city, in 1357, Edward III issued a directive for a city-wide clean up. He ordered that the streets and the banks of the Thames be cleaned of dung, laystalls and other filth to prevent “abominable stenches arising therefrom; from the corruption of which, if tolerated, great peril, as well to the persons dwelling within the said city” and also for the honour of the city.⁶⁵ This was not a plague year, but suggests an increasing waste problem, and also refers to cleaning up the Thames for avoiding the increasing “filthiness” of the river and banks. It includes an instruction that filth and dung be taken out of the city in carts or dungboats. In 1359 the king issued an order to the sheriffs of London and Middlesex that “Bisshopesgatestrete and Algatestrete to be cleansed from refuse and filth” because of the imminent arrival of Isabel, the queen mother.⁶⁶

Further, In 1372, Edward II ordered that Tower Hill be cleaned up, because of the foul air endangering health, and in the same year ordered the city to abate the nuisance of “rushes, dung, filth and noxious matter” cast into the Thames and hindering navigation.⁶⁷ In 1378, a Royal Inquiry under the direction of Richard II considered the repair of the City's walls, ditches, and gates, the cleansing of the Thames. It also considered the repair of the water-course from the Moor by Walbroke and providing places where Rakers and

⁶⁴ Riley, *Memorials*, 279; Sharpe, *LtrBkG*, 47, 49. “The jurors say that the ditch ought to be 10 ft. broad and have sufficient water to float a vessel freighted with a tun of wine”

⁶⁵ Riley, *Memorials*, 295.

⁶⁶ H. C. Maxwell Lyte, *Calendar of Close Rolls, Edward III: Volume 10 - 1354-1360*, 1908, 482–487, <http://www.british-history.ac.uk/source.aspx?pubid=1091>.

⁶⁷ H. C. Maxwell Lyte, *Calendar of Close Rolls, Edward III: Volume 13 - 1369-1374*, 1911, 365–9, 402–4, <http://www.british-history.ac.uk/source.aspx?pubid=1094>.

carters may deposit rubbish and filth".⁶⁸ The report of the inquiry includes a recommendation to find a better way to fund these civic responsibilities, partly through a levy of twelve pence in the pound and partly through a "voluntary" contribution from good men of the wards "according to their wealth and zeal for the City's welfare".⁶⁹ This is the first real acknowledgement of the city's on-going responsibility for public hygiene and an attempt to provide secure funding for it. There were very few interventions by the king to ensure the public health of the city before the plague, and at least seven between 1349 and 1378, and further interventions by Richard II including a directive in 1398 that both banks of the Thames be cleaned of filth.⁷⁰

In addition to interventions addressing general levels of pollution in the streets and watercourses, the disposal of butchers' waste was an ongoing problem that attracted the attention of the king. As seen in Chapter 3, waste from butchering and cleaning carcasses smelt highly offensive and had a very high pollution potential. The lack of refrigeration and transport costs dictated that killing and butchering be done as close as possible to centres of population. The problems with disposal of butchers' waste started before the arrival of plague. Problems with the scalding houses associated with butchering are noted in the records as early as 1301-02, when Thomas de Canefeld was charged with pouring water and blood into Puddinglane. "Pudding" in Middle English refers to "bowels, entrails, guts". Others were directed to take their butchery waste to the Thames and dispose of it at the ebb tide.⁷¹

In 1343, perhaps coincidentally a year when there was an epidemic in the city, the butchers were granted a location in Seacoal Lane near Fleet Prison near the Shambles for disposal of waste into the Fleet stream.⁷² However, in 1354 the Prior of the Hospital of St. John of Jerusalem complained to the king about the stench from the butchers' operations being injurious to the health of the prisoners in Fleet Prison and the

⁶⁸ Sharpe, *LtrBkH*, 108.

⁶⁹ *Ibid.*, 116. The report also recommended that an assessment should be made of the wealth of those who maliciously refuse.

⁷⁰ H. C. Maxwell Lyte, *Calendar of Close Rolls, Richard II: Volume 5 - 1392-1396*, 1925, 128-135, <http://www.british-history.ac.uk/source.aspx?pubid=1100>.

⁷¹ Ekwall, *Street Names*, 101; Sabine, "Butchering," 340.

⁷² Sabine, "Butchering," 343.

neighbourhood.⁷³ Sabine notes that there was a drought the previous year so the pollution problem may have been exacerbated by low flow conditions. After a second writ from the king in 1355, the butchers were provided Bochersbrigge on the banks of the Thames near Blackfriars for depositing the waste straight into the fast flowing river.⁷⁴ However, following the second plague epidemic in 1361, there were complaints about blood running down the streets and the entrails poisoning the air and causing sickness. The king decreed that all slaughtering should be done at Stratford or Knightsbridge.⁷⁵

Further complaints were received in 1368, and in the next plague year of 1369 butchering was again banned from the city and the city directed to remove Butchers Bridge.⁷⁶ Action to enforce this ban continued from 1369 to 1371 with accusations of butchers dumping waste in the Thames, and again in 1379-80, at the time of the third plague episode. The ban on butchering in the city was re-issued, in 1387 and again in 1391, another plague year.⁷⁷ Sabine reports that enforcing this ban caused a rise in meat prices and in 1392-3 a building was provided where the butchers could cut up the offal and dump it mid-stream at the ebb tide. Sabine notes that there were no complaints about the butchers of the Stocks market because they disposed of their waste “through the open sewer of the Walbrook stream”.⁷⁸

Overall, while there is no sign of an immediate civic response in terms of better regulations or better enforcement following the first plague outbreak, there is a longer term trend to greater civic responsibility for public health and sanitation infrastructure. There is, however, a clear correlation between plague outbreaks and complaints about waste in the streets and butchers’ waste, and action in response to interventions by the king. This is shown in Table 8. Complaints and royal directives could have been inspired by heightened fear of pollution and contagion, rather than actual pollution. However considering that the city sanitation resources would have been diverted to dealing with

⁷³ Sharpe, *LtrBkG*, 31.

⁷⁴ Sabine, “Butchering,” 343–4; Sharpe, *LtrBkG*, 32–33, 43. In 1355 there was also an inquest into latrine and tannery waste in the Fleet ditch as described above.

⁷⁵ Sabine, “Butchering,” 344.

⁷⁶ Thomas, *CPMR Vol2*, 93–94; Sabine, “Butchering,” 345.

⁷⁷ Sharpe, *LtrBkH*, 301.

⁷⁸ Sabine, “Butchering,” 347–50.

the dead, it is likely that waste built up quickly, and in a simple gravity system, any blockage would cause a backup of noxious material.

Table 8: Plague years and clean-up measures

Plague years ⁷⁹	Related responses
1343 (pre-plague epidemic)	Butchers granted a spot at St Nicholas Shambles, near the Fleet Prison, waste discharged to Fleet
1349	King orders streets to be cleaned because of build-up of human faeces and filth, and infected air
	1354 King orders action be taken to clean up the Fleet ditch, polluted with waste from latrines 1354 King orders clean-up of Tower ditch 1354-5 King protests stench from butchers' wharf, orders inquest into conditions at Fleet Prison, 1355 Butchers moved to Butchers Bridge, on banks of Thames near Blackfriars 1357 Edward III ordered that the streets and the banks of the Thames be cleaned of dung, laystalls and other filth to prevent "abominable stenches" 1359 King orders clean-up of Bishopsgate and Aldersgate
1361	1361 complaint to King about butchers in Shambles, butchers ordered to move out of city to Stratford or Knightsbridge
	1368 complaints about butchers at Shambles 1368 Castle Baynard Ward jury investigate waste disposal practices at Butchers Bridge, pollution of Thames, streets
1369	1369 King orders butchers to remove from city, Butchers Bridge to be removed -after petition to parliament - nuisance complained of in Westminster
	1372 First mention of Rakers 1372 King orders cleaning of Tower Hill
1379	1378 Inquiring re long term cleaning in Thames 1379-80 another protest re dumping waste at Holborn
1382	
	1385 first mention of Serjeants of the Channel
1390	
1391	Another protest about the butchers – city ordered to give effect to Ordinance 35 Edward III (1361-62) and 3 Richard II (1380)
	1398 King issues directive to clean the Thames
1407	

⁷⁹ Dates of plague years from Gummer, *The Scourging Angel*; Naphy and Spicer, *Plague: Black Death & Pestilence in Europe*; Sabine, "Butchering," 342. Later dates from Barron, "Government of London," 261. There was a "pestilence" in 1343, sufficient to prompt a directive on 10 August 1343 that all men "shall work as they used to do before the pestilence". Thomas, *CPMR Vol 1*.

Managing the Thames and other watercourses: conflicting environmental, economic and social interests

The previous sections of this chapter looked at the direct response of the city of London to pollution, through enforcing regulations and directives and providing infrastructure. It examined the proposal that the city's response became more concerted and proactive after the first plague episode, and found that changes evolved gradually rather than being imposed immediately. Complaints of pollution at the times of plague epidemics lead to clean-up actions in response to directives from the king.

This section looks at how medieval London managed an important resource, the Thames. This section will investigate how the city managed water quality, access to the Thames, and the fishery resource, using the latter as an example of how the model proposed in chapter 3 can be used to provide a context for examining a resource management issue.

The Thames would have been a major feature in medieval Londoners' perceptions of the environment, and was important for the economy and society, as a major transport and trade route; a convenient fishery; a source of water for drinking and washing; an energy source; and a sink for waste disposal. These uses sometimes conflicted, resulting in resource management problems for the city or the king. The Thames was the ultimate sink for pollution generated within the city, and this created a potential conflict with its other major use as a supply of fresh water. Water transport was important to the economy because it was considerably cheaper than transport by land and more reliable when roads were vulnerable to storm damage and difficult to traverse with heavy carts in wet weather. Numerous lanes provided access to the main markets from the Thames waterfront.⁸⁰ Conflicts arose between river navigation and fishing, because placing structures in rivers for attaching fishing nets impeded shipping. This section looks at the uses made of the Thames, the pressures on the resource and impacts resulting from these uses, and the responses.

Medieval London people relied on the Thames for a variety of uses, from personal bathing and laundering clothes to commercial abstraction of water to sell to the city inhabitants. Information on the uses made of the Thames and associated watercourses often comes from coroners' report. For example, at midday on 24 June 1275, an

⁸⁰ Keene, "Issues of Water," 162. Keene also notes that navigability of the Fleet River was important for landing coal and chalk at cheaper suburban wharves. P. 167.

unknown man came to the city fosse near the Tower, in Portsoken. He took off his coat of russet to bathe and “in a naked state entered the Foss; whereupon, being unaware of the depth of the water, he sank to the bottom, and so by mischance was drowned.”⁸¹ That this practice was widespread is suggested by a prohibition by Edward III on 13 July 1350 on bathing in the Fosse of the Tower of London or the Thames near the tower.⁸² No explanation is given of the ban, but the phrase used, “any person who shall dare or presume to bathe...” suggests an infringement of what was seen as the King’s rights to the river, rather than a public health or a safety issue, although this was the year immediately following the plague.

On the other hand, access to the river for drawing water was seen as a public right, whether by individuals or those taking water to sell. Again evidence comes from coroners’ reports and also prosecutions for restricting public access. One of the witnesses listed in the case of the unknown drowned bather is a water carrier, and the same Coroner’s roll describes the death of Henry Grene, a water carrier who drowned at St Paul’s Wharf while attempting to fill a water tankard.⁸³ Water was carted commercially from the river at Dowegate and Castle Baynard to Chepe and beyond by carters called ‘waterleders’ and they paid standard cartage rates.⁸⁴

While commercial water sellers were taxed, individuals were assured of free access the river. The 1322 Ward presentment from Portsoken accuses the Master of St Katherine’s and John Williamson of illegally charging people for access to the river, including “extortionately taken ... from the wife of John Suthwick a bottle, for washing her clothes in the river, from the wife of Robert Rampamd, labourer, ½d for a jar of water, and from the wife of William Fissh a towel by way of distress for washing her clothes outside the wharf on a staging in the river.”⁸⁵ The ward presentment from Dougate ward includes two cases of lanes obstructed or stopped up with filth “so that no one can go to the

⁸¹ Riley, *Memorials*, 6–7.

⁸² *Ibid.*, 260–61.

⁸³ Reginald Sharpe, *Calendar of Letter-Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book B Circa 1275 - 1312*, London: The Corporation of London, 1900, 259–60. A tankard was a large pail or tub for carting water, containing about three gallons, and designed to be carried on the shoulders. Riley, *Memorials*, 6.

⁸⁴ Riley, *Memorials of London and London Life, XIIIth, XIVth, and XVth Centuries*, 254.

⁸⁵ Thomas, *CPMR Vol4*, 120.

Thames water to have his easement”, again demonstrating the presumption that accessing the Thames for taking water and “other business” was a common right.⁸⁶

Further proof that access to the river was presumed to be customarily free to all, and that people were accustomed to drawing water and washing clothes in the river, comes from the Assize of Nuisance cases. Case 459 (20 December 1355) states that “the abbot of Redyng, John Bisshop and Gilbert Botelere were presented to John Costantyn, alderman of Castle Baynard ward, for obstructing a wharf (kayum) at Castle Baynard formerly used by people coming and going to the river to draw water or dispose of “dung and other things”.⁸⁷ Schofield estimates that by 1343 there were fifty public alleys providing access to the river.⁸⁸

Ensuring the public had free access to the river was an on-going problem. Nearly a hundred years later, in 1417, an ordinance forbade anyone from excluding “the common people” from access to the Thames. The reasons given were that profiteers had denied access to the Thames via wharves and stairs to the “poor common people, who time out of mind have there fetched and taken up their water, and washed their clothes, and done other things for their own needs”, and charged for access. The ordinance prohibited hindering or charging anyone accessing the river for “fetching, drawing, and taking water, or in beating and washing their clothes, or in doing and executing other reasonable things and needs there”.⁸⁹

While the Thames was used regularly for taking water, it is not clear the extent to which this water was used for drinking. Magnusson suggests that drinking water was perceived as causing illness, and given the variety of wastes discharged into the Thames, it certainly could have.⁹⁰ People therefore preferred to drink beer, ale or wine.⁹¹ A statement in

⁸⁶ Also “Dybleslane should be common as far as the Thames, and a stair should be made for the easement of the common people to wash and fetch water there, but it has been let for many years, and taken away from the common people by divers tenants...” *Ibid.*, 133, 137.

⁸⁷ Chew and Kellaway, *Assize of Nuisance*.

⁸⁸ Schofield, *Medieval London Houses*, 52.

⁸⁹ Riley, *Memorials*, 648–9.

⁹⁰ Magnusson, “Water and Wastes,” 302.

⁹¹ At coronations, the Letter Books record that the Mayor offered the King and his consort wine and a ewer of water for tempering the wine. It is not clear if this was a ceremonial use only or if it was common practice at the time. Sharpe, *LtrBkL*, 208.

1345 concerning the Conduit assumed that “middling persons therein might there have water for preparing food, and the poor for their drink.”⁹² Despite the establishment and expansion of the Conduit, the water supplied by the Conduit was insufficient to meet demand. It is likely therefore that poor Londoners used and drank water from the Thames that was polluted by waste discharges.⁹³

The Thames was also used for watering horses, as evidenced by the accidental drowning on 25 March, 1275 at Castle Baynard of Henry de Flegge. Henry was going to water a horse at the hour of Prime when the horse, “being filled with exceeding viciousness and strength” and apparently carrying a grudge for being punished with Henry’s spurs, carried Henry out into deep water where he drowned.⁹⁴ The Ordinance of the Hurers in 1398 mentions “divers persons and pages belonging to lords” taking their horses down to the Thames, this time in connection with fights breaking out.⁹⁵ There is no mention of any effect on water quality, but animals can degrade water quality through stirring up sediments and introducing contaminants, particularly in small streams.

Despite being London’s main water supply, the Thames was also used extensively for waste disposal, with household wastes washed down gutters into the river, dung taken away on barges, and butchers’ waste and various other types of waste disposed of from barges at the ebb tide. Before we rush to condemn this “out of sight, out of mind” approach to waste management, we should recall that this attitude has persisted into the twenty first century, and although most urban wastes streams in the developed world are now treated, many still end up discharging into rivers or the sea. The problem for medieval authorities was to manage the system so that the waste did not clog the drains and gutters and cause a bottleneck and backlog of the very material that the system was intended to remove. Various ordinances and proclamations are designed to prevent this.

Chapter 3 looked at the pollution potential of medieval London waste and the considerable quantities of concentrated human and animal waste likely to be generated. It is difficult to assess the impact these wastes would have on watercourses. The Thames

⁹² Keene, “Issues of Water,” 178. This statement is made in *Memorials*, but the equivalent entry in the *Letter Books* does not state the purpose of the Conduit. Riley, *Memorials*, 225; Sharpe, *LtrBkF*, 128.

⁹³ Gummer, *The Scourging Angel*, 99.

⁹⁴ Riley, *Memorials*, 4–5.

⁹⁵ *Ibid.*, 549.

is a large, fast-flowing river, and if waste was discharged into it at ebb tide and didn't wash back onto the shore, it would be carried out to sea. However, waste entering smaller streams could have had serious impacts, particularly at summer low flows. In dry periods it is likely that waste would build up in the kennels and drains, reliant as most were on stormwater to wash the waste down to the river. The Walbrook is described as an open sewer and was eventually paved over. The complaints largely related to these smaller streams, particularly the Walbrook, the Fleet and the city fosse, and malodorous organic waste would have built up quickly.

Noxious odours arising from the rivers and streams were seen as of great concern, and as early as 1290 the Carmelites complained to the king that "putrid exhalations" from the Fleet had caused the deaths of several friars.⁹⁶ Many of the decrees to clean up the Fleet and the Walbrook were based around cleaning up foul-smelling refuse and discharges. Stormwater runoff from the streets would be highly polluted at "first flush" with the build-up of waste and dung accumulating on the streets and in the kennels. Two main sources of water pollution were butchers waste and discharges from latrines and privies over or adjacent to watercourses. There were also pollution problems around the port area with the loading and unloading of ships. There are numerous injunctions against disposing of waste and dung directly into the street, and to clean up the Thames around the port area. For example:

Writ to the Mayor, Sheriffs, and Aldermen forbidding- the casting of rushes, dung, and refuse into the Thames, and ordering the removal of all such obstructions of the river's course. Witness the King at Prestone, 20 Aug., 46 Edward III. [A.D. 1372].⁹⁷

One of the biggest threats to water quality in the Thames and smaller watercourses was waste from butchering and processing meat. This is the main "industrial" discharge that gets the attention of the regulators, and is discussed in detail above in connection with plague epidemics. The other offenders are fishmongers and poulterers, as the gutting of fish and killing and dressing of fowl would produce malodorous waste streams. These

⁹⁶ *The Fleet River and Fleet Ditch', Old and New London: Volume 2, 1878, 416–426, <http://www.british-history.ac.uk/report>.*

⁹⁷ Riley, *Memorials of London and London Life, XIIIth, XIVth, and XVth Centuries*, 297; "Calendar of Close Rolls, Edward III: Volume 13: 1369-1374: August 1372 Pp. 402-404.," 1911, URL: <http://www.british-history.ac.uk>.

industries occasionally are prohibited from throwing wastewater into the street. Other industries such as tanning, rendering, and fulling cloth would also have generated waste streams but there is no concerted response to these recorded.⁹⁸ It may be that these operations were smaller, more dispersed, or dealt with at the local level, where most of the records have been lost. But certainly it was the butchers that offended most people and received the most response, often as a result of complaints to the king. The other main threat to water quality was the waste from public latrines.

Not all of the poorer tenements had privies, forcing the tenants to use the public latrines or dispose of their waste directly into the street.⁹⁹ Sabine concluded that there were public latrines at Temple Bridge near Fleet Street; at Queenhithe; on London Bridge and various other places.¹⁰⁰ This list of public latrines is likely to be incomplete, as some may not have left any documentary evidence nor been discovered through excavations. Most of the public latrines we know about relied on disposing of the waste into the city fosse, the Walbrook, the Fleet, or the Thames itself, either through flushing or by placing the latrine directly over water. There could have been significant pollution from latrines not discharging directly to the Thames, and many are reported as being poorly maintained.

The privies on London Bridge relied on access to flowing water from the Thames whereas other privies such as those with the walls near Bishopgate and near Ironmongerslane had pipes directing the water to the city fosse or the Walbrook. The Temple Bridge latrine was built over the Thames, as were several other public privies, including one dating from at least 1306 that had two entrances. In 1382 a new latrine was built at the end of London Bridge in response to complaints in 1377 that the old privy was in disrepair, and by 1412 there may have been another latrine on the bridge. Sabine concludes that the latrines on the bridge were of considerable size and important.¹⁰¹

Various inquests examined pollution of the Walbrook and the Fleet, often in plague years, as discussed above. Most focus on foul odours causing illness and blocking channels for

⁹⁸ Tanneries were included in the 1355 inquiry into pollution of the Fleet by latrines and other waste, as discussed below.

⁹⁹ Sabine cites evidence from the 1421 "Bassyngheshawe" wardmote return in evidence of this. Sabine, "Latrines," 306; Thomas, *CPMR Vol4*, 117–8.

¹⁰⁰ Sabine, "Latrines," 305–7.

¹⁰¹ *Ibid.*, 307–8.

navigation. For example, in 1355 Edward III ordered the city to inquire into and abate the pollution of the Fleet, “by reason of the infection of the air and the abominable stench which there prevails” thus endangering the health of the inmates of Fleet Prison. The inquest found the ditch was obstructed by eleven latrines, three tanneries and three sewers encroaching by up to three feet into the stream.¹⁰² There was one public privy in Ludgate hill over the Fleet stream. Similar problems occurred in 1388-89 where William Eryvn had made privies and a stone wall.¹⁰³

Eleven of the cases considered by the Assize of Nuisance court concerned the Walbrook stream, including a report on 4 January 1314 of a “perambulation” by the mayor, and aldermen to inspect the Walbrook. They identified obstructions, encroaching on the watercourse and infilling with dirt and obstructing the drainage of the “More” to the Thames via the Walbrook. Three cases required removing privies and pigsties above the watercourse. People were required to remove privies from over the Walbrook in 1344-45, but the practice was allowed again after 1383, subject to a fee and on condition that no rubbish blocked the stream.¹⁰⁴ Privies over the Fleet and the Walbrook were banned again in 1462-63, and the Walbrook vaulted over. Subsequently, in 1477 the Common Council banned privies over the Walbrook or any city fosses, and prohibited white tawers from dumping waste in these waterways.¹⁰⁵

Several public latrines discharged to the Walbrook, including one ordered to be removed in 1415 that was replaced with one inside the wall on the fosse of the Walbrook, although it is not clear why this would be an improvement. Another larger latrine in Cheap bordered the Walbrook, and there were several on the waterfront. One at Fenchurch Cemetery was unusual in that the waste was disposed of into a large cess-pit rather than a watercourse, and probably posed a risk to groundwater quality. The latrine at Queenhithe relied on a stream of water or open sewer flowing beneath it.¹⁰⁶ The public privies relying on smaller rivers to flush the waste must have generated considerable local pollution.

¹⁰² Riley, *Memorials*, 279.

¹⁰³ Sabine, “Latrines,” 311–312.

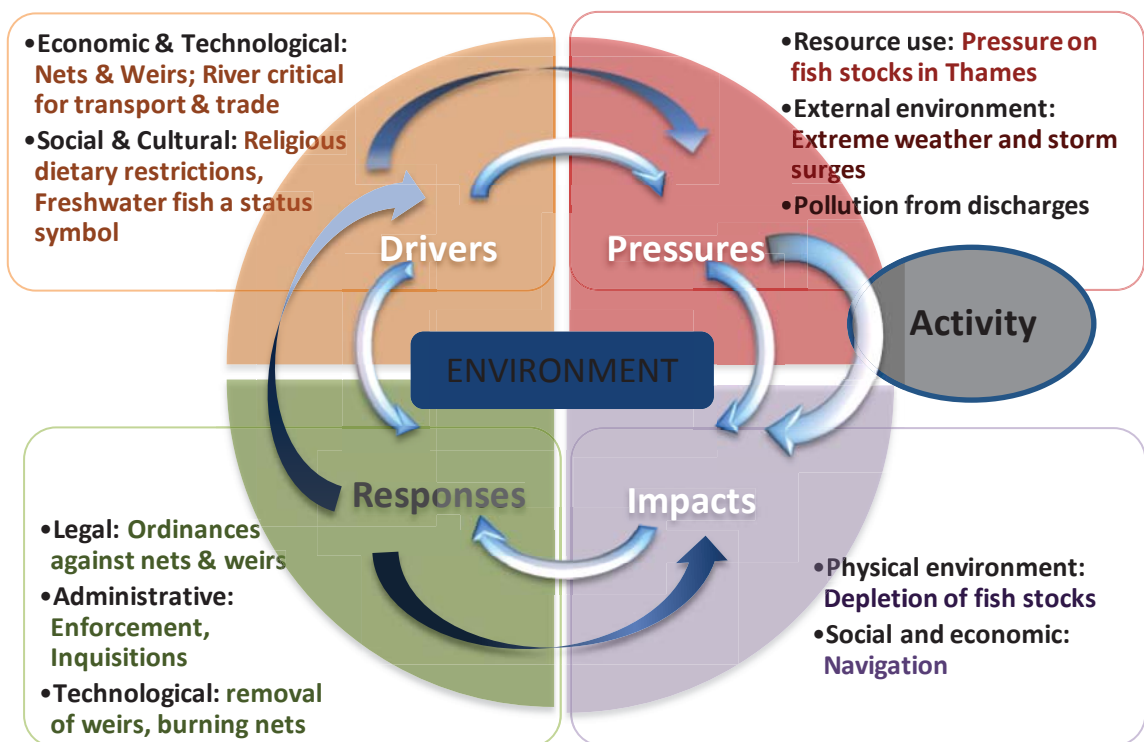
¹⁰⁴ *Ibid.*, 309–10.

¹⁰⁵ *Ibid.*; Sharpe, *LtrBkL*, 149. White tawers used alum to produce white leather.

¹⁰⁶ Sabine, “Latrines,” 308–9.

Sabine proposes that within the city, “fast flowing water” such as the Walbrook, the Fleet, the city ditch or moat, and the Thames would have been used for flushing away privy waste.¹⁰⁷ However, of these only the Thames was a major fast flowing river with sufficient dilution available for the quantities of waste likely to be discharged. This is borne out by the numerous complaints about the condition of the Fleet, the Walbrook and the city fosses, and the eventual prohibition of discharging waste from privies into these water bodies. Once again, the placement of privies over waterways illustrates the attitude that any moving body of water was available for waste disposal, and prohibitions only seemed to apply if the water body was unable to provide sufficient dilution, was liable to blockage, or if the waste washed back onto the banks.

Management of fisheries and navigation



This case study of the regulation of fishing in the Thames uses my modified DPSIR model as a framework for assessing the drivers for fishing, pressures on the resource, the impact on the resource, and the responses. Medieval society was heavily reliant on fish as a food source, a particularly valuable source of protein. Religious dietary requirements

¹⁰⁷ Ibid., 305–6. Even though medieval London was hillier than modern London, the fall would not have been sufficient to sustain a “fast flowing” small stream

prohibited eating meat and dairy products on 130 days, 35% of the year, including Fridays and religious days such as Lent, Advent, Pentecost and saints' days.¹⁰⁸ The importance of fish is evident in the in very detailed regulations about selling fish reproduced in the *Liber Albus* and *Letter Books* and fishmongers were among the more prosperous and important citizens.¹⁰⁹ An important driver, therefore, was cultural, namely demand driven by religious restrictions on acceptable protein sources.

Demand was also influenced by cultural preferences for freshwater fish. Those who could afford it ate fish, and archaeological studies suggest that the wealthy ate freshwater species as a status symbol, while those less affluent ate marine species.¹¹⁰ Preserved herring was the Lenten food of servants and the poor and was regarded as inferior to fresh fish.¹¹¹ This is borne out by a passage in *The Book of Margery Kempe* where Margery's choice of the inferior "reed heryng" over "good pyke" is seen by her critics as a show of false humility.¹¹² Although there were fish stews at Southwark, at an estimated 0.8 hectares per person to supply daily fish, even with extensive farming fish ponds would be unlikely to supply a significant proportion of the fresh fish eaten in the city.¹¹³ From the twelfth century an increasing share of the fish consumed came from preserved marine species, driven by an increasing demand for fish coupled with declining freshwater fish resources.¹¹⁴ Therefore, Londoners would have placed a high value on

¹⁰⁸ Hoffmann, "Aquatic Ecosystems," 48. Aidan O'Sullivan, "Place, Memory and Identity Among Estuarine Fishing Communities: Interpreting the Archaeology of Early Medieval Fish Weirs," *World Archaeology*, 35: 3 (2003), 461.

¹⁰⁹ Carpenter, *Liber Albus*, 209; Carrel, "Food, Drink and Public Order in the London Liber Albus," 185. Barron describes lavish receptions and pageants for royal dignitaries organised by the fishmongers. Barron, *London in the Later Middle Ages*, 19.

¹¹⁰ Schofield and Vince, *Medieval Towns*, 227.

¹¹¹ Hoffmann, "Footprint Metaphor," 304.

¹¹² Lynn Staley, *The Book of Margery Kempe*, Kalamazoo, Mich.: Medieval Institute Publications, Western Michigan University, 1996, 227.

¹¹³ Fish ponds are regarded as a social statement rather than an important food source. Fagan, *Elixir*, 314; Serjeantson, D. and Woolgar, C. M., "Fish Consumption in Medieval England," in *Food in Medieval England: Diet and Nutrition*, ed. by C. M. Woolgar, D. Serjeantson, and T. Waldron, Oxford: Oxford University Press, 2006, 102; Carlin, *Medieval Southwark*, 50.

¹¹⁴ Hoffmann, "Aquatic Ecosystems," 49. Barrett et al found that most assemblages from the seventh to tenth century were dominated by freshwater species, particularly carp and eels, whereas from the eleventh century assemblages had a greater proportion of marine species, particularly herring and cod James H. Barrett, Alison M. Locker, and Callum M. Roberts, "The Origins of Intensive Marine Fishing in Medieval Europe: The English Evidence," *Proceedings of the Royal Society of London. Series B: Biological Sciences*, 271: 1556 (2004), 2418, 2420.

the Thames fishery, and the simple technology of fish nets and brush weirs was readily accessible. However, while access to the river for washing and taking water was seen as a public right, taking the fish was not.

The ready availability of fishing technology and ease of access to the river was another driver of pressures on both the navigability of the river and the fishery. Medieval fishing technology on rivers used artificial barriers of stone or wood to deflect the fish into an opening where they were trapped in nets or baskets.¹¹⁵ These structures interfered with navigation in the Thames, and as seen above, water transport was important for the economy. Structures could also have caused increased siltation of the river bed if placed in slower flowing water bodies. Tight controls on fishing weirs were aimed at ensuring the river remained navigable by removing these structures. Prohibitions on structures in the Thames and Medway were in effect from at least the early middle ages.¹¹⁶

Prohibitions on placing “kidels” or weirs for fishing in the Thames appear in the Magna Carta and are confirmed repeatedly in statute.¹¹⁷ For example, a 1297 statute reconfirms the provisions of the Magna Carta (25 Edward I c. xxiii) including that “All wears from henceforth shall be utterly put down by Thames and Medway, and all through England, but only by the sea coasts.”¹¹⁸ The kidels would have involved a considerable expenditure of time and effort to construct, and would need to be inspected twice a day. They would most likely be located at a point where they could be inspected a few hours each side of low tide, and hence be open to discovery at low tide.¹¹⁹ Illegal “kidels” were burnt, so they were probably made of wood and brush. However, the word used in these instances may refer only to the basket for catching the fish, not the weir structure itself which may have been stone.

¹¹⁵ O’Sullivan, “Place, Memory and Identity Among Estuarine Fishing Communities,” 451.

¹¹⁶ Keene, “Issues of Water,” 167. The Medway is located downstream from London at the beginning of the Thames estuary.

¹¹⁷ The term “kidel” is usually used to refer to a “weir or wooden fence set in the river hung with nets and fish-traps”. However, the term is occasionally used to refer to the nets themselves. Laura Wright, *Sources of London English: Medieval Thames Vocabulary*, Oxford: Clarendon Press, 1996, 66, 188.

¹¹⁸ *The Statutes: Revised Edition: Vol I: Henry III to James II*, London: George Edward Eyre & William Spottiswoode, 1870, 88.

¹¹⁹ O’Sullivan, “Place, Memory and Identity Among Estuarine Fishing Communities,” 465.

Concern that over-fishing and using small gauge nets that trapped the fry would deplete the resource drove tight controls on net sizes and times of the year when species could be caught. An entry dated 15 January 1384 contains a clear statement of the purpose of banning close-mesh fishing nets as avoiding catching fry and hence depleting the fishery:

*Whereas many men of divers places around London use nets of which the mesh is too close and take and destroy every kind of minute fishes called "fry" in the Thames, so that fish of any size or value can hardly arise or be found therein, to the grave damage of the whole city and other places adjacent to the river and against the ancient custom of the city, according to which the mesh of small nets used for fishing should be two inches wide at least, so that little fishes can easily pass through them...*¹²⁰

A description of enforcement action in January 1386 depicts depletion of the resource, despite a reduction in population and increase in prosperity after the first plague epidemics. Twelve fishermen were sworn before the Mayor and Aldermen to report on "how and by whom the fish in the Thames were so destroyed that hardly a seasonable fish could be found in it". The fishermen reported on illegal nets and a fish harvesting scheme using weirs to divert fish into channels. They and noted that "*samoun* and *sturgeon* were utterly destroyed by *weres* and *treinkes*" and proposed times of year when fish and eels should not be fished because they were spawning.¹²¹ Nets of one inch mesh were to be brought to the Guildhall for safekeeping outside of the legal fishing period or the owners face punishment "as befitted one who destroyed the common food". There was clearly some attempt to enforce the assize in 1386, when seven men were charged with having illegal nets and shooting arrows at John Salisbury, surveyor of the Thames, who had been appointed to destroy all nets and engines damaging fry.¹²²

In August 1406, a precept from the mayor prohibited taking salmon in millponds or placing nets, particularly those called "stalkers" for catching the fry of salmon, lampreys

¹²⁰ Thomas, *CPMR Vol3*, 71. In 1384 three men with 'panniers of small fish called "fry"' and another with a *trog* (trough) were given a first warning, the only recorded follow up until 1386. (Ibid., 74)

¹²¹ A *Treinke* is a draw or drag net, or a net used on a weir or kidel. Wright, *London English*, 77. Wright has published a comprehensive and informative survey of terminology used in Late Medieval London for fishing equipment and the types of fish caught (Ibid., 54-114) as well as other structures, materials and tools used in the river and shipping terms.

¹²² Thomas, *CPMR Vol3*, 116–20.

or other fish in the Thames from mid-April until 24 June.¹²³ The precept also required the appointment of conservators to enforce this and directed the sheriff of Middlesex on the king's behalf “to summon twenty-four good and lawful men to come before the mayor at Stanes on 19 Aug. 1406, in order that he might inquire as to the nets and other engines by which the fry of salmon, lampreys and other fish were destroyed”.¹²⁴

The ordinances governing catching fish in the Thames and other rivers, weirs, kidels and other structures, and the types of nets to be used are set out in the *Liber Albus*. It is an indication of the importance of these ordinances that, unlike other ordinances where Carpenter has listed only those current at the time of writing, he has listed the fishing ordinances for each of the kings since Richard I. Further, he establishes the city's authority over the river by the city by rooting this in antiquity, in the time of “Brut the first monarch of Britain” and Edward the Confessor.¹²⁵ The Magna Carta confirmed these rights and extended the prohibition on kidels to all rivers, but excluding sea coasts. In the time of Henry III in 1237 and again in 1253, kidels were seized on the mayor's instruction, in the latter case following extremely high river levels and illegal nets were also seized and burnt.¹²⁶ It is not clear if the latter purge of kidels was related to extreme weather and flooding or if the structures were simply blocking the channel and obstructing navigation, but a later ordinance talks about kidels causing flooding.

From the ordinance attributed to Richard I, simply requiring that “all Kidels that were in Thames should be removed”, to those of Henry V, the regulations become increasingly complex. In 1327, Edward III confirmed the ancient customs and liberties of the city including that the citizens “should remove and take all Kidels in the waters of Thames and Medewaye” and in 1352 (25 Edward III) enacted a statute requiring removal of the kidels because “the common passage of ships and boats in the great rivers of England was oftentimes impeded”.¹²⁷ During the reign of Richard II the prohibition was extended to nets that would destroy fry, and the taking of salmon at certain times of the year was also

¹²³ He refers to the statute of Westminster II, which enacted that salmon should not be taken or destroyed by engines or nets in millponds, and to the statute of 13 Ric. II. A stalker is a kind of net used by poachers. Wright, *London English*, 76.

¹²⁴ Barron, “Government of London,” 357; Thomas, *CPMR Vol3*, 283.

¹²⁵ Carpenter, *Liber Albus*, 427–8.

¹²⁶ *Ibid.*, 428–31.

¹²⁷ *Ibid.*, 434; Cam, *1321 London Eyre*, xx.

prohibited.¹²⁸ Henry IV reconfirmed the statute of Edward III, and the structures were said to give rise to flooding and destruction of “meadows and pastures, and sown lands” as well as hindrance to navigation. The statute emphasised banning nets that would inhibit spawning.¹²⁹ Enforcement of the latter seems to have caused a riot in 1406.¹³⁰ The rationale behind these statutes broadened from hindering navigation to wider concerns about preserving fish stocks and flooding of adjacent land.

A common theme in the history of these statutes is the lack of enforcement. The frequency with which regulations concerning nets and weirs were promulgated and proclaimed and the numerous inquisitions into illegal nets and weirs suggest that regulations were not well-enforced or complied with. Barron notes that “The Mayor, as conservator of the Thames, was clearly saddled with a task which, without adequate royal help, was impossible and the statutes were frequently and openly violated.”¹³¹ However, Keene notes that jurisdiction of the river downstream of London was complex and it was only in the 1340s that jurisdiction of the entire length of the river was resolved in favour of the commonality of London.¹³² Barron looks at efforts to enforce the fishing laws in the Thames as initially a City initiative, but because of the extent of the problem – geographically and numerically – and the resistance of the owners of fishing equipment, she concludes that the efforts could only succeed with the help of the Crown.¹³³

Barron chronicles the on-going attempts by parliament and the city to remove these illegal nets, with the city petitioning for additional powers to enable them to effectively implement parliament’s directives.¹³⁴ In 1421 the Thames fishermen complained about the Mayor's failure to enforce the ban on nets of a small gauge liable to catch very young fry. The King directed the Mayor to survey the Thames twice a year. A search from

¹²⁸ Carpenter, *Liber Albus*, 434–5.

¹²⁹ *Ibid.*, 439.

¹³⁰ *Ibid.*, 442. A sworn sub-conservator of the Thames, after confiscating 16 nets, was attacked by “two thousand” rioters armed with bows, arrows, swords and clubs, although eventually the transgressors were pardoned and given licences to fish.

¹³¹ Barron, “Government of London,” 364–366. The Mayor held the position of the Conservator of the Thames in accordance with the city's charters, 8 Ric. I, 1 John, 11 Henry III and 1 Edw. III Thomas, *CPMR Vol3*, 71, n 19.

¹³² Keene, “Issues of Water,” 167.

¹³³ Barron, “Government of London,” 365.

¹³⁴ *Ibid.*, 361.

Kingston to Greenwich was carried out with the help of the city companies.¹³⁵ For example, The Brewer's records item 330 states that "These been þoo names of Brewers of London, þe wheche dede paien diuerse sommes of money, for to helpe to destruye þe weres yn Tempse, for þe comynalte of þe Cite of London shulde haue þe more plente of Fissh [three pages of names listed]".¹³⁶ Further searches were carried out in 1449, 1453 and 1454, the latter involving force of arms.¹³⁷ Note that the reason given here is to preserve the fishing resources. While overfishing was a significant pressure on the resource, external factors such as discharges of contaminants and human activity could also affect the fish habitat.

Pollution from urban runoff and the discharge of contaminants noted above would have adversely affected water quality, human activity and habitat degradation may have favoured the eel fishery, as eels are tolerant of relatively high levels of organic pollution.¹³⁸ The sources don't specifically mention fish kills, nor do they mention fishing in smaller tributaries of the Thames where a combination of high pollution levels and summer low flows could have killed fish. It is possible that in the event of a fish kill, the local inhabitants would simply collect the dead fish as free food.¹³⁹ The regulations aimed at keeping the streets clean discussed above treat the river as the ultimate pollution sink, and do not mention possible effects of pollutants on the fishery. However, as much of the pollution was organic, it is reasonable to assume that the main threat to the resource is likely to have been over-fishing and regulations were aimed at controlling the mesh size of nets, and the time of year fish could be taken to avoid interfering with breeding.

The Thames was an important waterway used for transport of domestic and imported goods, and exports. The earliest requirements to remove weirs or kidels were because of the risk to navigation, although later regulations stated additional concerns about flooding. The Thames was also a valuable fishery in a society with religious dietary laws

¹³⁵ *Ibid.*, 358–9.

¹³⁶ R. W. Chambers, *A Book of London English, 1384-1425*, Oxford: The Clarendon press, 1931, 151, Item 330.

¹³⁷ Barron, "Government of London," 362–3.

¹³⁸ Hoffmann, "Aquatic Ecosystems," 51.

¹³⁹ I have observed people scooping up dead fish for food from the lagoon on the Wellington waterfront during a toxic algae event while I was sampling water quality to determine the cause, even though they were aware of the connection between pollution and fish kills.

dictating that no meat or dairy was to be eaten on 35% of the year. Statutes enacted in 1390 (13 Richard II) were aimed prevent over-fishing by controlling the size of nets to prevent catching fry and restricting the timing of fishing to avoid spawning. The regular re-enactment of statutes was connected with the city's charter of self-governance. Despite repeated proclamations and attempts at enforcing prohibitions on small-mesh nets and weirs in the river, enforcement seems to have been piecemeal, violently resisted by illegal fishers, and often required the intervention of the king. This case study demonstrates how the drivers of religious dietary restrictions and cultural preference for freshwater fish place pressure on the fishery, depleting the resource and conflicting with use of rivers for transport, and requiring determined responses through increasingly specific ordinances and major drives to enforce them.

Trash Palace: Recycling and re-use of materials

The previous sections looked at responses by the city, in terms of providing infrastructure and sanitation services, and directives from the king to clean up streets and watercourses to prevent illness. These sections also considered the relationship between plague episodes and clean-up measures, and concluded that the provision of sanitary services and regulations evolved gradually rather than as an immediate response to plague epidemics. A case study on the management of the Thames fishery demonstrates the applicability of the model to medieval environmental issues. This section looks at private sector activities that reduced demands for resources and reduced the amount of waste generated.

In a pre-industrial society, it is likely that materials would be reused and recycled until they are no longer any use to anyone.¹⁴⁰ As discussed above, animal manure that could be readily collected from stables would have been valuable fertilizer, reducing one potential waste problem. There is archaeological evidence of building materials being re-used, ranging from masonry from decaying Roman structures and abandoned buildings to materials like timber, window glass and tiles. Slag from smithing was used for road metalling¹⁴¹ Judging by the number of regulations governing the re-use of materials and

¹⁴⁰ When I lived in a Turkish village in the early 1980s, the landlord would come and ask for our rubbish. Nothing was wasted. Our garbage was something of a disappointment, as we only had what we had brought with us in our backpacks, but did provide some organic scraps to be fed to the animals. Shopping involved bringing your own container for anything you bought, including yoghurt, and nuts were sold in a cone of recycled newspaper. Clothing was recycled, cut down, remade, and ultimately ended up in rag rugs. I imagine that the approach to waste minimisation was similar in medieval London.

¹⁴¹ Schofield and Vince, *Medieval Towns*, 124.

refurbishment of goods, the practice was widespread. In terms of the DPSIR model, recycling is a response to economic drivers – demand for goods – that has the effect of reducing resource consumption and reducing the impacts of waste disposal. Boyden shows recycling as a specific feature of the input-output section of the model (see Figures 5 and 6).

However, the city was also responsible for trade practices, and had to balance the desire of the population for affordable goods with controlling dishonest practices. Regulations forbade recycling and refurbishing of various goods, although they would have been very difficult to enforce and were probably widely flouted. Regulations such as those prohibiting refurbishing saddle bows and harnesses to sell as new made allowance for repairs.¹⁴² Similar regulations applied to lorimers (makers of harness fittings) and cobblers.¹⁴³ The authorities were also concerned about repairers of old items passing them off as new items. The cobblers were directed to restrict themselves to repairing old shoes, and the cordwainers to making new shoes: “that no person who meddles with old shoes shall meddle with new shoes to sell”.¹⁴⁴ The passing off of old furs, a valuable item of clothing, as new was particularly of concern.¹⁴⁵ Selling of recycled and refurbished goods was connected, in the minds of the regulators with petty crime, both passing off old goods as new in evening markets in poor light, and selling stolen goods.¹⁴⁶

The “frippersers” or “phelipers” refurbished and sold old clothes and furs, second-hand furniture, and other goods.¹⁴⁷ On the one hand, the frippersers could be seen as the medieval equivalent of charity shops, generating social and environmental benefits by taking goods that would otherwise end up as waste, and making them available to needy clients with very little money. Were some traders in second hand goods more akin to pawnbrokers? Davis gives examples of aristocrats and religious institutions pawning gowns, jewels and books, and suggests that the poor during times of hardship would be

¹⁴² Sharpe, *LtrBkG*, 141–2.

¹⁴³ Sharpe, *LtrBkH*, 396; Sharpe, *LtrBkI*, 96.

¹⁴⁴ Riley, *Memorials*, 539.

¹⁴⁵ Sharpe, *LtrBkH*, 158, 161.

¹⁴⁶ Hanawalt, *Growing Up*, 37.

¹⁴⁷ Sharpe, *LtrBkE*, vi. Sharpe suggests that “the scouring or cleaning of furs was no doubt frequently practised by frippersers” [*LtrBk D* p. 233]

forced to pawn goods to buy food.¹⁴⁸ Other sources of recycled goods were “trade-ins” which were refurbished and sold, and goods from bequests, sold by the executors to pay funeral expenses.¹⁴⁹ Similarly in modern times relatives of the deceased sell unwanted items or donate them to thrift shops. The high mortality from episodes of plague from the mid-fourteenth century would have released goods from the deceased onto the market and provided the opportunity for the less affluent to have access to better goods.¹⁵⁰

Judging by the frequency with which regulations were made governing the activities of these medieval Steptoes, the activity was common, and may have been carried out by people whose main intention was to make a quick goad. In environmental terms these recyclers were performing a public service resulting in a reduction in the volume of waste that needed to be disposed of, and minimising the raw materials requirements. However, recycling activities were regarded with suspicion and seen as at best competing with sellers of new goods and at worst fostering crime and supporting unsavoury characters.

The secondhand market was an important part of the medieval economy and fripperers were recognised as a trade, but their trade was often viewed as marginal, suspicious and fraudulent as it often occurred outside the formal market setting.¹⁵¹ Selling second hand and refurbished goods in informal night-time markets or “evenchepes” was associated with trade in stolen goods and disturbance of the peace, as suggested by an entry in *Memorials* noting the prohibition of these markets by Edward III in 1369 that specifically mentions selling stolen goods and old goods for new, as well as brawls and disturbances of the peace and this prohibition was repeated in 1396.¹⁵² The evidence we have of the

¹⁴⁸ James Davis, “Marketing Secondhand Goods in Late Medieval England,” *Journal of Historical Research in Marketing*, 2: 3 (2010), 276.

¹⁴⁹ *Ibid.*, 277.

¹⁵⁰ *Ibid.*, 278.

¹⁵¹ *Ibid.*, 270, 272. As a recognised trade, fripperers took on apprentices, for example, on 12 July, John de Totenhale junior, on the death of his father, a fripperer, was placed as an apprentice with fripperer John Robinet, and on 15 July, the younger son, also named John, was placed as an apprentice with Hugh de la Marche, fripperer Sharpe, *LtrBkF*, 234.

¹⁵² Riley, *Memorials of London and London Life, XIIIth, XIVth, and XVth Centuries*, 339; Davis, “Second Hand Goods,” 275.

activities of the fripperers, and societal attitudes towards them, comes from ordinances made restricting their activities, and prosecutions for breaching the ordinances.

Following the London Eyre of 1321, the Fripperers were accused of offering goods for sale at night in contravention of an ordinance prohibiting this, and directed “not to expose their old clothes, shoes, and other wares for sale in future after the hour of vespers [sunset].” The Fripperers mounted an unsuccessful appeal, and it appears that the subsequent directive was disregarded.¹⁵³ In September 1321 a jury was convened and large numbers of fripperers, men, couples and sole female traders were convicted of trading outside the lawful hours.¹⁵⁴ The list of names of these fripperers can be used to assess who was involved in this marginal activity.

The names of the defendants in the 57 prosecutions are listed in the *Letter Book*. I have counted each couple as a single defendant, as the women’s original surnames are not listed. Of these, 37 (65%) have surnames that could indicate place of origin.¹⁵⁵ The names of 28 (76%) of those with surnames based on place names indicate origins outside London, from as far afield as Barrow, Durham and St Ives, as shown in Table 9. Nine (24%) have surnames suggesting suggest local origins: Southwark, Houndsditch, Alegate, Whitechapel, Cripplegate, Crookedlane. A further 14 fripperers were accused but not charged. Of these, five can be identified as coming from London and two or more from the regions.

The proportion of fripperers from London is about twice the proportion of locals appearing at the Assize of Nuisance court (see chapter 4), however the difference may simply be because the records of the fripperers are from before the Black Death, whereas the Assize record continue through the second and third episodes, and thus would contain a higher proportion of immigrants and absentee landlords. Three quarters of those convicted were men acting alone. Despite the lack of barriers to entry for women,

¹⁵³ Sharpe, *LtrBkE*, vii–viii. While Sharpe states that the complaint about the Fripperers was presented to the Justicars of the Eyre, there is no mention in the published records of the Eyre of any action against the fripperers. Cam, *Year Books of Edward II: Vol. XXVI (Part II): The Eyre of London 14 Edward II AD 1321 Vol II*.

¹⁵⁴ Sharpe, *LtrBkE*, 156–9.

¹⁵⁵ The locations that place-name surnames refer to have been identified with reference to a review by Uckelman of Late medieval London surnames. Sara L. Uckelman, “Middle English Bynames in Early Fourteenth-Century London” 2013, <http://www.nomic.net/~liana/names/english/bynames1319.pdf>.

and their growing participation in the retail sector, only three (5%) of those convicted were sole women, and a further eleven (19%) were convicted as part of a married couple.¹⁵⁶ It may be that sole women were more involved in the trade than these figures indicate, but chose to trade during daylight for personal safety. The proportion of married women is similar to the percentage of married women appearing before the Assize of Nuisance court, but the percentage of sole women is slightly lower than the 10% of plaintiffs and 7% of Assize defendants who were sole secular women.¹⁵⁷

Table 9: Analysis of surnames of fripperers based on location:

Regional		London and suburbs	
Oxford	1	Southwark	2
Barrow	1	Houndsditch	2
Abingdon	2	Alegate	1
Kingston	1	Whitechapel	1
Hoddesdone (Herts)	2	Cripplegate	1
Dunstable	3	Crookedlane	1
Ipswich	1	Bassishawe	1
Stow	1		
Ware	1		
Buntingford	1		
St Ives	1		
Essex	2		
Grantley	1		
Lynne	1		
Melton	1		
Beverly	1		
Thorpe	1		
Warwick	1		
Cambridge	1		
Bedford	1		
Durham	1		
Canterbury	2		
TOTAL	28		9

It is not clear why, during a period of political instability and at the end of a period of extremes of rainfall and famine, the fripperers were singled out. The key concern seems to be displaying wares for sale after dark, and may be linked to general concerns about

¹⁵⁶ Derek Keene, "Tanners' Widows," in *Medieval London Widows, 1300-1500*, ed. by Caroline M. Barron and Anne F. Sutton, London ; Rio Grande: Hambledon Press, 1994, 5.

¹⁵⁷ This comparison takes into account that ten to fifteen per cent of the sole women appearing at the Assize of Nuisance court were religious women. See Chapter 4.

keeping the king's peace, rather than consumer protection. Trading after dark was seen as being "calculated to foster deceit and to give opportunity for felonies".¹⁵⁸ It would be easier to deceive customers and sell poor quality goods in the dark, and in the absence of effective night lighting the evening would have been very dark indeed. There was a general assumption by the regulators that anybody going abroad at night was up to no good. There are prosecutions of "nightwalkers" throughout the records and repeated proclamations of ordinances such as this one from 15 August 1384: "a proclamation made against covines and conspiracies : against walking the City after 9 o'clock [at night], ... and against throwing rubbish into the Thames, the Walbroke, and the Flete."¹⁵⁹ Thus it seems that fripperers were guilty by association because of their trading hours.

Overall, recycling of materials would have minimised the solid waste disposed of, and was an activity carried out regularly. The authorities were concerned about these activities being carried on after dark, probably to avoid unscrupulous misrepresentation of old goods as new, and sale of stolen goods. It also links to a general suspicion of those abroad at night were up to no good, and the action taken against the fripperers shows that perhaps social order and crime prevention was valued more highly than reuse and recycling as an environmental management activity. The other important way the commercial sector contributed to reducing the environmental impacts of their activities was self-regulation by the guilds.

Trades involving metalworking generated smoke from furnaces and forges, and noise from hammering metal, resulting in complaints from neighbours (discussed in Chapter 3). Some of the trade guilds took steps to reduce the nuisance effect of their activities by imposing their own regulations. On 7 January 1300 the spurriers were taken to court for making illegal ordinances prohibiting working at night, although the record does not indicate the purpose of the ban on night work – it could be to avoid the nuisance from coal as with the smiths, or because of the poor quality of work done in poor light.¹⁶⁰ On 12 March 1299 the blacksmiths were prosecuted for making illegal ordinances including a

¹⁵⁸ Sharpe, *LtrBkE*, vii–viii.

¹⁵⁹ Sharpe, *LtrBkH*, 147.

¹⁶⁰ The reason that these guilds' ordinances were illegal was that the king had taken over governance of the city at this time, however the ordinances that they considered important to make in spite of the lack of jurisdiction tell us what they considered important –

prohibition on working at night “on account of the unhealthiness of coal... and damage to their neighbours”, but were acquitted because the ordinances were not prejudicial to the king.¹⁶¹

This was either not enforced or insufficient, because the blacksmiths are mentioned again nearly a hundred years later on 22 September 1394, when they presented the Mayor and Aldermen a new set of articles to address complaints. They were “oftentimes indicted at divers Wardmotes ... and warned to quit their houses, by reason of the great nuisance, noise, and alarm experienced in divers ways by the neighbours around their dwellings...” The proposed articles restrict the times of work to the period from 6am to 8pm from November to February and from daybreak to 9pm the remainder of the year.¹⁶² This move is clearly intended to address complaints about noise and coal smoke.

Activities by artisans, merchants and guilds that reduced environmental impacts, by reusing and recycling materials or making guild ordinances that reduced the environmental or nuisance effects of an activity were tolerated, encouraged or discouraged by the city depending on whether the activity conflicted with other objectives. Recycling by fripperers and those who refurbished goods provided a valuable service but was regarded with suspicion because of the potential for fraudulently passing off old goods as new. The evening markets where these goods were sold were actively discouraged, because of this potential for dishonest trading in poor light, and also the potential for fencing stolen goods and association with the criminal element. Self-regulation with the guilds was encouraged unless the guilds made these regulations without authority at times that the city was under the control of the king.

Conclusion

This chapter examined the response of the city in providing public health infrastructure for water supply and sanitation, and taking measures to manage the Thames and the associated fishery. In particular it looked at whether the city’s response to the recurring plague epidemics from mid-fourteenth-century. It also looked at private sector activities

¹⁶¹ *Early Mayor’s Court Rolls*. These ordinances were illegal because at the time that they were made, the city had been taken into the king’s hand.

¹⁶² Riley, *Memorials*, 538. Penalties for non-compliance ranged from 40d for a first offence to 13s 4d for third and subsequent offences.

that benefit the environment, using the fripperers and self-regulation by two guilds as examples.

The first clear evidence of the city taking action in response to what would today be recognised as a public health issue is the provision of a public water supply, the Conduit, providing piped water from Tyburn to a fountainhead in the city. While the stated purpose was to provide water “so that rich and middling persons therein might there have water for preparing food, and the poor for their drink.” this statement was made in 1345, more than 100 years after the conduit was established.¹⁶³ Despite this retrospective statement, even given that the Conduit was established at a time when population was booming, there is no way to prove that the driver was population pressure.

There is only circumstantial evidence of the Conduit being for public health reasons. The alternative source of water was the river, which was probably contaminated from discharges; or wells, which tended to be on private property, and possibly contaminated from nearby cess-pits. The Conduit would have supplied a small proportion of demand, mainly to those who lived near the fountainhead, but the records show ongoing use of the river by individuals and water-sellers. An alternative theory for the establishment of the Conduit is prestige. Keene concludes that providing clean water to a public conduit demonstrated the collective strength of the community and its concern for the poor.¹⁶⁴ A use of the conduit that supports the theory of adding to the prestige of the city is that during major celebrations such as the birth of the child who would be Edward III, the Conduit ran with wine.¹⁶⁵ The overall driver therefore may have been political.

The level of responsibility taken by the city seems to have varied from expecting households to provide labour for work on the Conduit to the collecting fees from well-off and commercial users and managing the infrastructure. Overall, there seems to be a movement away from users being directly responsible for, or being charge for, sanitation services, towards these being carried out by officials and funded from local taxes and fines. The city appointed officials with increasing responsibility for cleaning the streets

¹⁶³ Keene, “Issues of Water,” 178. This statement is made in *Memorials*, but the equivalent entry in the *Letter Books* does not state the purpose of the Conduit. Riley, *Memorials*, 225; Sharpe, *LtrBkF*, 128.

¹⁶⁴ Keene, “Issues of Water,” 179.

¹⁶⁵ Reginald Robinson Sharpe, *London and the Kingdom*, 138.

and disposing of waste, rather than simply ensure householders did so, is clear from the records. However, even in the early fifteenth century there seems to be a presumption that householders were responsible for maintaining the pavements, supervised by the pavoirs.

The Black Death and the series of epidemics that followed through the remainder of the fourteenth century seems to have inspired a gradual change to either the level of sensitivity to malodorous pollutants, or an increase in the actual levels. The latter would certainly have been the case during the epidemics, when resources would have been diverted to dealing with corpses and the redistribution of property and responsibilities. During the first and several subsequent epidemics, the king intervened and ordered a clean-up. The focus was on cleaning the streets and streams, and ultimately finding a location for disposing of butchers' waste in the least offensive way.

The case study on the management of the Thames demonstrates the effect of cultural factors on fish consumption and hence pressure on the Thames fishery. Responses were aimed both at ensuring that catching young fry and fishing during spawning times did not deplete the resource, and also that the competing use of the river for navigation was protected. This included campaigns to ban and remove kidels or weirs from the river. The level of intervention increased over time. Another case study on fripperers or recyclers of used goods and clothing also highlights conflicts between the city's role as protector of consumer rights not to be shoddy goods, and consumer demand for cheap goods. Fripperers were regarded with suspicion because of the potential to pass off used or stolen goods as new in the gloom of evening markets, and the potential association with criminals and undesirable nightwalkers.

CHAPTER 6: Environmental attitudes and the state of the environment in late medieval London

In the previous three chapters I have examined the evidence for the state of the environment in medieval London and how the environment was managed. I first examined whether environmental models currently used to manage the environment and assess and report on the state of the environment might be useful to assess the state of the environment in medieval London. It quickly became apparent that assessing attitudes toward the environment, both individual and collective, would be important in understanding the responses to issues.

After proposing a model and framework, I have evaluated suitable indicators for drivers and pressures on the environment, and regulations and complaints, particularly the Assize of Nuisance, as an indicator of both pressures and responses to environmental problems. I then assessed the public infrastructure and services and private activities serving to reduce environmental effects. Finally I assessed how the city managed the Thames, and in particular the conflicts between various uses. This chapter will review the findings and draw conclusions, where possible, about environmental attitudes and the state of the environment in medieval London.

Attitudes to the environment

To the mayor and sheriffs of London. Order, under a pain of 100 marks, to cause the place of Tourehulle to be cleansed and hereafter kept clean of dung, ordure and other filth, that by their default no harm or peril happen henceforward to any from the corruption and stench, by reason whereof the king need be wroth with them as having despised his command; as the king has learned by credible witness that the air upon Tourehulle is so tainted thereby as to strike the men dwelling all about and the passers by with disgust and loathing, and that great danger is acknowledged to arise therefrom to the nuisance of the said men and others there having their conversation or passing by and to the manifest peril of their life; and the king will no longer endure these grievous and intolerable defaults. By K [Edward III March 1372].¹

The quote above demonstrates that environmental pollution in medieval London was seen as a grave danger to health at various times. However, it would be a mistake to

¹ Close Rolls, Edward III: March 1372', *Calendar of Close Rolls, Edward III: volume 13: 1369-1374* (1911), pp. 365-369.
URL: <http://www.british-history.ac.uk>

judge sanitation in medieval cities by the same standards we would use to judge a modern city. As seen in Chapter 2, there is an on-going debate among researchers about the medieval state of the environment. It is essential to understand medieval attitudes to the environment to determine whether medieval London it was indeed a “filthy city”, with streets resembling open sewers and the pervasive stench of privies and butchering, or whether these conditions were documented because they were unacceptable deviations from normal reasonably sanitary conditions. Before returning to this debate and reviewing the evidence on the likely state of the environment, I will look at the attitudes of medieval Londoners to the environment.

Some researchers have proposed theories medieval people had a developing awareness of their environment. In a recent book Aberth suggests that the beginnings of the “environmental movement” can be traced back to the late middle ages. He postulates that people in the Middle Ages were increasingly harnessing nature and aware that their actions could shape and impact the environment, and that the “unprecedented ecological crises” of the early fourteenth century famine and mid-century Black Death would have demonstrated that “nature could make war on man”.² Aberth says this inspired a view of the environment that acknowledged human contribution to adverse environmental events.³ While it is clear from the rationale given for many of the ordinances and directives, as discussed below, that there was an awareness of pollution, to view this as the beginnings of an environmental movement may be retrofitting modern values onto medieval society.

Kleinschmidt stresses that attitudes to the environment are culture-specific and therefore differ in space and time, and to ignore this is to risk retrofitting present expectations and values onto past societies.⁴ Whyte proposes that the environment is “an important determinant in how societies developed” and that when environmental conditions

² Aberth notes that the middle ages were a time of increasing harnessing of nature including wind and water power, more intensive arable cropping and conversion of woodland wetland or waste land to agriculture, mining and quarrying of materials. John Aberth, *An Environmental History of the Middle Ages: The Crucible of Nature*, Abingdon: Routledge, 2013, 2, 7, 28–31.

³ *Ibid.*, 9.

⁴ Kleinschmidt, “Space, Body, Action,” 176. He also points out the risk of taking a Eurocentric approach, which is less of

change, societies adapt, often without conscious planning.⁵ An example of this would be increased remarriage rates after the Black Death, brought about not by conscious planning to increase the population but by greater prosperity removing some of the former impediments to early marriage.⁶ Rather than being “playthings of the environment”, Whyte sees societies in the past as being successful because of their ability to adapt by making changes in economy and society and by mitigating the worst effects of environmental downturn by developing new resources and through technological innovations.⁷

Looking specifically at urban environmental issues, Jørgensen concludes that medieval citizens could not help but be aware of their responsibilities for, and consequences of, their actions on the urban environment. She bases this on the responsibilities for street maintenance and waste disposal placed on residents and enforced by local authorities.⁸ She argues that, even though medieval people did not understand “public health” in a modern sense, they understood the need to provide clean water and keep the streets clean and free from waste in the public interest, although not necessarily for health reasons.⁹

With primitive waste management technology, a certain level of dirt would have been inevitable. Without modern street sweeping trucks, any simple mechanised method of cleaning the streets would leave a residue of the inevitable horse manure and dirt. In the absence of flush toilets, underground sewage systems and treatment plants, the use of gutters or kennels in the street was the most practical method of waste disposal and exposure to the sight and smell of waste would have been unavoidable. On the other hand, the contemporary understanding of the causes of disease placed the blame at the door of infected air and foul stenches.¹⁰ The documentary evidence of proclamations, directives, regulations and complaints is subjective, because what is regulated for and

⁵ Whyte, *World Without End?*, 2. 6.

⁶ Ole J Benedictow, *The Black Death 1346 – 1353: The Complete History*, Woodbridge, Suffolk: Boydell Press, 2004, 271.

⁷ Whyte, *World Without End?*, 31.

⁸ Jørgensen, “Cooperative Sanitation,” 566.

⁹ Jørgensen, “Urban Sanitation,” 6–7.

¹⁰ Aberth notes that the dissemination of works by Arab authors reinforced the connection between miasmatic or pestilent air and disease, and its origins in waste and “fetid places “. Aberth, *An Environmental History of the Middle Ages: The Crucible of Nature*, 14.

complained about, and the rationale given, is biased toward and reflects what was regarded as unacceptable and bad waste disposal practice at that time.

An important part of the analysis of the state of the environment therefore has been to try and assess attitudes to it, in order to interpret the documentary record. Without knowing the threshold of tolerance it is difficult to determine the state of the environment suggested by the complaints. For example, people today will complain to the council about discoloration of a stream from discharge of sediment-laden water, but there are no complaints from medieval Londoners about water that simply looked dirty. Complaints were usually about waste that smelt, such as dung, sewage or butchers' waste, or was regarded as unsavoury, in particular blood. Modern complainants often use the process to get back at a neighbour they have an on-going dispute with, and it is likely that medieval Londoners would use the complaints procedures in the same way, particularly in the Assize of Nuisance court. Complaints about breaches of a presumed right to privacy are common in the Assize records, whereas in modern times the presumption is of quiet, and equivalent complaints tend to be about noise.

The assessment of attitudes is somewhat tautological: the way complaints are expressed in the record reflects the contemporary attitudes, but without supporting information on the problem they were describing, here is no easy way of assessing either attitudes or whether the description of the problem truly reflected the state of the environment. The documentary sources do provide clues on attitudes to the environment in late medieval London. Evidence may include the language that is used to describe the environment, infringement of ordinances and penalties for doing so, and rationale given for measures such as cleaning the streets. Frequent proclamations to clean up the streets could be interpreted as an indication of an on-going waste problem, a response to intermittent waste build-up, or a frequent restatement of the goal of clean streets and an indication that a high level of sanitation was expected. Even if it were the latter, there is no way to be sure that this goal was achieved.

The only sources of corroborating evidence come from documentary and archaeological information on industries and waste management practices. These sources confirm that there was a large amount of waste from butchering animals, at specific locations; large

quantities of dung throughout the streets; and human excrement to be disposed of in cesspits or to flowing water. If not cleaned regularly, waste could build up quickly on the streets and in kennels if the flow was blocked or insufficient, as in periods of low rainfall. This enables some interpretation of the records to reveal attitudes.

First, pollution of one's living space by one's neighbours was considered to be unacceptable behaviour. The priority this is given is demonstrated by the establishment in the early fourteenth century of a special Assize of Nuisance court to deal with nuisance complaints expediently. Although the prime motivator was preservation of "quiet enjoyment" of private property, there is also an element of concern for public health, particularly protection from obnoxious smells that were thought to cause disease. This aspect of the nuisance complaints may have been underplayed in the court records because the court was not effects-based, it was established to deal with property issues and judged complaints against compliance with the very prescriptive Assize of Buildings ordinances. Focussing on those technical matters would increase the chance of a successful case.

Several court cases demonstrate that depositing waste, human or otherwise, in streets was not considered acceptable behaviour. That this behaviour was unacceptable is also demonstrated in the existing wardmote returns, where there are frequent complaints of people casting "ordure" into the streets. While the dangers of being hit by the contents of a chamber pot emptied from above may be an urban myth, Hanawalt points out the inconvenience of climbing down ladders from the third, fourth or even fifth story to use a public latrine or empty the slops, and cites cases of people falling from high windows while relieving themselves.¹¹ We often know about these cases because the victim was injured attempting to stop someone urinating or depositing waste in the street. Some of the victims were officials injured in the line of duty, but some were merely concerned passers-by.

Magnusson concludes that the first line of defence was public opinion, and several court cases support this view.¹² An early Mayor's court case indicates attitudes to public

¹¹ Hanawalt, *Growing Up*, 29.

¹² Magnusson, "Water and Wastes," 303.

urination: on 13 April 1307 Thomas Scott, groom of the Prince, accused Walter and his servant John of assaulting him when he wanted to relieve himself in a Lane, but the defendants claimed he attacked them when they told him that “it would be more decent to go to the common privies of the City to relieve himself.”¹³ In November 1364 Walter de Brokesheved, apprentice, was charged with assaulting William Bonet, constable of Baynard Castle Ward, who stopped him from emptying a handcart full of rubbish and filth into the Thames at the West Watergate of Baynard Castle. In December 1364, Beatrice Langbourne was accused of calling Simon de Worstede, Alderman, a “false thief and a broken-down old yokel” when he arrested her for throwing filth in the street.¹⁴ The vigour with which these cases were prosecuted suggests that disposing of waste in the streets was not tolerated.

Another attitude that comes through clearly from the records is that pollution of the environment by offensive substances was considered to sit alongside “pollution” by offensive behaviour. This is apparent in the extant wardmote returns, where most of the returns contain a mixed bag of complaints. The returns describe pollution-related public nuisance complaints alongside other types of public nuisance, such as prostitution, nightwalking and being a scold. Officials were concerned to maintain the king’s peace to avoid having limits imposed on their ability to self-govern. This was a priority because each of the kings from Edward I to Richard II had taken away the city’s liberties at some point, or threatened to. Disorder gave the king an excuse to reclaim the city governance. Therefore it was in the city’s interests to resolve conflicts, including through negotiated settlements between powerful factions.¹⁵ We have no way of knowing about informal arbitration, mediation and negotiation, only those that came to court because, presumably, an informal settlement failed.

Directives for clean-ups were often associated with directives to maintain the peace and remove groups seen as a threat to order. Pollution was associated with other forms of socially unacceptable behaviour, the type of behaviour that “contaminated” society,

¹³ *Early Mayor’s Court Rolls*.

¹⁴ Thomas, *CPMR Vol2*, 2, 6, 15. The CPMR also records that in December Beatrice Bassett was charged with calling Simon de Worstede, Alderman, “a thief,” when he told her not to put her refuse in the highway. However, it seems likely that this is the same case as that reported for Beatrice Langbourne, and illustrates one of the difficulties of tracing people and cases, as people often used two names and/or a nickname.

¹⁵ Hanawalt, *Of Good and Ill Repute*, 43.

either physically through risk of contagion such as the perceived risk of catching leprosy, or morally. An important part of demonstrating effective local rule was keeping the streets clean of these social and environmental nuisances. The links between stews, nominally bath houses, and prostitution introduces an interesting contradiction, and with the closing of the stews and the prohibition on bathing in parts of the Thames, public hygiene (assuming some of the stews did actually provide bathing facilities) would have taken a turn for the worse.

The king intervened in the city's control of nuisance both to promote royal dignity and out of concern that malodorous waste would cause disease. Directives to clean the streets of a major occasion involving a procession through the streets were at one end of the scale of intervention. Examples are the clean-up ordered before the visit of the Queen Mother or a royal funeral, such as before kings' funerals.¹⁶ Pageantry was an important aspect of demonstrating the city's exalted position, particularly pageantry to impress foreign dignitaries.¹⁷ To provide an impressive backdrop for pageants, London's streets needed to be clean, and clean streets were also a visual sign that the city was maintaining the king's peace.

At the other end of the scale were the directives associated with times of plague. The directives issued by the king to clean up the streets and to deal with butchers' waste explicitly documented his concern for "infectious air" and the failure of the city governors to deal with the problem. While the concern may have been to remove the odour, this required removing the malodorous substance, so was effectively a pollution clean-up. Hanawalt states that experience with famine earlier in the fourteenth century would have led people to believe that the initial plague epidemic was a one-off and that the problem would resolve itself.¹⁸ However, after 1361 when plague returned, their attitudes would have changed, and it is from this time that there are more intensive efforts to keep the city clean. Over time, attitudes to streams changed, the Walbrook first being protected then designated as a sewer and bricked over.

¹⁶ For example in 1422, prior to Henry V's interment on 7 November an order was made to clean the streets for the funeral procession. Sharpe, *LtrBkK*, 2.

¹⁷ Barron, *London in the Later Middle Ages*, 9–10, 16, 18.

¹⁸ Hanawalt, "London's Poor," 1084.

Having clean drinking water was regarded as sufficiently important to provide the Conduit, and this may represent an early demonstration of understanding the link between water and disease. Magnusson believes that late medieval people were aware of the connection between pollution and ill-health and cites an example of a complaint in 1374 about contaminated water making Katherine Bishop “deathly ill” and an inspection of the London Conduit in when it was “slandered for poison”, probably associated with the outbreak of plague in 1349.¹⁹ However, when people became aware of the devastating impact of the plague and their powerlessness to stop it, they cast about for someone or something to blame. For example, in Savoy after the outbreak of the Black Death, Jews were tortured into confessions of well-poisoning.²⁰

While depositing waste in streets and public places and poor management of malodorous waste was a concern, disposal of waste by flushing or dumping in streams to be carried away by the Thames was regarded as best practice. The attitudes of medieval Londoners to water were contradictory, for while rivers were considered the ultimate sink for pollution, they were also a source of food and drinking water and charitable giving of water was highly regarded. There is very little recognition of these conflicts in the documentary sources, other than in the management of the Thames.

Control of the Thames was granted by charter from the king, since the time of the Magna Carta. The public had access to the river as of right, and the records show numerous prosecutions of people inhibiting or charging for access. The Thames was used extensively for drawing water and bathing, as shown by deaths from drowning in the coroners’ rolls and from attempts made to ensure that access to the river was not impeded by illegal or unsafe structures. Edward III banned bathing in the Thames shortly after the first plague epidemic. While this was probably because bathing was considered to increase the risk of plague, it is clear that rights to the river were granted by the king and could be revoked. That the king’s jurisdiction was regarded as extending into the river is illustrated by a charter of Matilda, wife of King Henry I granting the Prior and Canons of Christ Church, London the Gate and Soke of Aldgate. The jurisdiction and

¹⁹ Magnusson, “Medieval Urban Environmental History,” 302.

²⁰ John Aberth, *The Black Death: The Great Mortality of 1348-1350: a Brief History with Documents*, Boston: Bedford/St Martins, 2005, 145.

extent of the grant is expressed in a description of the Soke at Smithfield as “down to the Thames, as far into the water as a horseman at low water, riding his destrier into the water, can cast his lance into the water”.²¹

Management of the Thames was granted by charter to the city of London and as seen in Chapter 5, the charters become increasingly specific over time in the requirement to manage the resource to prevent destruction of fry and disturbance to spawning. When it comes to regulating the fishing on the Thames, the attitudes are much clearer as the rationale is stated in the ordinances and directives. Fishing weirs and structures were outlawed because they interfered with navigation, the economic necessities of transport and trade over-riding a public right to fish. The freshwater fishing resource was considered a sufficiently important part of the king’s estate to be listed in the Domesday Book, although there are no records for London.²² Fishing was carefully controlled to avoid depleting the resource by limiting net size to prevent catching small fry and thus the resource. Times of year were also regulated to avoid interfering with spawning, likewise to conserve this fishing resource.

As this analysis shows, it is clear that medieval Londoners had aspirations for clean streets free of foul odours, and that waste would be washed rapidly down the gutters to the Thames. Accumulations of malodorous waste, or discharges of this waste in a way that created nuisance, was seen as causing disease according to the medical theories of the day. Occasional proclamations suggest that these conditions were not always met, and as discussed in Chapter 5, certainly during the height of plague episodes, city cleaning resources would have been diverted to burial of the dead and court resources to settling their estates. Likewise complaints to the Assize of Nuisance court suggest that householders sometimes created environmental nuisance that impacted on their neighbours. These proclamations and complaints are relatively rare, and this could be interpreted as either meaning that conditions were otherwise satisfactory, or that conditions were filthy all the time and that it was only during times of stress, in particular

²¹ Sharpe, *LtrBkH*, 46. “*cum toto campo de Smethfeld usque in Tamisiam tam profundo in aquam quamprocul eques in recessu aque super dextrarium in aquam ingressus potest lanciam in aquam iaculari*” Sharpe, *LtrBk C*, 224–5.

²² Dolores M. Wilson, “Resources, Roles and Conflict Active Resource Management in the Anglo-Norman Kingdom” University of Houston, 2003, 76–78, <http://dolly.jorgensenweb.net/files/DollyJorgensen-MasterThesis.pdf>.

plague, that city officials were forced to deal with the problem. The debate on how to interpret the documentary evidence is set out in Chapter 2. The next section will analyse the likely state of the environment in medieval London, using the modified environmental reporting framework developed in Chapter 3.

Assessing the state of the environment

In order to make sense of the information that is available on the medieval London environment, I adapted current environmental reporting models to start with pressures on the environment and apparent responses to environmental issues and work back to what the issues were and what the state of the environment may have been, using a modification of a Driver-Pressure-State-Impact Response (DPSIR) model. These models are usually used to monitor the effectiveness of responses such as environmental levies or stringent environmental conditions on activities, through monitoring the state of the environment. After considering a model proposed by Boyden and adapted by Hoffmann, I have inverted the model to provide a framework for understanding the medieval environment, and as far as I am aware, nobody has looked at DPISR models in the context of the medieval environment.

In examining models for assessing the overall state of the medieval London environment and the way it was managed, it became quickly apparent that models used for assessing current environmental issues require far more information than could ever be discovered for the medieval environment. It was necessary to design a model that best utilised the information available. Documentary sources focus on responses, that is the regulation of activities with potential environmental or human health impacts. In particular, the Assize of Nuisance, a documentary record of the special court hearing private nuisance complaints about neighbours, is a rich source of information on neighbourhood relations and local environmental issues. The set of ordinances that establish the court and govern the type of complaints brought to it, the Assize of Buildings and Nuisance, also suggest the type of issues that regularly caused strife.

Court records can also give an indication of which activities were carried out regularly. For example, frequent mention in the primary sources on restrictions on the activities of “fripperers” (dealers in second hand clothing, furs and other goods) suggest that reuse and recycling of everyday items was common. Lilley suggests that the surviving

documents, relate to the activities of elites and is therefore “socially uneven”.²³ However, this is not entirely true, as many of those appearing at the Assize of Nuisance were ordinary landowners, and the wardmote records indict ordinary inhabitants of the wards for antisocial behaviour, as do other court records for minor offences, and in particular the prosecution of the fripperers who were ordinary Londoners.

The documentary evidence is supplemented with archaeological evidence, for example excavations have shown that large areas adjacent to the Thames and wetland areas were “reclaimed” by infilling with general waste, and that building materials were frequently re-used in new buildings. Archaeological excavations of tenements can also provide information on land use, on how crowded living conditions were, and the sanitary arrangements such as number and location of privies.

While the documentary and archaeological sources can give some idea of living conditions and how the authorities dealt with problems that had an environmental component, any assessment of the actual state of the environment requires a great deal of extrapolation and reading between the lines. In order to examine the medieval environment, an analytical framework needs to take account of the information available. As stated above, models used for assessing the current state of the environment require a great deal of information on pressures on the environment, the state of the environment itself, and the responses. For medieval environments, we have some information on pressures, from the concentration of people in a small area, the total number of people, and their likely activities. We have information on how those activities were controlled, and responses that we assume were intended to address environmental issues, although this may have been an unintended consequence of measures imposed for other reasons such as city defence or civic pride.

The paucity of information on the environment rules out using a traditional pressure-state-response model, or adaption taking account of feedback and the effectiveness of responses. There is too much guesswork involved in assessing the actual state of the environment to provide any meaningful assessment of either the state or the effectiveness of responses. Also, these frameworks are best suited to assessing the

²³ Lilley, *Urban Life*, 33.

changes over time in a selection of environmental indicators that can be measured, and determining if this is in response to changes in pressures on the environment or effective abatement measures. In addition, the pressure-state-response model leaves out a very important contribution to the state of the environment. Environmental attitudes are much more important than technologies in determining the state of the environment.

It is inevitable that any human activity will have an effect on the environment, from depletion of resources, effects of extraction and use of those resources, and discharges from people and their activities. The more concentrated those activities, the more concentrated the effects. Although by modern standards medieval cities were small, they were relatively densely populated. Medieval technologies were sufficient to supply not only the necessities of life, but also luxury items. However, pollution abatement technologies were primitive, generally comprising disposal of waste to the nearest water course, unregulated burial within the city or use as fill. Recycling of building materials, clothing and other items was common, judging by the regulations made governing these activities.

The modified environmental framework uses indicators of the drivers that result in environmental pressures, the resulting activities that impact on the environment, and the responses either to environmental impacts or to other factors, but which have an environmental outcome. These factors can be used to give an indication of the state of the environment. The key drivers in medieval London were economic, social, cultural and political. Political drivers usually resulted directly in a response such as a clean-up to persuade the king that the city was being well managed by its citizens. Economic activity in combination with population resulted in pressures on the environment from a demand for resources, and disposal of waste, particularly from livestock and industry. Total population resulted in problems of disposal of human waste, and population density created environmental and social problems as a result of crowding.

As discussed in Chapter 4, complaints about private nuisance were heard at the Assize of Nuisance court, and an analysis showed that complaints were largely about building-related matters, particularly disputes about ownership and responsibility for walls and encroachments. There were very few complaints about waste, and these mainly related

to cesspits too close to the boundary, stinking privies or blocking of gutters carrying away wastewater. Taken together they do not indicate a widespread problem, and do not show any correlation with plague years. Stormwater complaints do not show any correlation with known wet periods, and while complaints decrease from the mid-fourteenth century, they do not show a dramatic drop after the first plague episode.

Complaints from the only surviving wardmote returns of 1421-22 and 1422-233 give an indication of the range of local problems, mixing public nuisance complaints relating to waste with those relating to undesirable inhabitants and undesirable behaviours. The handful of complaints from each ward, which on average would have each had around 2,000 inhabitants, do not represent a major local problem. These complaints are probably the tip of the iceberg of the more recalcitrant infringements, as it is likely that most of these issues would be dealt with informally by the aldermen and ward officials. That there are so few from each ward suggests that local problem resolution was mostly successful.

The key drivers were used to determine pressures on the environment. Some of the pressures could be quantified, such as the likely quantities of human and animal waste, and by assessing the technology available to deal with this waste it can be determined that it is likely that on-site disposal could have put groundwater at risk of polluting wells. Discharge directly onto the streets would have resulted in a clean-up problem, at first the responsibility of the householders and later of the rakers, but even if the streets were cleaned regularly there would be a residue of filth on the cobbled streets. This would be unpleasant in wet weather, and in dry weather or if poorly maintained waste would probably build up in the kennels designed to carry the waste to the river. It is clear that medieval Londoners' regarded flowing water as a convenient medium for disposing of waste.

Streams and streets were both regarded as a part of the liquid waste disposal system, and there were frequent directives to keep them clean. If solid waste had been allowed to accumulate, it is likely that flow would be blocked and malodorous waste would have built up very quickly. Smaller rivers like the Fleet and the Walbrook streams may have

become foul, particularly at summer low flows.²⁴ It is not clear the extent to which the Thames would have been polluted, because it is a large fast-flowing river, probably able to assimilate both ongoing discharges and the highly polluted first-flush stormwater arising from rainstorms after a dry spell. Whilst the pollutant loading would be high, there would also be high flows to dilute it, and the system relied on frequent flushing with stormwater.

The activities most likely to impact on environmental quality were slaughtering by butchers, and the construction of privies over watercourses. The privies over the Thames do not seem to have caused a problem, as the river was large and fast-flowing. However those on smaller streams would have caused problems with direct discharge of contaminants, blocking of the flow, and in combination with the waste discharged into the kennels in the streets, would have created a stench. Those over the Walbrook were allowed, then banned, then allowed under licence, and finally banned altogether. Finding a place to dispose of butchers' waste was problematic, and it would have caused serious water quality and odour problems if not disposed of carefully. The location selected soon caused complaints, linked to concern for the health of the prisoners in the Fleet prison. The butchers were eventually banned from the city, but this caused the price of meat to rise, and they were finally allocated a place on the banks of the Thames where they could cut up their waste and dispose of it in the centre of the river at ebb tide. This seems to have resolved the problem.

Having an environmental management system in place would increase the chances of the environment being reasonably health, and of responses directed at the cause of the problem. While there was no formal environmental management system in place, there were clearly aspirational goals for clean streets and stream, as well as controlling odour, and retaining self-governance. The sporadic survival of the records makes it difficult to assess whether there was a co-ordinated plan in place to achieve these goals. If there was anything that could be called a plan it was the combination of making ordinances, enforcing them through officials, providing access to courts for complaints, from citizens,

²⁴ During summer low flows, not only would dilution of discharges be less than at high flows, the solubility of oxygen in water is lower at warmer temperatures, and the combination of these factors mean that oxygen-depleting organic wastes would produce anaerobic conditions quicker.

a hierarchical structure starting at the informal wardmote level through civic courts and the ultimate authority of the king, who intervened on several occasions.

Analysis of the matters covered in the Assize of Buildings suggests that the reasons for establishing it, and the later special court, were to protect property values and people's rights to freely enjoy their property, as well as to provide an avenue for addressing social conflict. Property rights were threatened by not only the activities of neighbours, prohibiting their neighbours from building, encroaching onto their land, allowing party walls to fall into disrepair, but also diverting stormwater onto neighbours' land and, discharging waste onto their land, and building cess-pits too close to the boundary. It is likely that prior to the establishment of the special Assize of Nuisance court, these cases were heard in the Mayor's court or the Husting, however by 1300 the workload of these courts may have increased to the point where a special overflow court was required to speedily deal with such cases. Judging by some of the other cases brought to the Mayor's court, a delay in dealing with conflict between neighbours could result in people taking the law into their own hands, with potentially tragic results. The ordinance governing the Assize requires that complainants be given a hearing within a week of making their complaint at the Husting.

A second priority was keeping the streets clean and passable. This involved either collecting waste and removing it to land disposal, or flushing it into streams. Householders were responsible for the streets outside their tenements and the wardmotes appointed officials to make sure the streets were clean, and from the latter part of the fourteenth century, officials undertook the streetcleaning. A third priority was the need to keep streams clean and flowing. This required a trade-off with the need to dispose of waste, as and fast flowing streams could carry waste away without the expense of carting it away.

There were undoubtedly times when the streets of London were unbearably filthy, but these were the times when extraordinary external pressures were operating. They were running with muck, as suggested in Dan Snow's television programme "Filthy Cities". There are several times, in the fourteenth century, when there were no complaints heard by the Assize of Nuisance court and there was known to be pestilence in the city. In

discussing the plague, Kelly states that medieval cities were “drowning in filth” and quotes Petrarch as describing Avignon as “a sink overflowing with all the gathered filth of the world”.²⁵ Francois Villon described the streets of Paris as a foul smelling slime with garbage, sewage and offal discharged into the street.²⁶ However, the main issues reported as shown in Chapter 5 are at times of plague, and the remainder of the time, it seems that the level of waste and pollution was reasonable, given the low level of technology available to deal with it, and deviations from this were not well tolerated.

The need for further work integrating data sources and disciplines

In an overview article on environmental history written in 2008, Arnold notes that, despite “growing interdisciplinarity”, there is insufficient integration of documentary and scientific evidence, and assessments of how reconstructed medieval environments shaped cultural identities. She sees a need to broaden traditional medieval disciplines and research questions to include both ecology and environmental history.²⁷ Likewise Magnusson, in a recent article, laments the lack of both scholarly and generalist publications that provide an “integrated synthesis of the textual and scientific evidence” for medieval urban environments. She sees the study of medieval waste management as having potential as a testing ground for theoretical models which may provide new insights into cultural attitudes and practices associated with medieval hygiene.²⁸ Hoffmann proposes that assessing the volume and flow of waste from medieval cities into their surroundings and the extent of the effects of these discharges should have high priority for future historical research. He sees this as a priority for locations with abundant administrative records such as Italian cities, Paris and London.²⁹

²⁵ John Kelly, *The Great Mortality: An Intimate History of the Black Death, the Most Devastating Plague of All Time*, New York: Harper Collins, 2005, 64, 146.

²⁶ Aubrey Burl, *Danse Macabre: François Villon, Poetry and Murder in Medieval France*, Stroud: Sutton Publishing, 2000, 10. Aubrey Burl, *Danse Macabre: François Villon, Poetry and Murder in Medieval France*, Stroud: Sutton Publishing, 2000, p10.

²⁷ Ellen F. Arnold, “An Introduction to Medieval Environmental History,” *History Compass*, 6: 3 (2008), 902–903.

²⁸ Magnusson, “Medieval Urban Environmental History,” 189–91, 203. Magnusson also notes the lack of research on the impact of natural disasters on medieval towns and the urban responses to them, apart from abundant research on the Black Death.

²⁹ Hoffmann, “Footprint Metaphor,” 312.

In this study I have attempted to address some of these issues. Although I have relied on material that has been published or made available on-line, there is a considerable amount of information on the medieval London environment scattered throughout these sources. Even within this body of material, further information may be available from sources such as the coroners' rolls that I have not fully interrogated, other than for deaths of people using the Thames.

Further systematic mining of the data contained in these records would be highly productive, even though Hanawalt notes that the coroners investigated homicides and other deaths that occurred outdoors, not deaths that occurred in houses.³⁰ To extend the study to later time periods would require access to the Journals of the courts, which are currently not published or available on-line. The entries in the Letter Books in the period after the Journal are much briefer and less informative than earlier periods. A possible approach to extracting information from the huge body of records is the use of text mining techniques. This method has been used to make a searchable version of the Sessions Records of proceedings at the Old Bailey and Guildhall from the sixteenth century accessible to the public.³¹ I assessed text mining for analysing the Assize of Nuisance court records, but concluded that extensive work would be required to produce useful results, and for my purposes using multiple keyword queries in an Access database was more efficient.

My analysis has focussed on official documents, in particular court records of ordinances, directives and complaints about environmental nuisance. A further possible source of information is contemporary chronicles and literature. However, chronicles tend to focus on events and people rather than the physical environment. Each chronicle will be influenced by the prevailing political view at the time it was written, and surviving chronicles tend to support the regime in power at the time. For example, the *English Chronicle* for 1377 to 1461 is strongly Lancastrian in tone until 1437, blaming Richard II's

³⁰ Hanawalt, "London's Poor," 1078.

³¹ <http://www.oldbaileyonline.org/>The text has been imported into Zotero and then exported to Voyeur Tools for analysis. I have trialled Voyeur <http://voyeurtools.org/> to analyse the *Assize of Nuisance* records but the time required to remove frequently occurring names like William and John, titles, locations etc meant that it was quicker to import the information to an Access database and use multiple keyword queries. Voyeur is currently in the beta stage of development, later versions may have more functions. www.hermeneuti.ca/voyeur

poll tax for “grete myscheefe and much diseas to all the communez off the reame”, and the later part is strongly Yorkist. The chronicle tends to record events without context. For example the *English Chronicle* mentions a “grete erthequake” in 1382, but does not give any sense of damage or loss of life, and in 1301 a scarcity of corn but gives no further information. It tells us that in 1391 “mony worþi men off Englonde died of the fflix”, a scant reference to a plague year.³² While chronicles such as this contain snippets of information, they tend to focus on events and seldom suggest causality or mention the state of the environment.³³ To extract information from chroniclers such as Henry Knighton and assess the extent of any bias is beyond the scope of this study. contemporary writers like Langland discuss moral laxity in society, but a comparative review of the available literature and chronicles of the period is also beyond the scope of this study.³⁴

As discussed in Chapter 2, both Magnusson and Jørgensen propose further publications examining the environment of the late medieval period and addressing the myth that medieval urban environments were filthy. It is a question that will never be fully resolved, but with the use of text mining techniques and further integration of documentary and archaeological sources, we may come closer to understanding the environment medieval Londoners lived in and their attitude to it.

³² National Library of Wales and Bodleian Library, *An English Chronicle, 1377-1461: Edited from Aberystwyth, National Library of Wales MS 21068 and Oxford, Bodleian Library MS Lyell 34*, ed. by C. William Marx, A new ed, Medieval Chronicles 3 Rochester, NY: Boydell Press, 2003, xiv, 5. In this context, “diseas” refers to a state of discontent rather than illness.

³³ While I have used the chronicle of Froissart for general background and descriptions of events, he does not mention the environment, and for example does not discuss the Black Death, breaking off the chronicle during the year of the first outbreak and resuming it with the resumption of hostilities in the war with France. Froissart, *The Chronicles of Jean Froissart, in Lord Berner’s Translation*.

³⁴ Faye Marie Getz, “Black Death and the Silver Lining: Meaning, Continuity and Revolutionary Change in Histories of Medieval Plague,” *Journal of the History of Biology*, 24: 2 (1991), 274.

Appendix 1: The Assize of Buildings

The following list of ordinances is reproduced from the *Liber Albus* (pages 223 on).¹ The entire list of ordinances from the *Liber Albus* has been reproduced re-ordered into more relevant subject groupings. The full text of the most relevant ordinance has been reproduced under the relevant heading in italics and indented. The numbers in square brackets refer to the page numbers in the *Liber Albus* on which the full text of the ordinance appears. The headings of the sections within the Assize are a useful indication of Carpenter's views on the purpose of the Assize. Despite the level of specificity of some of the ordinances, the Assize of Buildings has no provisions for noise or discharge to air (smoke, dust) nor does it restrict dumping onto the street, streams or public places. The Assize of Nuisance court sometimes dealt with such public nuisances even though they were beyond the scope of the Assize of Buildings.

Of allaying Contentions as to Assizes of Buildings.

In the first place, that contentions as to such Assizes ought to be allayed [276].

In the year of our Lord 1189, in the first year, namely, of the reign of the illustrious King Richard, Henry Fitz-Elwyne (who was the first Mayor of London) being then Mayor, it was, by the more discreet men of the City [thus] provided and ordained, for the allaying of the contentions that at times arise between neighbours in the City touching boundaries made, or to be made, between their lands, and other things; to the end that, according to the provisions then made and ordained, such contentions might be allayed.

The Order of proceeding in Assizes of Buildings between neighbours in the City of London; and of Nuisances as to Buildings.

Also, that twelve Aldermen shall be entered in full Hustings, to attend in faithfully carrying out the Assize, [and] upon summons of the Mayor to appear [277].

And the said provision and Ordinance was called an 'Assize.' To prosecute which Assize, and carry the same into effect, twelve men were elected, 'Aldermen of the City, in full Hustings; and were there sworn, that they would attend faithfully to carry out the same, and at the summons of the Mayor to appear, unless by reasonable cause prevented. It was necessary however that the greater part of the twelve men aforesaid should be present with the Mayor in carrying out the matters aforesaid.

Also, that he who shall wish to demand the Assize ought to demand it in full Hustings; and that if the defendant shall erect any building during the time of such petition for the said Assize, such defendant shall be immediately forbidden, at suit of the petitioner, to proceed any further with such building [277].

It should be known, that he who demands the Assize must demand it in full Hustings; and the Mayor shall assign him a day within the next eight days, for such Assize by the twelve men aforesaid, or the greater part of them, in manner already mentioned, to be determined.

... And if, notwithstanding such prohibition, any carpenters, stonemasons, or other workmen, or even the owner of the said building, shall persist in so building, they shall be sent to prison.

¹ Carpenter, *Liber Albus*.

Also, that if any person shall find it necessary to demand the Assize, such Assize shall be granted unto him gratuitously at a Congregation of the Mayor and Aldermen, if in the meantime the Hustings be not held [278].

Inspections

Also, that the Mayor, with the twelve men summoned thereunto, shall visit the tenements of the persons between whom the Assize is demanded, and upon view of the twelve men aforesaid, or the greater part of them, may settle such matter; after hearing on the one hand the case of the complainant and on the other the answer of his adversary [281].

Privies: Of Necessary-chambers in houses

Also, of necessary-chambers in the houses of citizens [280].

Also, concerning necessary-chambers in the houses of citizens, it is enacted and ordained, that if the pit made in such chamber be lined with stone, the mouth of the said pit shall be distant two feet and a half from the land of the neighbour, even though they have a common stone-wall between them. But if it shall not be lined with stone, it ought to be distant three feet and a half from the neighbour's land. And as to such pits, the Assize is afforded and granted unto everyone who shall demand the same, in reference as well to those of former construction as to new ones, unless the same should happen to have been made before the provision and Ordinance aforesaid, which was enacted in the first year of the reign of King Richard, as already mentioned. Provided always, that by view of such twelve men as are before-mentioned, or the greater part of them, it shall be discussed whether such pits have been reasonably made or not. 'In the same manner, proceedings must be taken where disputes arise as to any kinds of pits made for receiving water, whether clean or foul.

Windows : Of the Obstruction of the View from windows.

Also, that a neighbour may obstruct the view from another's windows, by building opposite to such windows [280].

Also, if any person shall have windows looking upon his neighbour's land, although he may have been for a long time in possession of the view [281] from such windows, and even though his predecessors may have been in possession of the windows aforesaid, nevertheless, his neighbour may lawfully obstruct the view from such windows by building opposite to the same, or by placing [anything] there upon his own land, in such manner as may unto him seem most expedient; unless the person who has such windows, can shew any writing by reason whereof his neighbour may not obstruct the view from those windows.

Stormwater: Of Stone-walls and Rain-gutters.

Also, where a person has a stone wall of his own, sixteen feet in height, his neighbour must make a gutter under the eaves of the house that is situate upon such wall, and receive in it the water falling from the said house, etc., in such manner, etc [279].

If any person shall have his own stone-wall upon his own land, of the height of sixteen feet, his neighbour ought to make a gutter under the [280] eaves of the house that is situate upon such wall, and to receive in it the water falling from the said house, and lead it on to his own land, unless he can carry it off into the highway ; and he shall, notwithstanding, have no interest in the aforesaid wall, when he shall have built [a wall] beside it. And in case he shall not have so built, he still ought always to receive the water falling from the house built on such

wall upon his own land, and carry it off without damage of him unto whom the wall belongs.

Also, that the neighbour of another person may build upon his own land, notwithstanding the fall of water [thereon] from the middle of his neighbour's house; provided that the person so building carries off the water falling from the said house without detriment to such neighbour .[286].

Also, that although the gutter of any one shall discharge itself into the gutter of his neighbour, such neighbour shall not stop up his said gutter, etc. [286].

And if a person's rain-gutter shall discharge itself into the gutter of his neighbour, or shall run through the middle of his tenement, such neighbour may not stop up such gutter; and even if he shall pull down that house, and shall think proper to build it anew, he shall still be bound to receive upon his own land the water falling from such gutter, and carry off the same, as before he used to do: but it must be fully understood by the men of the Assize that the water discharged by such gutter was so received and carried off.

Buildings and Walls

Also, that when it happens that two neighbours shall wish to build [a wall] between them of stone, each of them shall give a foot and a half of his own land, etc.,—in manner contained in the Chapter thereon made [278] .

Also, that if any person shall wish to build [a wall] of stone, according to the Assize, and his neighbour through poverty cannot, or perchance will not, then ought he to give unto him who shall so desire to build by the Assize, three feet of his land; and the other shall make a wall upon that land at his own cost, three feet in thickness [279].

Also, that this Assize shall not be granted unto any one, whereby any doorway, inlet or outlet, or shop, shall be narrowed or restricted, to the annoyance of a neighbour [279].

Also, that this Assize is granted unto anyone who shall demand it as to the land of his neighbour, even though such land shall have been built upon, [provided the wall so built is not] of stone . . . [279].

Also, that no one of those who have a common stone wall built between them, may or ought to pull down any portion of his part of such wall, without the assent and will of the other [280].

*When it happens that two neighbours wish to build between themselves a stone-wall, each of them ought to give one foot and a half of his land; and so at their joint cost they shall build a stone-wall between them, three feet in thickness and sixteen feet in height. And if they wish, they shall make a rain-gutter between them, at their joint cost, to receive and carry off the water from their houses, in such manner as they may deem most expedient. But if they should *[not] wish so to do, either of them may make a gutter by himself, to carry off the water that falls from his house, on to his own land, unless he can carry it into the King's highway.*

They may also, if they agree thereupon, raise the said wall, as high as they may please, at their joint cost.

And if it shall so happen that one wishes to raise such wall, and the other not, it shall be fully lawful for him who so wishes it, to raise the part on his own foot and a half as much as he may please, and to "build upon his part, without damage to the other, at his own cost; and he shall receive the falling water in manner already stated.

And if both shall wish to have arches, such arches must be made on either side, of the depth of one foot only; that so the thickness of the wall lying between such arches may be one foot. But if one shall wish to have an arch, and the other not, then he who shall wish to have the arch shall find free-stone, and shall cause it to be cut, and the arch shall be set at their joint expense.

And if any one shall wish to build of stone, according to the Assize, and his neighbour through poverty cannot, or perchance will not, then the latter ought to give unto him who so desires to build by the Assize, three feet of his own land; and the other shall make a wall upon that land, at his own cost, three feet thick and sixteen feet in height; and he who gives the land shall have one clear half of such wall, and may place his timber (Either the joists for flooring, or the wood for the superstructure and roof) upon it and build.

And they shall make a gutter, to receive and carry off the water falling from their houses, in such manner as is before mentioned as to a wall built between neighbours at their joint expense. But it shall always be lawful for one desiring so to do, to raise his own part at his own cost, without damage to the other.

And if they shall wish to have arches, they shall make them on either side, in manner already stated. But nevertheless, he who shall have found the land, shall find the free-stone, and shall have it cut; and the other at his own cost shall set the same.

But this Assize is not to be granted unto any one, so as to cause any doorway, inlet or outlet, or shop, to be narrowed or restricted, to the annoyance of a neighbour.

Building

Also, that no one may remove corbels placed in his neighbour's wall, without leave of his said neighbour [281].

Also, that any one may impede the building of his neighbour, if being built to his own detriment, after giving the Sheriffs of the City surety and pledges that he will prosecute [281].

Also, that when a person has corbels or joists to support his solar built on the summit of a neighbour's wall,—for all that he has such corbels there, etc., he may not have or demand any right in the aforesaid wall without the consent of him to whom the wall belongs that is so built upon on the summit [282].

Also, where a person owns only one part in a wall, and his neighbour owns two parts in such wall, he who owns the one part only may build as freely upon the said wall as he who owns the [other] two parts [283].

Also, that houses shall not be covered with straw or stubble; and that everyone who shall have a stone wall upon his own land, sixteen feet in height, shall possess the same as freely and meritoriously,—it being always the duty, that is to say, of such man's neighbour to receive upon his own land the water falling from the house upon such wall so built upon his land, etc [284].

Also, of a person building the whole of a wall upon his own land, etc [285].

Defaults, summonses, and procedural matters

Also, that if the party complaining shall make default, his adversary shall depart without day, and the pledges of the complainant shall be amerced; and if he against whom complaint is made shall make default, nevertheless, the Assize shall proceed [282],

Also, that the Assize of nuisance shall not proceed, unless it shall be testified that he against whom the Assize is demanded, has been summoned [283].

Also, that if the person demanding the Assize shall appear, and the twelve men of the Assize, or the greater part of them, together with the Mayor, and summons of the defendant shall be testified by the Sheriffs, the Assize shall proceed [283].

Also, that if it shall be testified by the Sheriffs that he against whom the Assize is demanded was not in the City at the time of summons made upon him, the Assize shall stand over, etc., as contained, etc. [283].

Also, of continuing the Assize [284].

Also, that when the parties appear upon the land as to which the Assize is demanded, and one of such parties alleges the existence of a deed from him who demands the Assize, or etc., a day shall be given unto him who alleges the existence of such deed, upon that day fortnight, etc., upon which day he may essoin, etc. [285].

Appendix 2: Wardmote Articles and Inquests

The Wardmote Articles are set out in the *Liber Albus*, and following the convention in Appendix 1, the headings of relevant articles are reproduced in this appendix, and the full text of the most relevant, with page number in the *Liber Albus* containing the full text in square brackets next to the text.²

Wardmote Articles:

Of keeping the Peace

In the first place, that the peace of God and Holy Church, and the peace of his lordship the King, be strictly kept between clerks and laymen, rich and poor, in common.[289]

Dung etc. into streets

Also, that no one shall place dung or other filth in the streets or lanes; but cause the same to be taken by the rakers to the places ordained [289].

Item, that no person throw straw, dust, dung, 'sawdust, or other refuse, into the streets or lanes; but cause the same to be taken by the rakers or others to the places ordained for receiving such dirt, under penalty of two shillings [to be paid] unto the Chamber.

Rakers

Also, that the men of every Ward shall have rakers sufficient for cleansing the Ward of divers refuse [289].

Item, that they have rakers sufficient for cleansing the Wards of divers refuse; and order the constables, with the bedel, to help them to collect their salary from the folks of the Ward.

Livestock

Also, that no persons shall rear swine, oxen, or cows in their houses, within the franchise, under pain, etc [289].

Item, that no persons rear swine, oxen, or cows, within their houses, under of forfeiture thereof unto the Chamber.

Fire prevention

Also, of making furnaces [287].

Also, that no one shall make any chimney, except of stone, tiles, or of plaster [288].

Also, that all persons who dwell in great houses shall have a ladder or two, for avoiding danger by fire.[288]

Also, that all who occupy such houses, shall have in summer-time, and especially between the Feasts of Pentecost and Saint Bartholomew, a barrel full of water, for quenching such fire, if one should chance to happen [289].

Also, that no house within the franchise shall be otherwise covered than with lead, tiles, or stone [289].

Also, that the reputable men of the Ward, with the Alderman, shall provide a strong crook of iron, etc [289].

² Carpenter, *Liber Albus*.

Obstructing streets

Also, that no stalls shall project beyond the house to a greater breadth than two feet and a half [290].

Also, that the penthouses shall be so high that men can easily go and ride beneath the same [290].

Also, if any oven, furnace, or reredos is defective ; and if they use other fuel than wood or charcoal [291].

Item, if there is any oven, furnace, or defective reredos within the Ward, whereby it is likely that there may arise misadventure by fire; or if any persons use other fuel than wood or charcoal, against the Ordinance of the City.

Wardmote Inquisitions:

The subject matter of the inquisitions were largely a re-statement of some of the wardmote ordinances. They show the close connection made between pollution and disorderly behaviour.

You shall present if the peace of his lordship the King has been broken, or any fray made within the Ward since the last Wardmote, and by what person or persons the same was done; or if any covin or assemblage against [the peace of his lordship the King] has been made.[290-291]

Also, if there is any huckster within the Ward [291] .

Also, if there is any house covered with reeds or straw, and not with tiles, stone, or lead [291].

Also, if any person places filth in the streets and lanes, and places the same before the doors of others [291].

Item, if there is any one whose practice it is to place filth in any streets and lanes within the Ward, and offensively before the doors of others.

Also, if any swine or cows are reared within the Ward, to the annoyance of the neighbours [291].

Item, if any swine or cows are reared within the Ward, to the annoyance of the neighbours.

Also, if there is any leper resident within the Ward [291].

Also, if any purprestures are made in the streets and lanes, or upon the walls or fosses of the City, or upon the Thames, or other the common soil within the Ward [291].

Also, if the ale-stake of any taverner is longer, or extends further, than is ordained [291].

Appendix 3: Relevant City and Crown ordinances in other collections

(Source: *Liber Albus*, Page 218, folio 173A, Book 3, Part the Second)

This list only includes ordinances related to nuisance, and public hygiene etc. They are re-ordered to make more sensible groupings. The most relevant ordinances are reproduced in full in italics, and the page number in square brackets refers to the page number of the *Liber Albus* on which the full version is located.

Of the Peace, Custody, and Cleansing of the City ; of Victuallers and Forestallers, Regrators, Apprentices, and Lepers, and other matters of usage from of old

In the first place, of keeping the peace and of keeping clean the streets and lanes; and that those who sell bread, cheese, poultry, hides, skins, and other small victuals, shall stand between the kennels in the market of Cornhulle [228].

In the first place, that the peace of God and the peace of our Lord the King shall be well kept and maintained among denizens and strangers; and that the places and the lanes of the City shall be kept clear of all manner of annoyance, such as dung, rubbish, pigsties, and other annoyances, under heavy penalties.

Watercourses and streets

Also, of the Watercourse of Walbrook, and of the King's highway there [237].

*Of the Water-course of Walbroke.
And that the water-course of Walbroke and the highway of his lordship the King shall be kept clear, that so no dung or other filth be thrown therein, to the disturbance or annoyance of folks.*

Also, that fishmongers shall not throw water into the streets [238]. [note this is included in an article about lepers]

And that no sellers of fish shall throw their water into the King's highways, or into the lanes, but shall cause the same to be carried unto the Thames, under a penalty of two shillings.

Also, of keeping clean the streets and lanes between the Tower and Castle Baynard ; as also, that no courtesans shall dwell within the walls of the City [239].

And that all the lanes leading towards the Thames, from the King's high- ways, from Castle Baynard unto the Tower of London, shall be kept clear, that so persons on horseback may without hindrance ride and go unto the Thames; and if it be not so, the Sheriffs shall cause the same to be done at the cost of those who have caused the impediment; and nevertheless, let those who thus impede be heavily amerced. And that no courtesan [or] common brothel-keeper shall be residing within the walls of the City, under of imprisonment. also, of holding the Wardmotes each quarter [242]

Also, of lime: that the same shall be well measured, and well, competently, and reasonably made, as it has been from of old; and that tiles shall be of the ancient dimensions [242].

Of chalk called 'Lyme.': And that lime shall be well measured by quarter and by bushel of assize; and that the same shall be well burnt, according to the ancient ordinance. And that every sack shall contain one bushel of assize. And that "tiles shall be of the ancient dimensions; and that they shall be well burnt and well leaded.

Also, of pavours: how much they shall receive [242].

Also, of butchers,—that no one shall sell woolfels in his own house or in a secret place [243].

Ordinances as to keeping the Peace, and as to Weights, Merchants, the Weaving of Cloth, Labourers, and divers other matters which King Edward enacted, when he took into his hand the Liberties of the City of London; and of the Oaths of the [City] Officers.

[The ordinances from 244 to 249 come from the King – it's not clear if the ones from p 249 on do as well as they don't always mention the King – perhaps this is assumed and doesn't need re-stating]

Also, of the lanes, penthouses, gutters, jetties, and carts . [250].

Of Penthouses, Gutters, etc.; And the King doth will, that all usages heretofore in the City established, for the amendment and profit of the City, as to the streets, keeping clean the lanes without accumulation of dung and filth, and free from annoyance by chips and stones, penthouses, gutters, jetties of houses, stands ' for carts shod with iron for the use of the City, corn-porters, carts with wood for sale, [shall be observed], that so no one enter the City except at the certain place thereunto assigned.

Also, of the 'weaving of woollen cloth; and of the sellers of fish and flesh [250-251].

Of streets and lanes leading to the Thames,—that they shall be cleansed and kept free filth. Of lime,—that it shall be well burnt and lawfully measured.

Of good tiles,—[that they shall be] well burnt and well leaded, and of the old dimensions.

Of woad,—that it shall be lawfully measured, and that by lawful persons thereunto sworn, and by rightful quarter thereunto assigned.

Of lepers,—that no one shall come into or make sojourn in the City. _

Of vendors of fish and of flesh,—that they shall not throw the water in which they wash their fish and their flesh upon the pavement, but shall have it carried unto the Thames.

Of fishmongers,—the form and manner of selling their fish.

Of poulterers and of pelterers,—after the like manner.

Of the assize and ordinance as to nets, great and small, for fishing in the river of Thames.

Of making the pavement, and repairing the same.

Of taking away and removing from the streets filth and dung.

Pigs

Also, that swine shall not wander about within the City [235].

And that no swine shall be found about the streets or about the lanes in the City, or in the suburbs, or in the fosses of the said city, from this time forward. And if swine shall be found in the places aforesaid, they may be killed by those by whom they shall be so found; and those who kill them, shall have them freely and clearly without any challenge thereof; or else the swine shall be bought back by him who owns it at the price of four pence. And he who shall wish to feed a pig, must feed it in his house.

Buildings

Also, as to raising penthouses and jetties,—of what height they shall be [237].

And that the penthouses and jetties [projections] of houses shall be so high that folks on horseback may ride beneath them. And that they shall be of the height

of nine feet, at the very least; and that all others shall be forth- with rearranged within forty days, under a penalty of forty shillings unto the use of the Sheriffs. And that no stall shall project out [from the house] beyond the width of two feet and a half; and the same shall be moveable and flexible, for the convenience of the neighbours.

Appendix 4: Methodology and analysis of the Assize of Nuisance records

Assessment of the range of source information

I have experimented with a variety of methods for analysing the documentary source material. I wrote an Access database to record the information presented in secondary sources, either summarised or scanned, and keyworded, and used queries and reports to extract records relevant to specific chapters and subchapters. Data entry was time-consuming, and it proved to be more efficient to take very brief notes, assign keywords and scan the most critical pages of secondary sources for later reference.

For the primary source material I downloaded information into Excel, keyworded it and converted it to a datasheet that could be uploaded into my Access database for analysis using a multiple keyword query. For example, I used this method to assess the number of clerical and aristocratic attendees at the Assize of Nuisance court. For most other purposes manipulation of the data directly in Excel was adequate. In Excel I relied on keywording and organising into groupings that allowed multiple filtering, for example to find Assize complaints relating to both light and stormwater.

I trialled text mining software but as mentioned above, medieval court records contain a large number of names, and extremely common names and general legal procedural jargon that doesn't provide information on the complaint or the outcome had to be painstakingly removed. This has potential if there were a quicker way of removing names and common jargon. Voyeur software will remove commonly used preposition and conjunctions from the search but not medieval jargon. The advantage of text mining is that the occurrence of all words can be assessed (as it can using Access or Excel for specific keywords), this frequency of occurrence presented visually as a word cloud, and the frequently occurring words shown in their context. This method bears further investigation in the future using software that can interact with the web-based Zotero, as has been done with the Early Modern session records of the Old Bailey.³ These tools are developing very rapidly and the next iteration may have better ways to eliminate irrelevant words quickly by simply ignoring irrelevant words in the word cloud.

Methodology

Of the three primary sources used in this thesis:

- The Assize of Nuisance records are available in translated and published form as *The Assize of Nuisance* and also available electronically on the www.british-history.ac.uk site. I downloaded these records in their entirety into an Excel spreadsheet and primarily analysed them using Excel. I also uploaded a copy into an Access database and used multiple search criteria to select records.
- The Calendars of Letter Books are available in translated and published form, in PDF format and electronically on the British History website www.british-history.ac.uk. I downloaded PDFs of the letter books and used the advanced features of PDF-XChange Viewer to select records and transfer them to an Excel spreadsheet for further analysis.
- The Calendars of Plea and Memoranda rolls are available in translated and published form. Rolls 1 to 3 are available on www.british-history.ac.uk, for the period from 1323 to

³ <http://www.oldbaileyonline.org/>

1412, but volumes 4 and 5 are only available in hard copy. Relevant entries were transferred to an Excel spreadsheet for further analysis.

Analysis of the Assize of Nuisance

Identifying cases before the court, essoins, and administrative entries

The records of the Assize of Nuisance court contain entries setting out when the Assize sat and considered cases, and also when an Assize was proposed but adjourned, often through lack of aldermen. For the purpose of this analysis, the total number of proposed sittings includes all dates listed where there is an entry, even if it is simply to record “essoins only” or an adjournment”, on the basis that the court must have been present expecting to hear a case. Total actual sittings includes only sitting days when a case was heard.

Analysing the actual Assize cases required removing from the record entries that don’t relate to actual cases, including essoins, entries noting that no assize was held because of the absence of the mayor and aldermen, adjournments and continuations and the reading of Crown writs. Although there are 661 numbered records, 172 can be eliminated from the analysis.

The first group of records I eliminated from the analysis of cases is the un-numbered records of when the Assize sat (or intended to sit). Next, entries relating to administrative matters only were removed, for example deferrals, discontinuations, postponements etc., and duplicate entries relating to the same case. The exception is enforcement of a case, which have been counted as new actions. Note that there are several ways of selecting the “cases” - for example is a request for an assize made in the Husting that does not appear as a case counted as a case? One or two matters brought to the Assize that seemed unrelated to nuisance, such as apportionment of rent, were also eliminated. In addition, two cases which were each adjourned several times were assigned new numbers when the Assize was heard.

Essoins are the largest group to be eliminated. Where names are listed, they do not reappear as cases, but if no names are listed then either no names were recorded or the case reappears in the records. Many of the un-numbered entries indicate that an Assize was held, and heard essoins only, but no names are given and they are not listed as cases. Records that a court heard “essoins only” but do not list the names are counted as one essoin, although there could have been more than one. Where the record of an essoin gives the names of the plaintiff and defendant, the names listed are included in the analysis of the gender and status of participants in the court.

There were 485 cases brought to the Assize, however eliminating duplicates and entries that were purely administrative brings this number down to 468 cases representing 617 complaints, and 21 actions of enforcement. Of these, 357 concern a single complaint, 79 two complaints, 31 three complaints, one case includes four complaints and one five. There were 36 adjournments, and although most don’t give a reason, eight were because the mayor and aldermen could not attend, usually specifying that they were preoccupied with city or the king’s affairs. These are not included in the totals. Some cases appear in the records more than once, usually because the case spanned more than one session of the Assize. Each case is counted only once, and any enforcement of a decision is counted as a separate case.

Dates

Some cases list the date the case is first brought to the Assize, and then a date where it was concluded following an adjournment, usually for the defendant to obtain and present further evidence. The date used is the date the case is initially brought to the Assize.

Types of complaints

After reading and keywording all the complaints, I grouped them into the following categories:

- Apertures & Light
- Stormwater
- Walls & Buildings
- Waste Animals
- Fumes & Noise
- Access & Streets
- Sewage & wastewater
- Watercourse/Water supply
- Unknown or not relevant

Excel was sufficiently flexible to be undertake most of the analysis directly, particularly graphing time series of different types of complaint.

Bibliography

Primary Sources

- Chew, Helena M. *London Possessory Assizes: a Calendar*, 1965. <http://www.british-history.ac.uk/report.aspx?compid=64178>.
- Chew, Helena M., and William Kellaway, eds. *London Assize of Nuisance 1301 - 1431: A Calendar*. London: London Record Society, 1973.
- Chew, Helena M., and Martin Weinbaum, eds. *The London Eyre of 1244*, 1974. <http://www.british-history.ac.uk/source.aspx?pubid=153>.
- Cam, Helen Maud, ed. *Year Books of Edward II: Vol. XXVI (Part I): The Eyre of London 14 Edward II AD 1321 Vol I*. London: Selden Society, 1968.
- . , ed. *Year Books of Edward II: Vol. XXVI (Part II): The Eyre of London 14 Edward II AD 1321 Vol II*. London: Selden Society, 1969.
- Carpenter, John. *Liber Albus: The White Book of the City of London*. Translated by Henry Thomas Riley. London: R. Griffin, 1861.
- Chambers, R. W. *A Book of London English, 1384-1425*. Oxford: The Clarendon press, 1931.
- Froissart, Jean. *The Chronicles of Jean Froissart, in Lord Berner's Translation*. London: Centaur Press, 1963.
- Geoffrey of Monmouth. *The History of the Kings of Britain*. Translated by Lewis Thorpe. London ; New York: Penguin Books, 1966.
- Harding, Vanessa and Laura Wright (eds) "London Bridge: Selected Accounts and Rentals, 1381-1538," 1995. <http://www.british-history.ac.uk/source.aspx?pubid=1273>.
- Jones, Philip E., ed. *Calendar of Plea and Memoranda Rolls Preserved Among the Archives of the Corporation of the City of London at the Guildhall, Volume 5, A.D. 1437-1457*. Cambridge: Cambridge University Press, 1954.
- Loengard, Janet, ed. *London Viewers and Their Certificates, 1508-1558 - Certificates of the Sworn Viewers of the City of London*, 2003. <http://british-history.ac.uk/source.aspx?pubid=158>.
- Maxwell Lyte, H. C. *Calendar of Close Rolls, Edward III: Volume 10 - 1354-1360*, 1908. <http://www.british-history.ac.uk/source.aspx?pubid=1091>.
- . *Calendar of Close Rolls, Edward III: Volume 13 - 1369-1374*, 1911. <http://www.british-history.ac.uk/source.aspx?pubid=1094>.
- . *Calendar of Close Rolls, Richard II: Volume 5 - 1392-1396*, 1925. 128-135 <http://www.british-history.ac.uk/source.aspx?pubid=1100>.
- . *Close Rolls, Edward III - March 1349*, 1906. <http://www.british-history.ac.uk/report.aspx?compid=101316>.
- . *Calendar of Close Rolls, Edward I: Volume 4: 1296-130*, 1906.

- National Library of Wales, and Bodleian Library. *An English Chronicle, 1377-1461: Edited from Aberystwyth, National Library of Wales MS 21068 and Oxford, Bodleian Library MS Lyell 34*. Edited by C. William Marx. A new ed. Medieval Chronicles 3. Rochester, NY: Boydell Press, 2003.
- Riley, Henry Thomas., ed., *Memorials of London and London Life in the XIIIth, XIVth and XVth Centuries*. London: Longman Green, 1868.
- Sharpe, Reginald, ed. *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book A: Circa A. D. 1275-1298*. London: The Corporation of London, 1899.
- . *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book B Circa 1275 - 1312*. London: The Corporation of London, 1900.
- . *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book C Circa 1291-1309*. London: The Corporation of London, 1901.
- . *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book D Circa 1309-1314*. London: The Corporation of London, 1902.
- . , ed. *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book E: Circa A. D. 1314-1337*. London: The Corporation of London, 1903.
- . , ed. *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book F: Circa A. D. 1337-1352*. London: The Corporation of London, 1904.
- . , ed. *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book G: Circa A. D. 1352-1374*. London: The Corporation of London, 1905.
- . , ed. *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book H: Circa A. D. 1375-1399*. London: The Corporation of London, 1907.
- . , ed. *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book I: Circa A. D. 1400-1422*. London: The Corporation of London, 1909.
- . , ed. *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book K: Temp Henry VI*. London: The Corporation of London, 1911.
- . , ed. *Calendar of Letter- Books Preserved Among the Archives of the Corporation of the City of London at the Guildhall: Letter Book L: Temp Edward IV- Henry VII*. London: The Corporation of London, 1912.
- . *Calendar of Wills Proved and Enrolled in the Court of Husting, London: Part 1 - 1258-1358*, 1889. <http://www.british-history.ac.uk/source.aspx?pubid=570>.
- Staley, Lynn. *The Book of Margery Kempe*. Kalamazoo, Mich.: Medieval Institute Publications, Western Michigan University, 1996.

- Stow, John. *A Survey of London*. Oxford: Clarendon Press, 1971.
- . *The Survey of London*. Rev. ed. London: Dent, 1987.
- Thomas, A. H., ed. *Calendar of Plea and Memoranda Rolls Preserved Among the Archives of the Corporation of the City of London at the Guildhall, Rolls A1a-A9, A.D. 1323-1364*. Cambridge: Cambridge University Press, 1926.
- . , ed. *Calendar of Plea and Memoranda Rolls Preserved Among the Archives of the Corporation of the City of London at the Guildhall, Volume 2 1364 to 1381*. Cambridge: Cambridge University Press, 1929.
- . , ed. *Calendar of Plea and Memoranda Rolls Preserved Among the Archives of the Corporation of the City of London at the Guildhall, Volume 3, 1381 to 1412*. Cambridge: Cambridge University Press, 1932.
- . , ed. *Calendar of Plea and Memoranda Rolls Preserved Among the Archives of the Corporation of the City of London at the Guildhall, Volume 4, A.D. 1413-1437*. Cambridge: Cambridge University Press, 1943.
- Weinbaum, Martin. "The London Eyre of 1276," 1976. <http://www.british-history.ac.uk/source.aspx?pubid=156>.
- Wright, Laura. *Sources of London English: Medieval Thames Vocabulary*. Oxford: Clarendon Press, 1996.
- Calendar of Early Mayor's Court Rolls : Preserved Among the Archives of the Corporation of the City of London at the Guildhall A.D. 1298-1307*. London: University Press, 1924.
- The Fleet River and Fleet Ditch', Old and New London: Volume 2*, 1878. <http://www.british-history.ac.uk/report>.
- The Statutes: Revised Edition: Vol I: Henry III to James II*. London: George Edward Eyre & William Spottiswoode, 1870.

Secondary sources

- Aberth, John. *An Environmental History of the Middle Ages: The Crucible of Nature*. Abingdon: Routledge, 2013.
- . *The Black Death: The Great Mortality of 1348-1350: a Brief History with Documents*. Boston: Bedford/St Martins, 2005.
- Ackroyd, Peter. *London Under*. London: Chatto & Windus, 2011.
- Arnold, Ellen F. "An Introduction to Medieval Environmental History", *History Compass*, 6: 3 (2008): 898–916.
- Baker, J. H. *An Introduction to English Legal History*, 2nd ed., London: Butterworths, 1979.
- Barrett, James H., Alison M. Locker, and Callum M. Roberts. "The Origins of Intensive Marine Fishing in Medieval Europe: The English Evidence." *Proceedings of the Royal Society of London. Series B: Biological Sciences*, 271: 1556 (2004): 2417–2421.
- Barron, C. H. "The Government of London and Its Relations with the Crown 1400-1450," 1970. <https://qmro.qmul.ac.uk/xmlui/handle/123456789/1393>.

- Barron, Caroline M. *London in the Later Middle Ages: Government and People 1200-1500*. Oxford: Oxford University Press, 2004.
- Barron, Caroline M., and Anne F. Sutton, eds. *Medieval London Widows, 1300-1500*. London ; Rio Grande, Ohio, U.S.A: Hambledon Press, 1994.
- Barton, N. J. *The Lost Rivers of London: A Study of Their Effects Upon London and Londoners, and the Effects of London and Londoners Upon Them*. London: Phoenix House; Leicester University Press, 1962.
- BBC. *Filthy Cities - Medieval London*, 2011.
http://www.youtube.com/watch?v=qC0mKH0HvYY&feature=youtube_gdata_player.
- Benedictow, Ole J. *The Black Death 1346 – 1353: The Complete History*. Woodbridge, Suffolk: Boydell Press, 2004.
- Besant, Walter. *The Survey of London*. London: A. & C. Black, 1902.
- Blair, John, and Nigel Ramsay, eds. *English Medieval Industries: Craftsmen, Techniques, Products*. London ; Rio Grande, Ohio, U.S.A: Hambledon Press, 1991.
- Bolland, W. C. "The Book of Assizes." *The Cambridge Law Journal*, 2: 2 (1925), 192–211.
- Booth, Philip. "The Control of Discretion: Planning and the Common-Law Tradition." *Planning Theory*, 6: 2 (2007), 127–145.
- Bottero, Marta, and Valentina Ferretti. "Integrating the Analytic Network Process (ANP) and the Driving Force-pressure-state-impact- Responses (DPSIR) Model for the Sustainability Assessment of Territorial Transformations." *Management of Environmental Quality: An International Journal*, 21: 5 (2010), 618–644.
- Boyden, Stephen. "Nature, Society, History and Social Change." *Innovation: The European Journal of Social Sciences*, 14: (2001), 103–116.
- . *Western Civilization in Biological Perspective: Patterns in Biohistory*. Oxford; New York: Clarendon Press ; Oxford University Press, 1987.
- Boyden, Stephen Vickers. *The Biology of Civilisation: Understanding Human Culture as a Force in Nature*. Sydney: UNSW Press, 2004.
- Brimblecombe, P. "Industrial Air Pollution in Thirteenth-Century Britain." *Weather*, 30: 12 (1975), 388–396.
- Brimblecombe, Peter. "Attitudes and Responses Towards Air Pollution in Medieval England." *Journal of the Air Pollution Control Association*, 26: 10 (1976): 941–945.
- . *The Big Smoke: a History of Air Pollution in London Since Medieval Times*. London: Methuen, 1987.
- Brimblecombe, Peter, and Carlota M. Grossi. "Millennium-long Damage to Building Materials in London." *Science of The Total Environment*, 407: 4 (2009), 1354–1361.
- Brown, A. L. *The Governance of Late Medieval England 1272-1461*. 3. London: Edward Arnold, 1989.
- Bryson, Bill. *At Home: A Short History of Private Life*. Random House, 2011.

- Burl, Aubrey. *Danse Macabre: François Villon, Poetry and Murder in Medieval France*. Stroud: Sutton Publishing, 2000.
- Carlin, Martha. *Medieval Southwark*. London: Hambledon Press, 1996.
- Carrel, Helen. "Food, Drink and Public Order in the London Liber Albus." *Urban History*, 33: 2 (2006), 176.
- Carter, Simon. "Disease and Infection in the City." In *The New Blackwell Companion to the City*, edited by Gary Bridge and Sophie Watson, 245–254. Wiley-Blackwell Companions to Geography. Malden, MA: Wiley-Blackwell, 2011.
- Cheren, Robert D. "Tragic Parlor Pigs and Comedic Rascally Rabbits: Why Common Law Nuisance Exceptions Refute Coase's Economic Analysis of the Law." *Case Western Reserve Law Review*, 63: 2 (2012), 556–598.
- Cherry, John. "Leather." In *English Medieval Industries: Craftsmen, Techniques, Products*, edited by John Blair and Nigel Ramsay, 295–319. London ; Rio Grande, Ohio, U.S.A: Hambledon Press, 1991.
- Ciecieznski, Natalie. "Defining a Community: Controlling Nuisance in Late-medieval London." University of South Florida, 2009.
<http://scholarcommons.usf.edu/etd/1902>.
- Clark, John, ed. *The Medieval Horse and Its Equipment, c.1150 - C.1450*. 2nd ed. Woodbridge, Suffolk, UK ; Rochester, NY: Boydell Press, 2004.
- Cooper, Davina. "Far Beyond 'The Early Morning Crowing of a Farmyard Cock': Revisiting the Place of Nuisance Within Legal and Political Discourse." *Social & Legal Studies*, 11: 1 (2002): 5–35.
- Couclelis, Helen. "Modeling Frameworks, Paradigms, and Approaches." *Geographic Information Systems and Environmental Modeling* (2002): 36–50.
- Curtis, D. R. "Pre-industrial Societies and Strategies for the Exploitation of Resources : a Theoretical Framework for Understanding Why Some Societies Are Resilient and Some Settlements Are Vulnerable to Crisis." PhD, Universiteit Utrecht, 2012.
<http://igitur-archive.library.uu.nl/dissertations/2012-0822-200425/UUindex.html>.
- Davis, James. "Marketing Secondhand Goods in Late Medieval England." *Journal of Historical Research in Marketing*, 2: 3 (2010), 270–286.
- Department for Environment, Food and Rural Affairs. "Defra Position Statement on Environmental Management Systems." DEFRA, 2008.
<http://archive.defra.gov.uk/environment/business/scp/documents/position-statement.pdf>.
- Ekwall, Eilert. *Street-Names of the City of London*. London: Oxford University Press, 1954.
- Elverhøi, Pia. "Making Cities Habitable in the Middle Ages? A Study of London via the 'London Assize of Nuisances 1301-1431. A Calendar'," 2007.
- Fagan, Brian M. *Elixir: a History of Water and Humankind*. 1st U.S. ed. New York: Bloomsbury Press, 2011.
- Gabrielsen, Peder, and Peter Bosch. *Environmental Indicators: Typology and Use in Reporting*. Copenhagen: European Environment Agency, 2003.
<http://www.iwrms.uni->

jena.de/fileadmin/Geoinformatik/projekte/brahmatwinn/Workshops/FEEM/Indicators/EEA_Working_paper_DPSIR.pdf.

- Galloway, James A., Derek Keene, and Margaret Murphy. "Fuelling the City: Production and Distribution of Firewood and Fuel in London's Region, 1290-1400." *The Economic History Review*, 49: 3 (1996): 447–472.
- Getz, Faye Marie. "Black Death and the Silver Lining: Meaning, Continuity and Revolutionary Change in Histories of Medieval Plague." *Journal of the History of Biology*, 24: 2 (1991), 265–289.
- Gray, Alison, and Ministry of Social Policy. *Definitions of Crowding and the Effects of Crowding on Health: a Literature Review*. Wellington, N.Z.: Ministry of Social Policy, 2001.
- Gummer, Benedict. *The Scourging Angel: The Black Death in the British Isles*. London: Bodley Head, 2009.
- Halper, Louise A. "Untangling the Nuisance Knot." *Boston College Environmental Affairs Law Review*, 26: (1998), 89–130.
- Hanawalt, Barbara A. *Growing Up in Medieval London: The Experience of Childhood in History*. New York: Oxford University Press, 1993.
- . *Of Good and Ill Repute: Gender and Social Control in Medieval England*. New York: Oxford University Press, 1998.
- . "Reading the Lives of the Illiterate: London's Poor." *Speculum*, 80: 4 (2005), 1067–1086.
- Harding, Alan. *The Law Courts of Medieval England*. Historical Problems: Studies and Documents 18. London, New York: Allen & Unwin; Barnes and Noble, 1973.
- Hawkes, Emma. "'[S]he Will ... Protect and Defend Her Rights Boldly by Law and Reason...': Women's Knowledge of Common Law and Equity Courts in Late-Medieval England." In *Medieval Women and the Law*, edited by Noël James Menuge, 145–161. Woodbridge: Boydell Press, 2000.
- Hibbert, Christopher. *London: The Biography of a City*. London: Longmans, 1969.
- Hoffmann, Richard C. "A Brief History of Aquatic Resource Use in Medieval Europe." *Helgoland Marine Research*, 59: 1 (2005), 22–30.
- . "Economic Development and Aquatic Ecosystems in Medieval Europe." *The American Historical Review*, 101: 3 (1996), 631–669.
- . "Footprint Metaphor and Metabolic Realities: Environmental Impacts of Medieval European Cities." In *Nature's Past: The Environment and Human History*, edited by Squatriti Paolo, 288–325. Ann Arbor: University of Michigan Press, 2007.
- . "Medieval Europeans and Their Aquatic Ecosystems." In *Beiträge Zum Göttinger Umwelthistorischen Kolloquium 2007-2008*, edited by Bernd Herrmann, 45–64. Göttingen: Universitätsverlag Göttingen, 2008.
- Holt, Richard, and Gervase Rosser, eds. *The English Medieval Town: A Reader in English Urban History 1200-1540*. London; New York: Longman, 1990.
- International Organisation for Standardisation. *ISO 14001:2004 - Environmental Management Systems - Requirements with Guidance for Use*. Geneva: ISO, 2004.

- Johnson, David J. *Southwark and the City*. London: Corporation of London and Oxford University Press, 1969.
- Jørgensen, Delores Marie. "Private Need, Public Order: Urban Sanitation in Late Medieval England and Scandinavia." PhD, University of Virginia, 2008.
<http://proquest.umi.com/pqdweb?did=1801471531&sid=1&Fmt=2&clientId=52314&RQT=309&VName=PQD&cfc=1>.
- Jørgensen, Dolly. "'All Good Rule of the Citee': Sanitation and Civic Government in England, 1400—1600." *Journal of Urban History*, 36: 3 (2010), 300–315.
- . "Cooperative Sanitation: Managing Streets and Gutters in Late Medieval England and Scandinavia." *Technology and Culture*, 49: 3 (2008), 547–567.
- . "Local Government Responses to Urban River Pollution in Late Medieval England." *Water History*, 2: 1 (2010), 35–52.
- . "What to Do with Waste." In *Living Cities: An Anthology in Urban Environmental History*, Ed. Matthias Legnér and Sven Lilja Stockholm: Forskningsrådet Formas, 2010), 34–55, 2010.
- Keene, Derek. *A Medieval Capital and Its Grain Supply: Agrarian Production and Distribution in the London Region C.1300*, 1993.
- . "Issues of Water in Medieval London to c. 1300." *Urban History*, 28:2 (2001), 161–179.
- . "Medieval London and Its Supply Hinterlands." *Regional Environmental Change*, 12: 2 (2011), 263–281.
- . "Metropolitan Values: Migration, Mobility and Cultural Norms, London 1100–1700." In *The Development of Standard English 1300–1800: Theories, Descriptions, Conflicts*, edited by Laura Wright, 93–116. Cambridge: Cambridge University Press, 2000.
- . "Rubbish in Medieval Towns." In *Environmental Archaeology in the Urban Context*, 26–30. Research Report No 43. London: The Council for British Archaeology, 1982.
- . *Survey of Medieval Winchester*. Vol. 1. 2 vols. Oxford: Oxford University Press, 1985.
- . "Tall Buildings in Medieval London: Precipitation, Aspiration and Thrills." *London Journal*, 33: 3 (2008), 201–215.
- . "Tanners' Widows." In *Medieval London Widows, 1300–1500*, edited by Caroline M. Barron and Anne F. Sutton, 1–28. London ; Rio Grande: Hambledon Press, 1994.
- Keene, Derek, and Vanessa Harding. "Historical Gazetteer of London before the Great Fire - Cheapside; Parishes of All Hallows Honey Lane, St Martin Pomary, St Mary Le Bow, St Mary Colechurch and St Pancras Soper Lane," June 22, 2003.
<http://www.british-history.ac.uk/source.aspx?pubid=8>.
- Kelly, John. *The Great Mortality: An Intimate History of the Black Death, the Most Devastating Plague of All Time*. New York: Harper Collins, 2005.
- Kershaw, Ian. "The Great Famine and Agrarian Crisis in England 1315–1322." *Past & Present*, 59 (May 1, 1973), 3–50.

- Kleinschmidt, Harald. "Space, Body, Action: The Significance of Perceptions in the Study of the Environmental History of Early Medieval Europe." *The Medieval History Journal*, 3:2 (2000), 175–221.
- Kowaleski, Maryanne. "Town and Country in Late Medieval England: The Hide and Leather Trade." In *Work in Towns, 850-1850*, edited by Derek Keene and Penelope J. Cornfield, 57–73. Leicester ; New York: Leicester University Press, 1990.
- Lewis, M. E., C. A. Roberts, and K. Manchester. "Comparative Study of the Prevalence of Maxillary Sinusitis in Later Medieval Urban and Rural Populations in Northern England." *American Journal of Physical Anthropology*, 98: 4 (1995), 497–506.
- Lilley, Keith D. *Urban Life in the Middle Ages 1000-1450*. European Culture and Society. Houndmills, Basingstoke; New York: Palgrave, 2002.
- . "The Assize of Nuisance: Origins of An Action at Common Law." *The Cambridge Law Journal*, 37: 1 (1978), 144–166.
- Lyon, Bryce Dale. *A Constitutional and Legal History of Medieval England*. N.Y: Harper & Row, 1960.
- Magnusson, Roberta J. "Medieval Urban Environmental History." *History Compass*, 11: 3 (2013), 189–200.
- . "Water and Wastes in Medieval London." In *A History of Water. Vol. 1, Water Control and River Biographies*, edited by Terje Tvedt and Eva Jakobsson, 300–313. London: I. B. Tauris, 2004.
- Makra, L., and P. Brimblecombe. "Selections from the History of Environmental Pollution, with Special Attention to Air Pollution. Part 1." *International Journal of Environment and Pollution*, 22: 6 (2004), 641–656.
- Mumford, Lewis. *The City in History: Its Origins, Its Transformations, and Its Prospects*. New York: Harcourt Brace Jovanovich, 1961.
- Naphy, William, and Andrew Spicer. *Plague: Black Death & Pestilence in Europe*. Stroud: Tempus, 2004.
- Nicholas, David. *The Later Medieval City, 1300-1500*. New York: Longman, 1997.
- Nightingale, Pamela. *A Medieval Mercantile Community: The Grocers' Company & the Politics & Trade of London*. New Haven, Conn: Yale University Press, 1995.
- . "The Growth of London in the Medieval English Economy." In *Progress and Problems in Medieval England: Essays in Honour of Edward Miller*, edited by R. H. Britnell and John Hatcher, 89–106. Cambridge ; New York: Cambridge University Press, 1996.
- O'Sullivan, Aidan. "Place, Memory and Identity Among Estuarine Fishing Communities: Interpreting the Archaeology of Early Medieval Fish Weirs." *World Archaeology*, 35: 3 (2003), 449–468.
- Organisation for Economic Co-Operation and Development. "Key Environmental Indicators." OECD, 2008. <http://www.oecd.org/environment/indicators-modelling-outlooks/37551205.pdf>.
- . *OECD Core Set of Indicators for Environmental Performance Reviews: A Synthesis Report by the Group on the State of the Environment*. Paris: OECD, 1993. <http://www.oecd.org/handle/1834/2677>.

- Palmer, Robert C. *English Law in the Age of the Black Death, 1348-1381: a Transformation of Governance and Law*. Chapel Hill: University of North Carolina Press, 1993.
- . "Personal Injury in Private Nuisance: The Historical Truth About Actionability of 'Bodily Security'." *Environmental Law and Management*, 21 (2009), 302–311.
- Pounds, Norman. *The Medieval City*. Westport, Conn: Greenwood Press, 2005.
- Pryor, Francis. *Britain in the Middle Ages: An Archaeological History*. London: Harper Collins, 2006.
- Reginald Robinson Sharpe. *London and the Kingdom: A History Derived Mainly from the Archives at Guildhall*. Longman Green, 1894.
<http://archive.org/details/londonandkingdo02shargoog>.
- Rexroth, Frank. *Deviance and Power in Late Medieval London*. Cambridge: Cambridge University Press, 2007.
- Robinson, Dorothy L. "Australian Wood Heaters Currently Increase Global Warming and Health Costs." *Atmospheric Pollution Research* (July 1, 2011).
<http://www.atmospolres.com/articles/Volume2/issue3/APR-11-033.pdf>.
- Rosser, Gervase. *Medieval Westminster 1200-1540*. Oxford: Clarendon Press, 1989.
- Sabine, Ernest L. "Butchering in Mediaeval London." *Speculum*, 8: 3 (1933), 335–353.
- . "City Cleaning in Mediaeval London." *Speculum*, 12: 1 (1937), 19–43.
- . "Latrines and Cesspools of Mediaeval London." *Speculum*: 9: 3 (1934), 303–321.
- Schofield, John. *London 1100-1600: The Archaeology of a Capital City*. Sheffield: Equinox, 2011.
- . *Medieval London Houses*. New Haven: Yale University Press, 1994.
- . *Medieval Towns: The Archaeology of British Towns in Their European Setting*. Studies in the Archaeology of Medieval Europe. London: Equinox, 2005.
- Schofield, John, and Alan Vince. *Medieval Towns: The Archaeology of British Towns in Their European Setting*. London: Equinox, 2005.
- Serjeantson, D., and Woolgar, C. M. "Fish Consumption in Medieval England." In *Food in Medieval England: Diet and Nutrition*, edited by C. M. Woolgar, D. Serjeantson, and T. Waldron, 102–130. Oxford: Oxford University Press, 2006.
- Shah, R. "International Frameworks of Environmental Statistics and Indicators." In *Statistics for Environment Policy 2000*, Inception Workshop on the Institutional Strengthening and Collection of Environment Statistics, 2000.
- Taylor, Craig. "The Disposal of Human Waste: A Comparison Between Ancient Rome and Medieval London." *Past Imperfect* 11 (2005): 53–72.
- The Corporation of London. *The Corporation of London: Its Origin, Constitution, Powers and Duties*. 2nd ed. London: Oxford University Press, 1953.
- Thorndike, Lynn. "Sanitation, Baths, and Street-Cleaning in the Middle Ages and Renaissance." *Speculum*, 3: 2 (1928), 192–203.
- Thrupp, Sylvia L. *The Merchant Class of Medieval London: (1300-1500)*. Ann Arbor, Mich: University of Michigan Press, 1962.

- Tucker, Penny. *Law Courts and Lawyers in the City of London 1300-1550*. Cambridge: Cambridge University Press, 2007.
- . "Relationships Between London's Courts and the Westminster Courts in the Reign of Edward IV." In *Courts, Counties, and the Capital in the Later Middle Ages*, edited by Diana E. S. Dunn, 118–137. New York: St. Martin's Press, 1996.
- Uckelman, Sara L. "Middle English Bynames in Early Fourteenth-Century London" (2013). <http://www.nomic.net/~liana/names/english/bynames1319.pdf>.
- Walton, Penelope J. "Textiles." In *English Medieval Industries: Craftsmen, Techniques, Products*, edited by John Blair and Nigel Ramsay, 319–354. London ; Rio Grande, Ohio, U.S.A: Hambledon Press, 1991.
- Whitney, Elspeth. *Medieval Science and Technology*. Westport, Conn: Greenwood Press, 2004.
- Whyte, Ian. *World Without End?: Environmental Disaster and the Collapse of Empires*. London ; New York: Tauris, 2008.
- Williams, Gwyn A. *Medieval London: From Commune to Capital*. London: Athlone Press, 1963.
- Wilson, Dolores M. "Resources, Roles and Conflict Active Resource Management in the Anglo-Norman Kingdom." University of Houston, 2003. <http://dolly.jorgensenweb.net/files/DollyJorgensen-MasterThesis.pdf>.
- "COMING SOON: 'Medieval Urban Environmental History' by Dr. Roberta Magnusson." *History Compass*. Accessed August 25, 2013. <http://history-compass.com/2012/11/15/coming-soon-medieval-urban-environmental-history-by-dr-roberta-magnusson/>.
- "Feeding Medieval European Cities, 600-1500 by Derek Keene | Institute of Historical Research." Accessed September 20, 2012. <http://www.history.ac.uk/resources/e-seminars/keene-paper>.
- "Map of Medieval London." Accessed June 29, 2013. <http://www.fordham.edu/halsall/maps/London.jpg>.
- "Office of the Commissioner for Sustainability and the Environment - ACT State of the Environment Report." Accessed June 20, 2013. <http://www.envcomm.act.gov.au/publications/soe>.
- "UNEP / FIDIC / ICLEI Urban Environmental Management: Environmental Management Training Resources Kit." Accessed June 20, 2013. http://www.unep.or.jp/ietc/announcements/emskit_launch.asp.