Flow Dynamics in Nineteenth-Century British Literature and Culture

Darin Trent Graber
University of Colorado at Boulder, darin.graber@colorado.edu

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FLOW DYNAMICS IN NINETEENTH-CENTURY BRITISH
LITERATURE AND CULTURE

by

DARIN TRENT GRABER

B.A., Wabash College, 2005
M.F.A., University of Notre Dame, 2008
M.A., University of Colorado Boulder, 2010

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ABSTRACT

Graber, Darin Trent (Ph.D., Department of English)

“Flow Dynamics in Nineteenth-Century British Literature and Culture”

Thesis directed by Professor Sue Zemka and Professor Helmut Müller-Sievers.

Streams’ and rivers’ use to drive mills dates at least to Roman occupation, but industrialization’s concentration along the watercourses that powered its factory-style “mills” had begun to deplete English watercourses by the 1790’s, exposing the need for a reliable hydrological science. Accordingly, cultural leaders turned to the existing, though unreliable, fields of “hydrodynamics” and “hydraulics,” and in 1822, the later-knighted John Robison codified a set of functions that a well-managed watercourse performed for society, pushing hydrological thinking to the cultural forefront. His idealized, natural “river” voided surplus, redundant material in predictable flows that could be easily, profitably, and—in theory—sustainably used. These functions appealed to and helped shape the sanitary movement’s goals, politicians’ approaches to urbanizing populations, and various industries, including serial literary production. Sanitarians seized on Robison’s concept of redundancy-voiding drainage in densely-inhabited cities, building drainage infrastructure and eliminating cesspools in favor of dismissing human waste through drainage flows connected to adjacent watercourses. Their subsequently accelerated pollution then led to catastrophes like 1858’s “Great Stink” in London. Though the sanitary adoption of Robison’s concepts proved disastrous for England’s watercourses, it attracted social commenters and political authorities, who applied its voiding of “surplus” and “redundant” material to what they saw as problematic populations—treating them, in what I call social hydrology, as liquid material to be channeled and drained to avoid perceived, culturally-threatening collection, stagnation, or
flooding. Simultaneously, the initial environmental disasters of sanitarian and industrial drainage initiated a second phase of hydrological thinking in nineteenth-century England that I call *flow dynamics*, which re-conceived and re-engineered naturally given flows for extended economic and social usefulness over distance and time. Massive expenditures of other natural resources and money would expand the capacities of previously-natural watercourses that could no longer meet society’s demands. In turn, skeptical Victorian novelists like Charles Dickens, George Eliot, and Thomas Hardy reacted to flow dynamics’ wide-ranging implementation, exposing its consequences for the environment and people managed according to its tenets and problematizing its purported efficacy and disregard for individuals’ unique, dynamic potential.
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Flow Dynamics in Nineteenth-Century British Literature and Culture

INTRODUCTION

Charles Dickens first experienced serial novel authorship by being pulled full-force into the current of the already-in-motion *Pickwick Papers* when its primary contributor died. In his first issue as its main author, he announces his wish for more time to fill the pages that this death left empty. Decades later in *Great Expectations*, Dickens questions the flow-based management practices that shape nineteenth-century narrative production as much as its topographical and social landscapes, causing main characters to circulate in its tide-locked rivers while denying readers a recuperative ending and shaping one that simply dissipates in disappointment instead (which he was subsequently compelled to alter). More outrageously, *The Wild Boys of London*’s unnamed author(s) reject(s) the premise of univocal authorship and unidirectional narrative flow, crafting a story that simply seeks to remain in print, recycling narrative threads and character types just as its anarchic group of sewer-dwelling boys circulate through London to repurpose materials they find there. As a consequence of its rejection of flow-based orthodoxy, its 103 individual “numbers” were banned once they emerged in single-volume form, preventing them from entering subscription, “circulating” libraries.

A few years later, George Eliot compares her writing work to “grinding out” or “spinning” narrative like material from a water and/or steam-driven mill (qtd in Feltes 48), just as she describes the influence of literature on its audience as dynamic motion “passing through” their minds and constructs her early, semi-autobiographical novel, *The Mill on the Floss*, to speed increasingly violently down its narrative course toward its climatic flood (Haight 1:23). Likewise, Thomas Hardy advocates against the moralized management of serial flows for the
largest possible—meaning family—audience, proposing in their place specialized distribution
“courses” that would allow authors to deliver narratives that probe the realities of society’s
regulation of sexuality, gender inequality, and socioeconomic disparities while moving the art
form forward (qtd in Orel 133). At the same time, his *The Return of the Native* stages an attack
on cultural restrictions of desire via its predominant water-management features, which also
produce a catastrophic flood. As with Dickens’s *Great Expectations*, Hardy’s novel originally
concluded here without any familial, romantic, or economic remediation, but later, upon editorial
insistence, he added “Aftercourses,” a section that provided a modicum of romantic recuperation.

As this work will make clear, nineteenth-century narratives came to be within a culture-
ranging system of flow-based management. In fact, they appear in that culture as material and
narratological flows produced along hydrological lines and delivered and consumed in real time
as they move. However, as the insistence on unidirectional, forceful flows widely infuses
political, social, and economic fields of thought, authors begin to question such flow-based
management within these same narratives. Why, though, does this multifaceted focus on flows
and flow management in material and literary culture occur in the nineteenth-century England?

Idealized cultural notions about flowing rivers in English thought go back as far as
Hobbes, who compares freedom in *Of Liberty and Necessity* to a river whose “water is said to
descend freely, or to have liberty to descend by the channel of the river, because there is no
impediment that way” (qtd in Skinner 132). Even *Magna Carta* Clause 33 orders the removal of
all fish-weirs from England’s rivers, showing that the signers of that document saw free-flowing
rivers as important enough to warrant mention in their seminal framing of contractual
governance. And while this might strike current readers as almost humorously mundane
compared to *Magna Carta*’s better-known clauses, the contract takes time to assert political
authorities’ right to preserve clear, flowing rivers over individuals’ rights to make use of them, voicing a conceptual connection of freely flowing rivers to political organization and power.

What has changed about English culture, then, so that John Ruskin, in Letter 19 of 1872’s *Fors Clavigera*, identifies the unfettered movement of rivers and streams in his Italian surroundings as indicators of that nation’s underdeveloped political organization? Why does he command readers of his “Letters to the workmen and labourers of Great Britain” that, “above all,” they must “learn a little hydraulics” (258)? Far from Hobbes’s “liberty” and “freedom” lying in the relative lack of obstructions to a river’s flow, which symbolize “arbitrary power within a civil association” (Skinner 212), Ruskin sees a properly restrained river and the knowledge of how one produces such restraint via “hydraulics” as necessary for a functional, if still class-based, society.¹ He even explains the regret he felt in reading a depiction of a flooding river in an unnamed novel, because it does not comport with hydrological science and, therefore, miseducates the reading public.

An English subject’s perspective on managing rivers and streams in 1872 could only have included wariness that decades of water and river-related crises in England had produced. These crises were foretold by the degrading state of its streams and rivers in the last decades of the eighteenth century, and the practical reformation of the Thames Navigation Commission in 1771 marked the official acknowledgment of that fact. Its engineers’ reports that began to be filed in the 1790’s confirmed a national, river-based crisis. Repeated outbreaks of typhus and cholera, particularly, had killed tens of thousands across England’s ports and town starting in 1832, and public criticism of the Thames’ poor management appeared as early as the satirical pamphlet, “The Dolphin,” in 1827 or George Cruikshank’s famous engraving, “Salus Populi Suprema

¹ Note that “hydraulics” indicated a practically-oriented, experience-based counterpart to “hydrodynamics”’ academically-centered, theoretical approach to early hydrology, according to Darrigol.
Lex,” in 1832. Three years after that, Queen Victoria commissioned the first ever royal water purifier, a Doulton ceramic model. Concurrent to Ruskin’s writing, the first set of Thames embankments were being completed, with the city’s collective human waste running out of sight and smell in main drains underneath their surface.

Far from the idealized symbols of authority, political organization, or natural beauty that they had traditionally been, Victorian rivers and streams earned connotations of pollution, obstruction, stagnation, and disease, thanks to the combined stresses of urbanization, industrialization, and poor management. The response—a mindset in which political authorities, scientists, and to a large extent, the general public view flowing bodies of water as dynamic tools necessary for economic and literal survival that call for human intervention on the scale of entire watersheds in order to remain useful—marks this era as distinct in English history.

A. “The waters repaired, and the forfeit to the King not forgotten”: Political Authority as the Power to Manage Flowing Water

English watercourses have been diverted, blocked, fished in, and used to drive mills, specifically, since at least Roman occupation, and when Edward the Confessor decreed in 1066, “If mills, fisheries, or any other works are constructed to [the four royal rivers’] hindrance, let these works be destroyed, the waters repaired, and the forfeit to the King not forgotten,” he made the first recorded assertion of political authority over flowing, inland water in England (Thacker 12). This unchallengeable authority over effectively oversaw that which flowed and the its flowing action. *Magna Carta’s* 1215 eradication of “fish-weirs” from the Thames, the Medway and “throughout the whole of England, except on the sea coast,” left economically necessary mills and mill-weirs in place, but cleared other flow-impeding structures to bolster the river’s
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overall navigability, flow rate, and strength (British Library). Its reassignment of the River Thames’ supervision from locally-operating water bailiffs to the Admiralty placed it more directly under the Crown’s supervision.

The ensuing history of, primarily, English monarchs claiming ownership of rivers’ channels and useful dynamism shows those claims to be consistently in conflict with local uses of that dynamism that were perceived as systemic drains on their power, quantity, and continuity. While the thousands of mill-weirs along flowing bodies of water across England were intended primarily to provide a “heads” of water that would be diverted through “races” and power mills, they produced secondary benefits that encouraged private individuals to maintain them through the centuries.2 “Fish and flour go together as byeproducts (sic) of nearly all our large rivers,” claims one mill enthusiast, because “wherever there is a water-mill, a mill cut is made to take the water to it” which subsequently “holds the biggest fish” (Cornish qtd in Thacker 6-7). Cornish imagines a river as an almost miraculously productive body, when only partially impeded and directed, providing staples of literal and economic survival for riverine communities. The elision of the agricultural work that brings grain to the mill and delivers flour to market afterwards, not to mention that of fishing as a business or subsistence endeavor, only emphasizes the idealistic understanding of the flowing Thames as a life-giver—whose traditional adaptation to economic use by human intervention is thought of as “natural.”3

2 According to Tvedt, at the time of the Doomsday Book’s compilation for William I in 1086, over six thousand water mills were registered across Britain (43).

3 In 1841, George Combe begins his speculation about the pairing of human physiology to the physical and geological makeup of the Earth by citing an idyllic image of flowing water, which humans profit from in its supposedly “natural state.” “By the law of gravitation,” he writes, “heavy bodies always tend toward the center of the earth,” meaning that “[w]ater descends from the clouds, from the roofs of houses, from streets and fields, and precipitates itself down the channels of rivers, turns the mill-wheels in its course, and sets in motion the most stupendous and useful machinery” (7, emphasis mine).
Motivation to install or rebuild removed or even illegal weirs and other “flashlocks” also came from the fact that their owners profited from their obstruction of boat traffic. That is, each time a barge or other vessel wanted to navigate through or past a miller’s weir, the latter would collect a sum of money before releasing a temporary torrent called a “flash” by lifting up or removing a set of paddles within the weir or lock.4 Theoretically, the toll compensated the miller for the loss of water from the mill’s head and for the loss of production while he waited for the river’s flow to recharge it—never knowing when the next vessel would seek passage. Thus, for millers or fish-weir keepers, a river’s flow not only powered their economic activities, the flowing action itself became, in Oliver’s words, “an object of exchange” (226).5

From the eleventh to the nineteenth centuries, then, a pattern emerges in which royal decrees and Acts of Parliament crack down on fishers’, millers’, or farmers’ profiting from such “natural,” local uses in order to preserves such bodies’ continuous, powerful flowing for economic, political, and military ends. Within this long history, however, exists a vital consolidation of authority over inland flowing water at increasingly high and more geographically expansive levels, with the accompanying incorporation of political bodies for establishing and enforcing such consolidation. With the River Thames as the paradigmatic case, this consolidation of authority exhibits an increasingly intense focus on the river’s flowing as a kind of movement-and-object necessary to national wealth (and later, health).

From Edward the Confessor to the 1771 Thames Navigation Commission, monarchs repeatedly responded to apparent lapses in the enforcement of earlier restrictions against blockages and diversions of the Thames, or decreed more restrictively against them. In 1227

4 Hardy invokes such details about Shadwater Weir in The Return of the Native’s catastrophic flood scene.
5 In Oliver, Stuart, “Liquid Materialities in the Landscape of the Thames: Mills and Weirs from the Eighth Century to the Nineteenth Century.”
Henry III appointed justices to inspect all forms of weir or dam to identify those which might affect boat traffic, and in 1274 Edward I ordered the “water of the Thames…to be so widened that ships and great barges might ascend from London to Oxford, and descend, without hindrance from any weirs,” complaining that it was “so narrowed in divers places that ships could not pass” (Thacker 18, 19). Parliament got involved in 1350, passing legislation that declared that all “gorces, mills, weirs, stanks and kiddels…which be raised in the time of King Edward the king’s grandfather and after…shall be out and utterly pulled down without being renewed” (Thacker 26). Later, still under Edward III, a 1371 Act instituted the death penalty for anyone who sought to “setteth up or enhanceth” weirs in the Thames, showing how seriously the Crown took the unfettered flow of its symbolically and practically critical river.

Henry IV’s policy toward the Thames forms a pivot for the Crown’s obsession with its continuous flow and the creation of authorities intended to oversee the same. In 1399, he decreed a balance between the use of the river’s energy along its course (with the prevention of its over-use that often resulted in flooding) and the maintenance of its valuable navigability by forbidding “outrageous enhancing and straitening (sic) of wears” that diverted too much of the river’s water and energy or too greatly altered its current, while also endorsing “a reasonable substance of wears, mills,” and related structures (Thacker 29). Nonetheless, determining the criteria of this balance remained the king’s prerogative and at some point, very importantly for the river’s future, he laid claim to its “bed and the soil.” This phrase may have been meant to indicate the territory underneath the river as well as its banks, but its vague nature allowed for a Victorian conflict over control of topographical features pertinent to the River Thames within London that would have to be resolved in order to remedy its mid-century malaise.
However, perhaps related to the same pressure that led to that document’s signing, Richard I had granted the Lord Mayor and Corporation of the City of London the right to regulate its own stretch of the Thames in 1197. This transfer of power to regulate the Thames’ flow also forbade the paying of weir-tolls to the keeper of the Tower of London (probably what is known as the “constable” of the tower) (Thacker 14). The constable had been collecting tolls destined for the Royal Treasury in exchange for permission to build fish-weirs in the river’s London reaches. However, the Crown saw fit to forgo this revenue stream in exchange for the sustained power of the flowing river through the city. According to Summerson, this made an acceptable tradeoff because it ensured the Crown’s ability to do the shipping required by its current war in Normandy, which was primarily supplied through London.\textsuperscript{6}

The first conflict within this arrangement that saw the Crown managing most of the Thames and England’s other rivers while the Corporation of the City of London oversaw the river there presages the power struggles of Victoria’s reign, when drastic measures become necessary to address the Thames’ deteriorated condition. In 1468, the Corporation of the City of London brought a case against Edward IV, charging that he had illegally issued a weir grant to William, Earl of Pembroke, within the city that violated their charter of conservancy from Richard I (Thacker 32). Thus, a contest arose over what body of political authority not only controlled the water (the surface of which was traditionally held to be a public highway), the banks, and the “soil” underneath and surrounding it, but possessed the power to modify the river’s topography to affect the resulting movement’s dynamism. This fifteenth-century suit sets the parameters for the power struggles of Victoria’s reign and the ultimate renegotiations of

\textsuperscript{6} In “The 1215 Magna Carta: Clause 33, Academic commentary,” from The Magna Carta Project. The 1197 grant mentioned here likely denotes the “mouldy heaps of documents” that were brought out in the City’s case to prove its control over bed and shores of Thames in London in 1841 (Thacker 222).
jurisdiction and authority for intervening into the nineteenth century’s river-bound crises—that time, with Parliament and the City together opposing the Crown.

Most importantly, even this highly condensed history of English river management shows that the apex of political authority constituted that body which had the say to watch over and preserve English rivers’ strength and continuity of flow. The height of English political authority resided in whichever bodies possessed, or won, the right to oversee flow in the country’s major rivers, with Parliament, via its Acts and the Commissions it creates, ascending to the forefront (and carrying legal arguments) in the nineteenth century.

B. Flow Dynamics Rises: From “diminishment” by Industry to the “Great Stink”

The 1771 Thames Act expanded the powers of the Thames Navigation Commission, consolidated its membership numbers into a practical working body, and established a set of districts that constituted an segmented but expanded jurisdiction to more systematically address the river’s management than any previous locally-based system. This new jurisdiction ran down from Crickdale to the edge of London City’s jurisdiction (which newly included an upstream section of the river to Staines, in order to allow the city a more effective scope of management).

Oliver considers this new Commission a clear step against isolated sites of water power use along the river’s banks in favor of “what [its] consulting engineer Robert Mylne described as ‘establish[ing]…certainty, which is the Soul of Inland Commerce’” in the river’s “free and uninterrupted Navigation” (226). In 1791’s “Reports of the engineers appointed by the Commissioners of the Navigation of the Rivers Thames and Isis,” Mylne announces the problem that English political bodies will struggle to solve through the middle of the next century:
Providence has allotted a certain quantity of water, to run in the bed of this River;

—*Which is not in the Power of man to encrease* (sic). —In some places, it has been diminished, at partial and particular Places, in former times, when the Value of it to internal commerce, was not so well understood, and had not such great and pressing demands for it. (qtd in Oliver 227, emphasis mine)

Mylne pictures the flowing river as a resource more than apparently God-given and endlessly life-giving. It exists as a geographical phenomenon whose energy, quantity, and capacity obey certain physical laws and is, therefore, subject to very real physical limitations.

Vitally, both Mylne and his engineer colleague, William Jessop, rail against what will long be a central concern for, and criticism of, Victorian flow-based thinking—the wastefulness with which England’s rivers and streams were being harnessed. Both engineers expressed alarm at the standard use of “flashing,” or blocking up and intermittent releasing of flashlocks, particularly at mill sites where the “depth of the river and the availability of water had been compromised” by those mills’ prior use of them. Jessop describes the use of flashlocks as “a wanton waste of the Water,” and Mylne called such practices a “spendthrift Way” of deploying flowing water’s dynamism (qtd in Oliver 227).⁷ Such alarm at the “wasting” of flowing water comes from the acknowledgment that this loss might never be reversed—might be *irrecoverable* to “the Power of man.” What had begun as a collective desire to bolster the Thames’ flow and navigability in the 1771 Commission, thus, transformed into fearful acceptance of the widespread, potentially irreversible depletion vital rivers and streams.

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⁷ One of the eventual products of the Commission’s research was the widespread replacement of the flashlock with the “poundlock,” which functioned like small-scale versions of modern locks, emptying or flooding an enclosed chamber to more safely and efficiently allow passage to vessels (Oliver 224).
For arguably the first time, the River Thames became a problem of physics (if not yet thermodynamics) with the highest of political and economic ramifications. One the one hand, as Tvedt notes, water powered or helped power nearly all production and transport in late eighteenth and early nineteenth-century industry, until or unless new applications of steam power took over. It is unclear what future interventions on English rivers may have been in that time if not for the advent of steam power and rail transport, but the development of industrial modes of production and distribution to markets—not to mention accompanying social formations—are due in Tvedt’s reading “to changes in the human relationship to water” at this moment (48). A river could only bear so much use and remain useful. At a point threatening to come in 1790’s near future, their too-enthusiastic utilization by an increasing number of economic actors would reduce the Thames and other rivers’ dynamic power to the point of uselessness.

The primary, private-sector answer in the Commission era to how English economic interests could continue to exploit the Thames and other major rivers without having the capability to “encrease” their given flows was to build new canals. For Tvedt this “canal mania of 1760-1840” is the most interesting outcome of the era, because it “created a new kind of business mentality, or the ‘true beginnings of financial capitalism’, utilizing surpluses from agriculture and trade, and capital provided by manufacturers and other investors” and producing “high returns to a new class of shareholders” (36). Logic suggests that such an intervention, while creating new avenues in which water could lay (and barges be towed), exacerbates the problem of a systemic loss of water within given watersheds.

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8 Oliver’s more politics-oriented take corroborates the cultural shift Tvedt posits as well. The former writes that, “[f]rom the eighteenth century the response of the state to calls for a comprehensive management of the river allowed a new form of governance that made possible the re-engineering of the Thames” (228) that would come to fruition only later in the nineteenth century.
Industrial manufacturers located on these rivers and streams, also most responsible for their depletion, were among the first entities forced to grapple with what we might call the sustainability of their ventures in the face of such depletion. Richard L. Hills shows how Sir Richard Arkwright recognized the increasingly obvious limitations of naturally flowing water as a productive energy source, despite that his mills’ far-flung locations proved their initial dependence on it. Rivers and streams drove the wheels that moved Arkwright’s industry-leading, mechanized spinning loom and carding processes. In 1783, having placed his new Manchester (“Shudehill” or “Simpson’s”) mill on a tiny stream that was reduced in the dry season, he devised an application for the Newcomen steam engine—to replace the one-time use of the stream’s flow with a more profitable, reliable process. This process entailed shipping and burning coal to fire the steam engine and pump water from a lower (post-use) to a higher (pre-use) holding reservoir, so that it could repeatedly run over the mill’s 30-foot wheel (Tvedt 42).

Burning coal to make steam, in order to pump already-used water uphill, Arkwright had made himself an infinite flow (Hills 43-45). One of steam’s earliest and most influential

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9 Hills summarizes the role of flowing bodies of water throughout mill-based economics, including their eventual exhaustion: “At first, the mill owners had to use either horses or waterwheels. Horses soon became tired and, in any case, mills outgrew the power that could be supplied by animals. The cotton industry had to spread far afield in search of suitable sites where water could be harnessed from rivers and this was why Arkwright’s empire was so scattered” (42-43). As a result, “[t]rade depended upon good communications because the raw material had to be imported and the finished product exported. First the Mersey and Irwell rivers were made navigable to Manchester in 1720 which helped to cheapen rates of carriage between Liverpool and Manchester” (43). After the Duke of Bridgewater initiated the canal era in 1762, “[w]ithin the next 40 years, the North West was criss-crossed” by them. “Local resources played a vital role, for, without rivers and water, there could have been no finishing of the fabrics, no power for the waterwheels and, in the early part of the Industrial Revolution, no transport for heavy goods. But the rivers quickly proved to be inadequate to supply all the power that was needed,” leading to the power source that would create steam to make up the for the lack of flow—coal (43). At this point, coal “dr[ew] the cotton industry back into Lancashire where it will be noticed that all the major textile towns were situated on coal seams which stretched down into Cheshire and Stockport and Poynton. Some millowners, like the Ashton’s of Hyde, also owned coal mines literally under their mills. Coal was to provide the solution to the power crisis for it was the primitive steam engine to which Arkwright and his partners turned for their mill on Shudehill near the middle of Manchester” (43).
industrial roles, then, was as ersatz flowing water. The natural capacity of the given watershed had been enhanced or extended by technology’s application to the topography—so long as Arkwright could bear the economic and environmental costs entailed in this circulatory, steam-driven process. This form of “sustainability,” however, previews that which will be achieved in Bazalgette’s reengineering of the Thames in the 1860’s and 70’s—not an ecological sustainability, but the preservation of a river’s usefulness for human ends.

This initial movement toward the attempted mastery of rivers for increased and enduring productive capacity—which will become more and more widely applied, as I will show directly—begins in the face of physicists’ concurrent, increasingly codified understandings of energy in thermodynamics. Over the decades from Arkwright’s and the Thames Commission’s late eighteenth century, through “hydrodynamics” and “hydraulics” rise to prominence in the 1820’s and 1830’s, to the realization of Bazalgette’s projects in the 1870’s, energy science moved toward accepted versions of the first and second laws of thermodynamics: the conservation of a given total of energy within a system, and the irreversible tendency of energetic entropy in a system to increase, both of which were posited in the English academy by the early 1850’s. The subsequent, growing acceptance of these laws increasingly suggested the astounding irresponsibility of schemes like Arkwright’s and, especially, Bazalgette’s later intervention onto the Thames. It bears noting at this early moment at Shudehill Mill, then, that the embrace of useful flows preempted any great concerns about the energetic wastefulness and acceleration of environmental damage that would accompany efforts to secure their power and predictability.

All the same, during its tenure the Thames Navigation Commission carried out many of its own topographical and technological “improvements” to the River Thames that regulated its depth and flow rates to preserve its strength and navigability—while the Corporation of London
only carried out similar interventions on the river between Staines and the city after the turn of
the nineteenth century (keeping in mind that both of these constituted newly expansive and
powerful regulatory bodies than previous, more local forms of watercourse preservation)
(Thacker 206). Tvedt’s characterization of an ideal river for transportation also identifies the
Commission’s preferred kind of movement for the Thames: “a regular, perennial, and gentle
flow…necessary for the shipment of heavy goods” (38). Under the Commission’s direction,
more than thirty-five pound locks were installed along with systematically rather than locally-
oriented and located weirs in order to segment and regularize the river’s fall. Engineers built
these features in conjunction with canals that diverted ships around shoals, shallows, and
obstructions, all to make for a more navigable river above London than ever before (Oliver 227).
Also, vitally, the Commission executed the standardization of ships’ and barges’ dimensions and
draws along with those of any locks to be constructed henceforth, as well as fixing coordinated
times for “flashes” of miller’s weirs that had been called for in a 1770 Act of Parliament
(Thacker 126). According to Thacker, the Commission simultaneously strove to standardize tolls
along the entire stretch of the river it oversaw, or in other words, to regularize the direct
economic cost and profit for the flow’s interruption. In combination with the other forms of
segmentation and regularization of watercourses’ flowing, this effort suggests the model for
serialized narrative’s management in the nineteenth century, as Ch. 1 will explore. In all, to help
reduce “waste” and “diminishment” of the Thames’ waters and energies, the Commission
segmented and regularized the disruptions of its flow, coordinating them both spatially and
temporally while attaching economic value to those dimensions.

Oliver posits that the Commission’s work establishes the context within which 1866
Thames Conservancy is later able to “entirely restructure…the river’s socioecology” through the
Main Drainage and Embankment projects (227). First, the Commission’s and the City of London’s interventions on the Thames established the legal, scientific, and financial validity of efforts to regularize and usefully shore up important rivers’ flowing action across the lengths of their courses. Second, the Commission embodied political willingness to found new regulatory authorities to shape the topography of a dynamic, productive, and economically vital space. These formations were still limited to regional jurisdiction (as in the Commission’s inability to work within the realms of London and Oxford or those towns’ authorities limited to within them), but the movement was clear. Such new political bodies were growing in size, in the hydrological expertise they employed, and in the expanse of their jurisdictions, toward an ever more topographical, watershed-level scope.

As the Thames Commission’s work moved into the nineteenth century, the dual stresses on flowing waterways, especially the Thames, weighed more heavily than ever. One on hand, individuals’ and private businesses’ desire to utilize the productive energy of English watercourses grew ever greater, while political authorities simultaneously needed to maintain their strength and navigability of the same bodies over their entire courses. However, as is widely documented now but hardly seemed a fact of history then, the accelerating growth rate of population centers like those in the northern milling districts and in London simultaneously and perhaps more insidiously strained the water-management infrastructure of those towns. Blossoming demand for drinking water and for means of waste removal in these new urban centers heaped more pressure onto—and tons of pollution into—the same rivers.10

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10 One symptom of this pressure in London was the beginnings of its now “lost” rivers. The Fleet, for example, metamorphosed from a relatively clean Thames tributary into an open, sewage-carrying “ditch” that authorities covered over out of consideration of its filth and stench, before running dry and lending its name merely to the street above its former course. “Black ditch” suffered a similar fate.
While the 1771 Commission had modeled a new, more widely coordinated management of the Thames’ flow, it employed long-existing technologies like poundlocks, canals, and weirs. Its only, though important, innovative quality was that broader scale of jurisdiction and intervention (like London City’s expanded ability to work on the river from its city limits upstream to Staines). While no radical improvements followed their interventions, these bodies’ work had some effect in making travel along the Thames more predictable, but the greatest apparent relief to major English rivers around the turn of the nineteenth century was brought about by the advent of steam power and the swift expansion of rail networks. These factors lent a false, if any significant, sense of reprieve for English watercourses, however, as their conditions clearly deteriorated even to the eyes of untrained observers.

Into this context, the man who helped shape the field that became hydrology (he named his field “hydrodynamics”), John Robison, wrote in *Theory of Rivers and Hydrodynamics* (1822), “as to the uniform course of the streams which water the face of the earth, and the maxims which will certainly regulate this agreeably to our wishes, we are in a manner totally ignorant” (392). After centuries of political and economic haggling over the installation and removal of traditionally designed mill and lock structures, Robison intends to alarm his readers about the fact that such debates contained almost no certain, scientific knowledge.\(^{11}\) The English academy could not adequately manage its rivers or streams (what present-day hydrologists would call “channels” or “watercourses”).\(^{12}\)

\(^{11}\) In a way foretelling Mr. Tulliver’s skepticism about engineers’ reports on Pyvart’s proposed “erigations” upstream of his mill in Eliot’s *The Mill on the Floss*, as I will show in Ch. 4.

\(^{12}\) The National Weather Service/National Oceanographic and Atmospheric Administration defines “channel,” or “watercourse,” as “an open conduit either naturally or artificially created which periodically, or continuously contains moving water, or forms a connecting link between two bodies of water” that “may be single or braided” (NWS/NOAA online).
Especially painful to Robison, this hydrodynamic ignorance coincides with England’s utter dependence on its rivers. His term “wishes” knowingly understates this dependence. By the first decades of the nineteenth century, the Thames and other major rivers did still provide some food (mostly outside of towns), while they primarily provided energy for grain and textile milling as well as for industrial machining and tooling and provided means of heavy industrial transportation, avenues for imperial and merchant shipping via the empire’s capital, drinking water, and a mode of waste removal, including for human excrement. Yet, as Robison asks of his academic colleagues, “Who can pretend to say what is the velocity of a river of which you tell him the breadth, the depth, and the declivity?” (392). Or, also very practically, he asks, “Who can say what swell will be produced in different parts of its course, if a dam or weir of given dimensions be made in it, or a bridge be thrown across it? or how much its waters will be raised by turning another stream into it, or sunk by taking off a branch to drive a mill?” (392).

Such questions regard the most basic, even centuries-old uses of flowing waters and their direct effects on communities and economic activities surrounding them, yet Robison’s confidence in English academy’s inability to answer them (and bowing to practice-based, untheorized “hydraulics”) indicates an embarrassing and dangerous lacuna in socially-useful knowledge. Even regarding the provision drinking water, he asks, “Who can say with confidence what must be the dimensions or slope of this branch” in order to sustain an inhabited district, or—vital for the sanitary movement which I posit that Robison’s hydrology helps to shape—“or the dimensions and slope of a canal which shall effectively drain a fenny district?”

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13 Tvedt describes this era in which steam power depended on and interacted with traditional water power: “At the beginning of the nineteenth century, in brooks and streams all over England, water wheels were established, effectively powering not only the textile industry, but also the metallurgical industry. Indeed, steam engines could not have been built in the first place without water wheels to drive the machinery that was needed to smelt the iron and form the cylinders that the steam engine was made of” (43).
for the health of its people and productivity of its land (392). For Robison, almost none of the basic actions of a river, or its reactions to human intervention, could be predicted with any relative accuracy—vital as their stakes are to England.\footnote{After *Theory of Rivers and Hydrodynamics*, Robison helped with an investigation of waves sponsored by the British Association for the Advancement of Science, in which he posits similarly basic questions: “What is a Wave? Of what nature are the Waves of the Sea? Is the Tidal Elevation of a wave obeying the same laws with any other order of wave? Is the propagation of the tide-wave affected by Local Winds? and if so, in what manner?...[I]n the existing state of our knowledge of hydrodynamics,” he writes, “we had no grounds either dogmatical or empirical to form a reply, and it was therefore of importance to the advancement of the science...that we should be able to fill up this *hiatus valde deflendus*” (417).}

If scientists did not understand the dynamics of watercourses, how could they guide interventions onto them to help sustain the health and prosperity of large towns and the country, generally? As a case study for the inadequacy of extant hydrological “theory,” Robison cites Edinburgh’s recent attempt to modernize its water supply. The city had brought in a well-known engineer, “the celebrated Desaguliers,” to build the necessary infrastructure for a reliable water supply, and his plans were “executed to his complete satisfaction” (425). After their completion, though, “the quantity of water delivered was about one-sixth of the quantity...promised,” and for that matter only “about one-eleventh of the quantity which the no less celebrated M'Laurin calculated from the same plan” (425). Traditional “hydraulics” clearly was not equal to its purposes. An expertise was demanded, a set of scientifically proven and accepted “laws” in Robison’s terms, which would have guaranteed their own applicability to any river or stream and gone a long way toward providing London and England with vital, usable flowing water.\footnote{Robison also refers often to men (perhaps unsurprisingly, only men seem to have been admitted to this field) working in other countries, especially France and Italy, whose hydrological work he sees as advanced beyond any English equivalent (forcing him to work from translations or read in the original).}

Robison’s call to settle on a reliable hydrological science in order to effectively manage watercourses’ dynamic potential to England’s benefit also has roots in Mylne and Jessop’s concern for the “diminishing” of its rivers in the late eighteenth century. From the time of those
engineers’ writing to his own, of course, industrial towns had only continued to attract unprecedented masses of workers, accelerating pressures on the watercourses around whose energy they were originally built. Into this already daunting scenario of the 1810’s and 20’s would come a series of crises through the middle of the century that induced a tipping point toward a second “new relation” to water—one which would not focus on canals or increasing the raw number of available watercourses but would address existing watercourses, seeking to ensure through direct interventions the forms of utility that Robison finds in their natural state.

In Robison’s theory a river or “watercourse” always exists as a system of sequential collections. Topography forms the physical context, physics determines the motion(s) that can occur within this context, and climatic events initiate those movements in the collection of rain and groundwater. “River,” Robison begins simply enough, “[i]s a current of fresh water, flowing in a Bed or Channel, from its source to the sea” (369). What makes this current intriguing for Victorian culture is its nature as a “considerable collection of waters”—an already-collected and always-collecting, dynamic phenomenon, “formed by the conflux of two or more Brooks, which deliver into its channel the united streams of several Rivulets, which have,” in turn, “collected the supplies of many Rills trickling down from numberless springs, and the torrents which carry off from the sloping grounds the surplus of every shower” (369, emphasis in bold mine). To this, Robison vitally declares, “Rivers form one of the chief features of the surface of this globe, serving as voiders of all that is immediately redundant in our rains and springs” (369, emphasis mine). Thus, “surplus” and “redundant” water and suspended material both form and are removed by rivers, which gain strength and volume as they flow down their watersheds. It is this

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16 The other main roles ascribed to rivers in Robison’s second point of definition include as “boundaries,” “barriers,” “highways, and…storehouses.” Further, they are (nearly anthropomorphized) fertilizers, graciously “laying upon our warm fields the richest mould, brought from the high mountains, where it would have remained useless for want of genial heat” (369)
quality that led to rivers being taken for granted in their supposedly “natural state,” even to the extent that the work they had traditionally been adapted to become viewed as “natural.”

While rivers’ flowing action was so consistently described as if timeless and ceaseless, Robison, following Mylne and Jessop, recognizes and seeks to address their physical, energetic limitations. He invokes a metaphor of Pliny’s about human life as a river, in which its “general origin and progress…bear some resemblance…to the life of man,” stressing that a river’s movement is neither timeless nor ceaseless but obeys physical laws (370). Over its “progress” the river-as-man “plays among the flowers of a meadow…waters a garden, or turns a little mill” (echoing Combe’s image) (370). Robison’s metaphor understands something that Combe and many others never engage with—the reduction and unavoidable, eventual dissipation of its flowing (ergo, energy). Its later years render it “grave and stately in its motions”—signs of a reduction in forceful movement—leading to eventual “majestic silence…on its mighty waters, till it is laid to rest in the vast abyss” (371).17 Silence and rest both invoke something like “heat death,” a term which was already a topic of public speculation and scientific inquiry at the time.18 Framed as “death,” energetic equilibrium or stasis bears connotations of both inescapability and finality. Thus, the already-described dependence of England on its watercourses ought to, for Robison, include a respect for their eventual, unpreventable dissipation.

In response, Robison advocates scientific understanding of how these ends can be forestalled, or barring such dramatic possibilities, for maximizing the time and distance over

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17 The ocean was repeatedly invoked as an image of an energetic “sink” among Victorian physicists who feature in Chapter 2 of this work, representing a state of energetic dissipation or equilibrium in which no more work is possible and into which any the addition of more work would be a “waste.”

18 Byron’s “Darkness,” from 1816, shows an artist’s interest in the topic, while Fourier and Sadi Carnot lead early scientific study of heat and what would eventually be called “entropy” and “heat death.”
which rivers can be put to social use despite increasing stresses on them. He asserts that “[e]very nation, every country, every city, is interested in” a fully-wrought “theory” of rivers and hydrodynamics which will produce a developed field of knowledge and set of practices (388).

“Neither our wants, our comforts, nor our pleasures, can dispense with an ignorance of” how to understand and maintain rivers’ flowing action, he writes (388). Englishmen must “conduct their waters to the centre of [their] dwellings” in order to enable modern living conditions, they “must secure [them]selves against their ravages” in exceptional climatic events, and they “must employ them to drive those machines which, by compensating for [their] personal weakness, make a few able to perform the work of thousands” (388). In each case, the flowing action of a watercourse exerts power while removing excess material-as-force and remaining predictably channeled.

The desire to bend England’s rivers and streams to these ends leads Robison to a hegemonic-sounding statement, which I posit becomes one of the explicit or implicit premises of nineteenth-century British culture, generally. Because of the threats of their unruliness, unpredictability, and depletion, and for the sake of all the vital functions listed above, Robison writes, “we must confine and govern the mighty rivers” (388). His conceptual, ideal “river” constitutes a voiding force, made of a series of collected and drained surpluses that can be put to work with immensely powerful results, though it constantly threatens both to “ravage” humankind’s efforts when mechanisms of control fail to accommodate climatic events and to dissipate—always in the end, if not along the intended course. Thus, watercourses must be reconsidered, and they must be brought under closer control.

The deliberate reconception of a class of geographical phenomena into human-“governed” and “confined,” flowing tools whose formerly “natural” action is viewed as industrial-scaled social and economic utility denotes the beginnings of a distinct era of relations
between humankind and topography—that of flow dynamics. However, this relation to
topography that I call flow dynamics does more than simply seek to further domesticate
watercourses—“conduct[ing]” them more skillfully into the hearts of English homes for the
purposes of drinking, cooking, and bodily excretion (and the drainage thereof). Flow dynamics
denotes a new cultural relation to topography, whether inhabited or “natural,” that always
evaluates it as the meeting of watershed and watercourse along the lines of Robison’s idealized
“River.” This new relation to topography calls for expert study of watercourses and topography
and implies subsequent infrastructural interventions onto them aimed at their transformation, if
not subjugation, in order to maximize the use of those qualities Robison hailed for the economic
and social boon of English society (or one class of that society).

Though its set of concepts for quantifiably evaluating the relative state of a watercourse
and watershed along the lines of Robison’s idealized functions of those, flow dynamics also
always provides aims for any infrastructural-topographical interventions in practice—to
quantifiably boost its depth, flow rate, and length of course, and their predictability and
endurance through increased usage—with success measured via the same qualities that had been
used to evaluate a watercourse’s state to begin with. It cannot be overstated that interventions
steered by flow dynamics first attempt to shore up, but then also to expand, watercourses’ natural
powering and voiding capacities in order to accomplish more of what English society wants from
its flowing waters. Thus, given Robison’s awareness of the unavoidable “rest” coming to every
river or stream in the energetic sink that is the ocean, the desire of flow dynamics to extend the
duration and distance of its powerful, useful flowing comes in contest with that unavoidable
tendency toward energetic dissipation. The negotiation between the economic and energetic
costs necessary for shoring up and/or extending watercourses and the value that such flows might
produce would lie with the private businesses and political authorities who modeled their interventions on Robison’s hydrodynamic thinking.

The keystone application of flow dynamics onto a major river in the era, Joseph Bazalgette’s Main Drainage and Sewage Interception and Thames Embankment projects, demonstrated the extent of such costs that English political authority—under intense public pressure—was willing to endure in order to obtain a newly forceful flowing in the nation’s most looked-upon (and smelled) river, the Thames in London. Its deteriorating state had already inspired the first Royal Commission to address water provision in London in 1828, and engineers and concerned members of the public had been proposing ways of addressing it since the 1830’s, (including figures as unexpected as the artist John Martin whose designs closely resemble Bazalgette’s eventual plans). However, only after 1858’s “Great Stink” along the London’s tide-locked, depleted, and polluted Thames paralyzed the city and closed Parliament through its abject, sensorial assault, did that body set the Metropolitan Board of Works to the task of finally bringing the flow back into the Thames—the only perceived way to alleviate its condition.19

Bazalgette’s work will be central in Chapter 3, but it bears mentioning here that his embrace of flow dynamics’ concepts for more fully and permanently channelling and extending the Thames’ useful, sewage-voiding flow utterly disregarded considerations of cost, sustainability, and impact to downstream ecologies and communities below that extended point of its dissipation. First, he studied the flow rates (or lack thereof), volumes, and tiling materials and designs in the haphazard arrangement of parish-based drainage throughout the the city, as

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19 The 1828 investigation’s official title: Royal Commission on the Water Supply of the Metropolis. Conspicuous, man-made contributors to the later “Great Stink” were the widespread adoption of Bramah’s improved flush toilet, changes to laws in 1818 and 1848 that allowed (meaning, encouraged) private homes to circumvent the traditional cesspool system and deliver tons of human waste into the Thames, as a sanitarian outgrowth of the desire to make waste flow “away” rather than collecting it in cesspools, and dryer and hotter weather patterns throughout the Thames watershed.
well as the competing movements of the river’s currents and its unavoidable tidal counterparts, which he also sought to quantify through “float studies.” He then settled on a unified, watershed-based model of drainage on both sides of the river that would, in his opinion, ensure consistent flow rates of runoff and wastewater through his drainage systems in any tidal or climatic scenario. This humanmade, “nature”-modeled “flow” used coal-burning pumping stations on both shores to lift the city’s combined sewage at critical points, so that it would flow by “gravitation” through the new, firm borders the embankments would serve as and reach “outfall sewers” located downstream. These sewers’ locations had been calculated to coordinate with the river’s tidal movements and eject the sewage beyond any potential for its continued recirculation into London against the river’s overused current.

Bazalgette’s (and the public’s) fixation on powerful, uni-directional, waste-voiding flow contradicts ardent criticism from chemists and physicists, who criticize both its wasting of the recuperative potential in the sewage it drains as well as the waste of all the energy it expends just to extend its drainage flow’s inevitable point of dissipation. Even Robison’s earlier metaphor for a river from Pliny suggests a basic sense of the energetic expenditure and eventual dissipation into equilibrium that a watercourse must necessarily endure, and thermodynamics shared bonds with hydrology to the extent that William Thomson (Lord Kelvin) wrote in 1857 that “hydrodynamics is to be the root of all physical science” (qtd in Darrigol v). Thomson even articulated his contribution the foundation of the second law—the tendency of energy to be move in only one direction, toward entropy—via the image of a river running downhill toward the ocean. In this image, kinetic and potential energy existed as it fell, while its outlet into the

20 James Prescott Joule’s thermodynamics-based critique of this energetic waste, coupled with his advocacy for the chemical potential in the sewage thusly flushed downriver, make up a central part of this work’s reading of Dickens’s *Great Expectations*, in Chapter 3.
ocean, as an energetic “sink,” made it part of a body into which no amount of energy could be put to raise its temperature and made it capable of performing work (Smith and Wise 290). The principles of energy conservation and the flow of energy toward expenditure in equilibrium, were available to Bazalgette and educated engineers and scientists, generally, by the late 1860’s when his plans began to be realized by workers. Nonetheless, the usefulness of powerfully flowing watercourses celebrated in flow dynamics’ view of topography prevailed. Even above the objections of the monarch, whose failed suit to control the river’s banks led to her concession to the Parliamentary Commission’s wishes, Bazalgette’s crews executed his plans and transformed the river into a more consistently useful version of its historical, idealized self, rendering the river a more-than-naturally-capacious power and water source and drain for London.

The victory of flow dynamics’ desire to shore up and extend useful flows over the proofs of new thermodynamic science—that energy, once expended in an effort like Bazalgette’s, could not be recuperated—hearkens back to Arkwright’s first coal-powered response to his diminished Shudehill stream. This prioritization of economic utility over energetic responsibility (not to mention claims for environmental sustainability, which Ch. 3 will examine in part), inhere in the general application in industrialization of flow dynamics-shaped models of production. In a sense, the era of industrialization exists as the profit-driven conversion of matter into liquid which can be managed as closely as possible to the way Robison advocates for watercourses. To begin with, flowing water’s harnessing in early industrial mills enabled machining, which enabled steam power and its implementations, which, in turn, enabled the turning into liquids of metal (in steel), asphalt, and cement. All of these also occurred in the same era that turned human excrement into liquid in sanitarian drainage flows and made paper from flowing liquid—
first from rags and then from trees liquified into paper pulp in mills—which, as I will show, then flowed forth as serial narrative. In terms of the industrial utilization of otherwise-natural flows, we ought not forget, either, that in addition to the human waste which the Thames was reengineered to help deliver further downstream, the liquid byproducts and runoff of these and many other types of industrial operations also flowed into that river—directly or through London’s drains, sewers, and streams.

C. From “Hydraulics” and “Hydrodynamics” to Social Hydrology — “voiders of all that is redundant” in Sanitary Reform

I posit a productive relationship between the Robison-led drive to establish and apply a reliable hydrology and the advent of the sanitary movement in early nineteenth-century England. Specifically, the influence of flow dynamics as a way to evaluate inhabited areas as watersheds provides a discourse Victorians can use to voice their concerns about the perceived political, moral, and health threats posed in new, densely populated, urban neighborhoods. Those seeking to relieve the social pressures caused by urbanization—population explosion and density, new forms of work with unprecedented individual and collective consequences, poverty and filth within the newly and poorly constructed residential areas—found flow dynamics to be an apt starting point. Robison’s quest to establish a science for managing watercourses toward

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21 I would like to note here that, while Marx’s depictions of the activities of a capital-based economy are too large a topic for the current writing, his work could be seen as questioning the potential for wastefulness in capitalism’s embrace of flows and circulations of capital and goods, given the finite resources of the system in which it works and the potential for poor management of them.

22 This period of interest in hydrology features works like the “Report of the Committee on Waves” from the British Association for the Advancement of Science, cowritten by Robison and published in 1838, and various hydrological studies (books and collected lectures on “Mechanics” increasingly featuring “Hydro-mechanics,” investigations of fluid motion, and other hydrological inquiries, John Hollingshead’s Underground London [an 1861 book on London’s drains and sewers], or Sir Thomas Dick Lauder’s The Great Floods of 1829 in the Province of Moray and Adjoining Districts [1873], for example).
societal and economic benefit lends an epistemological structure to the socially-minded sanitary
movement, beginning an ongoing interaction between the two that sees increasingly direct
applications of flow dynamics’ evaluative criteria to problems of population management over
the course of the century. I call this application of flow dynamics’ principles to the crafting of
public policy for socioeconomic and population management social hydrology. This application
of hydrological thinking to socioeconomic and population management seeks to shape
individuals’ and targeted population groups’ physical movements through inhabited space, their
collective bodily intakes and excretions, and their labor-related activities as flows, consequently
opening them up to hydrologically-based management.

Robison’s hydrological rhetoric provides the foundations of this crossover from physical
into social (pseudo-)science. Even his initial definition of “river” lends itself to the social
applications of hydrology that will follow, in so far as it invokes rivers as dynamic collections
that collect to drain surplus or redundant material (as a “considerable collection of waters” that
“carr[ies] off…the surplus of every shower,” acting as “voiders of all that is immediately
redundant) (369). Because so much Victorian anxiety concerns rapidly collecting, apparently
“surplus” or “redundant,” stagnating or “dissipated/-ing” population groups, a science for
managing these dynamic characteristics in rivers and streams carries over into the formation and
regulation of social spaces and practices—perhaps after or as it helps form discourses for
expressing those concerns to begin with. These forms of regulation, in turn, are reflected and
opened for critique in the era’s artistic production, including the novels this work will examine.

A social and political urge similar in aim to Robison’s, and using his hydrological
rhetoric, set the sanitary movement’s terms of engagement, evaluative criteria, and both
diagnosed social ills and their prescribed treatments. Through this appropriation of
hydrodynamic criteria, the sanitary movement also inherited that science’s roots in Mylne’s and Jessop’s fear for England’s “diminishing” watercourses—their deterioration and dissipation. By extension, the campaign inherited the rest of hydrodynamics’ language of liquid movement—of stagnation and dissipation, of molding and contagious dampness, of blockage and failed drainage, of the kinds of community-scaled problems that Robison’s science would alleviate. Robison’s promise to manage rivers against their flows’ dissipation so they could envelop surplus and void redundancy while functioning as power sources lead to social applications of his flow dynamics’ concepts. These applications will seek to predictably locate “surplus” populations, set them in motion in well-bounded, forcefully productive economic channels of work, preventing their “dissipation” and dangerous, stagnant collection. In several important instances, sanitarians even explicitly deploy hydrological terms on people in particular social environments.23

Among others, Michelle Allen, Mary Poovey, and Pamela Gilbert have detailed the sanitary movement’s cultural interventions and some of their repercussions in literary representations of the time. What has not yet been made clear, however, is the influence of critical concepts from “hydraulics” and “hydrodynamics” on the nineteenth-century sanitary movement’s paradigm of diagnosis and resulting intervention on social ills (the height of which Poovey locates between 1832-1842).24 Further, the adoption of a hydrological discourse in the

23 Also like Robison’s science (or Bazalgette’s later statistically-oriented application of it), the primary drivers of the sanitary movement deployed statistical study to dynamic (mostly hydrodynamic) phenomena in targeted towns and neighborhoods. These produced evaluative criteria that could quantifiably indicate ideal, acceptable, or problematic statistical ranges for a wide range of concerns like density of population, flow rates or numbers of outlets for drainage, drinking water, and sewage.

first decades of the nineteenth century eventually took on wider cultural significance during and after the water-related crises of the 1850’s.

James Phillips Kay’s 1833 work, *The Moral and Physical Condition of the Working Classes Employed in the Cotton Manufacture in Manchester*—which Poovey details in *Making a Social Body* as a vital influence on the sanitarian movement’s social connotations—contains seventy-two pages of diagnoses and proposed treatments for the working classes who appeared so unwell to him. Its introduction intended as a methodological statement reads like a declaration of bias, as he assures readers that the “evils” of Manchester *operatives*’ lives are to be “unreservedly exposed” in the work (1). However, in the same sentence, he assures readers that these evils are “far from being the necessary consequences of the manufacturing system,” that they do not “flow from any single source” like lengthy working hours or machine operation, but may “have a remote or accidental origin, and might, by judicious management, be entirely removed” (1). On the contrary, the very minimal “restrictions” already placed upon capitalism damage not just the capitalist, but the working classes, for whom “are reserved the bitterest dregs of the poisoned chalice” (2). Thus, before his work beings in earnest, Kay invokes a dynamic interrelationship between flow, political management, economic movement, and the “moral and physical health” of his work’s title. Vitally, too, the reader already understands that the term “management” holds the weight of addressing whatever poor living conditions the Manchester laborers suffer, and not the manufacturing system’s workings nor capitalism writ large.

A close follower of Kay’s, William Cooke Taylor reiterates both this beginning bias and its expression in a discourse of liquid movement in *The Natural History of Society in the Barbarous and Civilized State* (1841). Regarding the factory system’s effect on its *operatives* (as he also calls workers), Taylor expounds a list of their woes while simultaneously absolving the
factory system from any role in them. “That many will dissent from these views is highly
probable,” he states, because the factory system is still new and “no new element of society was
ever developed that did not excite alarm and produce peril” (261). Such alarm, for Taylor, is
misguided because it would rather “destroy the element instead of regulating its courses” (261,
emphasis added). When it comes to the “operatives” suffering in factory districts, better
management from above and perhaps better domestic economy of their own—a favorite topic of
sanitarians—might easily cure them. The belief that proper “management” by authorities could
unquestionably effect desired outcomes, which are framed as “courses” and “flows,” introduces
the implementation of flow dynamics in what I am calling social hydrology.

The fact that Kay’s introduction includes the word “flow” demonstrates that a discourse
of liquid movement suffuses the essay from its opening, and *Condition of the Working Classes*
proves to be full of hydrological or hydrology-derived criteria for diagnosing and proposing
treatments for both town and people. Also, where Robison ruefully informed readers that he had
to translate and/or work from Italian and French researchers in his “hydraulics,” Kay laments
that Prussia, the Netherlands, Sweden, and France all had outpaced England in their statistical
analyses of their working classes’ condition. “[B]y specific measures…[t]he statistical
investigations” of those countries were, compared to what Kay found for his own country,
“minute and accurate…concerning population, labour, and its commercial and agricultural
results” (4). In other implicitly more advanced countries, people, land, laborers, work, and its
products were statistically measured like systematic inputs and outputs. In Kay’s reading this
allowed those countries to adjust taxation, finance, and other policies accordingly, as opposed to
the “approximation to truth” England got by its lengthy, complicated Parliament-led

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25 The term “course” will prove to be central in narratological and critical reception of serialized
narrative, as well, as Chapter 1 and Chapter 5 will both make clear.
machinations for studying the populace (5). Kay’s desire for something like a social science to equate to Robison’s hydrological science, thus, comes from similarly nationalist, economic motivations as does Robison’s call for a reliable “theory” of rivers and hydrodynamics.

Recalling that Robison’s hydrology works from the premise that a topography gives form to possible avenues of flow which combine with physical laws and climatic events to initiate flows of water and collected material, Kay’s initial isolation of “districts” within Manchester begins his application of social hydrology there. These districts become a series of distinctly drained urban topographies which set the pattern for subsequent sanitary projects. Kay’s adoption of already-established police districts contributes to the long-predominant interpretation of works like his, Edwin Chadwick’s, or even Charles Booth’s in London late in the century as extensions of the Foucauldian “carceral.” While they do display a cartographic (potentially “disciplinary”) urge, what Kay establishes with his district-based statistical inquiry is a segmented topography, an inhabited landscape whose subdivisions are oriented around and dependent upon—or poisoned by—their water supply and drainage flows. As present-day hydrology defines a “drainage area” or “watershed” as “an area having a common outlet for its surface runoff,” Kay’s sixteen Manchester districts’ analyses center on their drainage features.26 Thus, mapping performed by Kay as an initiator of sanitary study is motivated by and carried out through attention to liquid movement. And while a collective, human body is our (rightfully) accepted metaphor for the concept that Kay’s work helps to establish about Victorian English society, his analysis of Manchester and its laboring inhabitants actually constitutes an application of hydrological, flow-based thinking to urban space and populace, starting with cities conceived of as segmented and, ideally, regularly drained watersheds.

26 According to the NWS/NOAA.
This flow-oriented mapping inheres in his evaluative criteria, provided to readers as the “tabular queries” that Board of Health employees carried with them through the city. These queries will be discussed in detail in Chapter 2, but the standard questions address the presence or absence of drainage features, availability of drained “privies” and how many of such facilities exist per household in a given street, and the presence of collected, stagnating or flooding waters in streets or homes. The data provided by his Board of Health officers then create a series of information-loaded maps of the city by district which plot the quantity, capacity, and quality of moving water, waste, matter, people, or goods (especially alcohol) as flows or other particularly liquid movements.27

This action describes Manchester’s districts via the drains and streets that ought to denote liquid movement through them, though Kay most often discusses their inadequacy for preventing the collection and stagnation of liquid (rain, manufacturing runoff, human waste all included) in streets, alleys, courtyards, or houses’ lower levels. When it comes to districts that demonstrate hydrological problems, they are, according to Kay, in “the greatest portion… of very recent origin; and from the want of proper police regulations are untraversed by common sewers” (13). Their shared traits are their newness, because of the rapid rate of population growth, and their

27 Such an impulse toward mapping and/or tracking liquid movement across topography also emerges in Chadwick’s famous Report on the Sanitary Condition of the Working Class (1842). Its second section begins with a long chapter entitled “Drainage” (26). Then broken down into multiple subcategories, only the first subsection of “Drainage” proceeds by examining topography according to preexisting place names. The rest are organized around problematics of drainage whose instances are then put into a sequence according to the strength of their examples. Thus, a tabular or cartographic representation or project is really shown to be a secondary effect of a desire to study and improve flows of water, people, and other material, which define the spaces around them.

Similarly, William Cooke Taylor’s own introduction to Natural History of Society in the Barbarous and Civilized State (1841), his factory operatives’ districts follow Kay’s pattern. “It is an admitted evil, that population has accumulated in certain districts beyond the means of finding proper accommodations,” he writes (Natural History 249). Of most concern, again, are that “[s]ewerage, drainage, ventilation, and the supply of water, have been neglected in the haste to provide dwellings for the multitudes that aggregate” in a booming mill town (Natural History 247).
being conceived of first and foremost as poorly functioning watersheds. ("Police regulations" refers to the only previous legislation that attempted to address drainage in urban areas, if and when police chose to designate particular streets for improvement.)

Any infrastructural deficiencies that prevent clear, strong, separately channeled flows of water, sewage, or runoff—or any conditions that indicate the lack of such flows—draw Kay’s fire. For example, that “there is only one privy for three hundred and eighty inhabitants” of Parliament-street, and that within “a narrow passage, whence its effluvia infest the adjacent houses,” suggests to Kay that the location is “a most fertile source of disease” in need of immediate remedy (24). In the same street, he notes cesspools with open grids in houses where at least twelve families of weavers live (24). Similarly, a neighborhood called Gibraltar features a “mass of cottages filling the insalubrious valley through which the Irk”—a river utilized and polluted by multiple mills—“flows,” and which is “denominated Irish town” (25). Thus, Kay observes and connects a “mass” of minority, immigrant population, foul, poorly drained living conditions, and the “insalubrious,” industry-abused river Irk as one conceptually linked problem.

In another district whose “evils” are “so remarkable as to require more minute description,” Kay’s alarm about the problematic movements of water and (implied) liquid waste justify his judgment of its inhabitants’ moral state (21). In a location between “a high bank over which the Oxford Road passes, and a bend of the river Medlock, where its course is impeded by weirs,” notably obstructing its otherwise natural flow, this district, is “inhabited by the lowest Irish,” he says (21). Their “lowness” corresponds to, or is even encourage or confirmed by, their homes’ or streets’ physical relation to the nearby river, its improper use and flooding, and to the lacking drainage among the nearly 200 houses (21). Then, as if in direct cause-and-effect relationship, he declares that “[t]his district has been frequently the haunt of hordes of thieves
and desperadoes who defied the law, and is always inhabited by a class resembling savages in their appetites and habits” (21). Savagery, dissipation, and illegal behavior all correspond to a river’s literal flooding, pooling, and energetic dissipation.

Kay ascribes even more concrete, direct connections between Manchester’s hydrological and social problems in other ares. Districts “1-4” feature “narrow, unpaved streets, in which mud and water stagnate” that “become the receptacles of offal and ordure” and are, not coincidentally, “inhabited by a turbulent population, which (is) rendered reckless by dissipation and want” (25, emphasis mine). He claims that local police cannot prevent occasional riots there, which include the burning of machinery or other equipment.  

Conceptually, then, where a river’s “insalubrious” flow floods and collects in streets and homes, or where drainage flows dissipate into stagnant pools, the people “dissipate” or are “dissipated” as well.

When nineteenth-century writers like Kay invoke “dissipation” as a moral quality or state, they are diverging from that term’s longest-standing meaning in physical science. By doing so, they are also illustrating the extent to which hydrological thinking has seeped into the sanitary movement and colored the evaluations of whole population groups along lines that Robison’s flow-based hydrology helped to establish. I will more fully illustrate the extent of this term’s newly-moral denotations and that change’s relationship to social hydrology in Ch. 1, but it bears inclusion here that the term’s use in physical science dates to the sixteenth century, while its first use in describing potentially vicious behavior is credited by the OED to Cowper’s 1785 work, *The Task*. This change in the usage of the word “dissipation” directly aligns with the

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28 Literary examples of such targeted neighborhoods abounds, as in Hardy’s *The Mayor of Casterbridge*, where the police-evading “skimmity-ride” emerges from muddy “Mixen Lane” before eventually depositing Farfare’s effigy in the nearby creek, or in *Bleak House’s* “Tom-All-Alone’s” from which Jo, the disease he helps to spread, and the keys to the Deadlock family secrets come.
acknowledgment and response to diminishing English watercourses that I have traced here.\textsuperscript{29} It also appears to coincide with the moralized, if also xenophobic and classist, expressions of concern for the English social body that respond to rapid urbanization in the same towns whose location along English rivers reflects their sustained dependence and abuse of them (also suggesting why the temperance movement’s origins lie within the sanitary movement). Like waters that are “diminished,” inhabitants of districts with collecting, stagnant, dangerous wastewater or other liquids lacking proper flow are, themselves, “dissipated.”\textsuperscript{30}

In the model of watershed drainage, then, when social topographies lack productive, healthy flows of consumption and subsequent drainage, dangerous collection and stagnation begins and those “surpluses” threaten to flood. Kay’s initial problem with workers’ districts is their lack of drainage infrastructure and hydrological management (blamed on their newness and speed of construction). From there, he begins assigning social ills to the same kind of rapid

\textsuperscript{29} The change in moral terminology after the advent of Robison’s “hydrodynamics” can also be seen in comparing sanitarians’ writings to an earlier example like Thomas Percival’s \textit{Observations on the State of the Population in Manchester and other adjacent Places} (1775). Throughout this work, Percival links seasonal changes, rainfall amounts, and climatic factors generally to the rates of disease and death. (“It is remarked…that wet seasons are generally more free from epidemic diseases than dry ones,” he notes [22].) However, despite his interest in water as an influence on urbanizing populations’ health, he uses no overlapping, hydrology-based language. He favors “intemperance” to describe alcohol overconsumption and has no widely-applicable, formerly physics-oriented term like “dissipation.” “In small corporation towns, like Richmond,” he quotes an interviewee as saying, for example, “numbers are taken off by excessive drinking; but he people who live temperately” live relatively long lives (49). People are not “dissipated” and they do not “dissipate” in this moral discourse that precedes Robison and Kay. As physiological texts show, too, this same era saw the movement from the traditional term “fluxus” to the term “flow” in describing movements of bodily fluids. Flow-based criteria seem to have pushed that word and its negative quality, dissipation, to the forefront of various modes of scientific thinking.

\textsuperscript{30} It is no coincidence that the work Kay foresees for this surplus pool of humanity—Ireland’s “redundant labour”—is in “great public works…such as draining bogs, making public roads, canals, harbours, &c., by which the entire available capital of the country would be increased,” “England would then cease to be, to the same extent as at present, the receptacle of the most demoralized and worthless hordes of the sister country” (54). From the end of the eighteenth century, those “navvies” who helped to dig the network of canals discussed earlier were often targeted as “dissipated,” alcohol-abusing populations. Furthermore, Kay’s imagined purpose for these populations closely matches not only those navvies’ work but the initial, declared purpose of the first hulks prisoners’ labor at Woolwich Warren on the Thames, which I will discuss in Ch. 3 in context of Dickens’s \textit{Great Expectations}. 
buildup, but this time of the populations inhabiting those neighborhoods. Working from a flow
dynamics perspective, the rate and volume of such collection can only threaten dangerous
stagnation, dissipated flow, even flooding.

Kay consistently applies hydrological criteria to such people as well, as in his lamentation
that Ireland had “poured forth the most destitute of its hordes” into British mill towns (6,
emphasis mine). As in the above examples, too, these people who “pour forth” like liquid
material collect where proper water and waste drainage lacks—where “[t]he houses are ill
soughed, often ill ventilated, unprovided with privies, and in consequence, the streets which are
narrow…become the common receptacles of mud, refuse, and disgusting ordure” (13). Setting
the stage for the most important development of social hydrology, then, Kay begins equating not
just the moral character of people to the relative sufficiency of their neighborhoods’ hydrological
management, he begins to see such people as material aggregates, otherwise redundant in their
counties, towns, or countries of origin.

In his 1842 *Notes of a Tour in the Manufacturing Districts of Lancashire*, William Cooke
Taylor follows suit and names those who had relocated from English agricultural settings to mill
towns as a “long a continuous influx,” whose movement is “the most striking phenomenon of the
Factory system,” leading to a “population which…has suddenly accumulated” (Taylor 7). Such
hydrologically-depicted movement transforms these people into “an aggregate of masses, our
conceptions of which clothe themselves in terms that express something portentous and
fearful” (*Notes on a Tour* 6). Interestingly, too, for Taylor the people who have suddenly
accumulated like so much dust or mud, their instability or inconsistency as people is also clear.

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31 The *OED* defines “sough,” v.: “to make drains in (land); to drain by constructing proper channels.”
He continues, “these men have very speedily laid aside all their old habits and associations, to assume those of the mass in which they are mingled” (7).

Turning Kay’s beginnings of social hydrology to the social and more explicitly political, Taylor repeats his “poured forth” phrasing word for word to describe not the workers’ initial immigration but their day-to-day movement, exaggerating that, “had our ancestors witnessed the assemblage of such a multitude as is poured forth every evening from the mills of Union Street,” they would have reacted by reading the Riot Act (6, emphasis mine). Even more than becoming an “aggregate,” the aggregated people become a fluid object requiring treatment under flow dynamics—damming up, steering toward usefulness, voiding redundancy or surplus through productive motion, shoring up against dissipation.

Even if such populations do not appear to pose a threat in such aggregation, Taylor argues that their sheer numbers, their nature as an “influx” that “pours forth” without apparent end, will eventually threaten destructive flood at some future point through its scale of latent energies. For Taylor, this marks the present moment as a crisis point. “Hitherto, the manufacturing towns have absorbed the surplus labourers from the agricultural county,” he writes, “but the drain is now choked, and the stream, driven backwards to its source, threatens a fearful overflow, which may sweep away the very elements of civilisation” (81, emphasis mine). A racist, imperialist attitude clearly underlines Kay’s judgment of the Irish in Manchester (as Poovey has explored), and here, Taylor invokes the same terminology and problems that Robison addressed in his

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32 The image of the “choked” drain will be important in John Snow’s cholera research, as I will explore in Ch. 2, particularly regarding his initial evidence for water-borne “communication” of the microbe. Two late-century literary imaginings of such backing up of drains to cause destructive floods—one more literal and one more figurative—come in Jefferies’ After London, in which obstruction of the Thames causes its collected waste matter to flow backwards through the metropolis’s sewage system and destroy the city, and in Elizabeth Barrett Browning’s Aurora Leigh, as Pamela Gilbert’s Citizen’s Body also points out, depicts the urban poor as “clogging” streets, and “oozing” in dark slow stream, like blood” (134-5)
“hydrodynamics” in order to compare all incoming workers to a potentially forceful, liquid matter that can undo “civilisation.” By implication, then, like the inhabitants of Kay’s most problematic district, a human “influx” that collects beyond towns’ ability to void them as productive flows, therefore, threatens a potential, unpredictable flood that could return England to a barbarian, if not a savage, state. Bearing in mind that Taylor’s 1841 book was entitled *The Natural History of Society in the Barbarous and Civilized State*, we can assume he feared a return against the “course” of civilization (in the “West,” in his view)—like a second “Noah’s Flood” that erases the progress assumed to inhere in Western or English history.

Taking up such a political tack, Thomas Carlyle’s “Laissez-Faire” and “Not Laissez-Faire” from 1840’s *Chartism* feature an argument against the “donothingism” of laissez-faire government, in which he senses that the current era demands an end to the philosophy of passive intervention into the “course” of England’s laboring classes’ lives. Carlyle wants England’s political authorities to “govern” the “under classes,” as he calls them, via active, direct “guidance” to secure English society from the threats of both violent revolution (“ravaging” misdirected or poorly-contained force) and the failure of productive economic forces (dissipation which Taylor also sees in “wasted” laborers) at stake in those classes of people (64, 66). As Ketabgian notes in her *The Lives of Machines*, Carlyle specifically imagines the purposeful, working man as “a free-flowing channel, dug and torn by noble force” (137), and he desires that

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33 Privileged writers criticizing new urban populations accumulating in industrial towns that drove English industry fits within a cultural moment that also saw complaints about restrictions of free trade in the Corn Law debates alongside the “threat” of Chartism. The constellation of England’s first cholera epidemic, the first Reform Bill, and the delivery of the Queen’s first personal water filter within a span of four years also hardly seems coincidental considering the statement of a Tory MP mentioned by Gilbert in *The Citizen’s Body* who hailed the French for not granting the franchise so “low” as in England but “made their voters pass through a kind of filtering stone…in order to cleanse them of their political filth” (40).
politics be a “noble force” that might “confine and govern,” as Robison demanded for English watercourses, those aggregate masses into such free-flowing, well-contained streams (388).

The social hydrology that Kay and Taylor help to establish can seemingly only end in such calls for conservative, even anti-democratic, political action, thanks to the connotations of literal survival, let alone prosperity, that flow dynamics bears. If Robison’s hydrodynamics can function as a model for the combined management of urban space and population, it must be to shape those inhabited topographies so that the populations’ energies are set in motion effectively. The “influx” to which Kay, Taylor and others ascribe much of the blame for the “evil” conditions in which these people find themselves has a function other than helping to ascribe blame. That second function is to equate humanity to matter, because while people do not “accumulate,” liquid matter flows in “influxes,” accumulates, pools, can be deemed “surplus” or “redundant,” after having been “poured forth” in the passive voice. Thus, when population groups can be made into matter rather than humanity in public discourse, they can be—they ought to be, in this line of thinking—submitted to “governance” in Carlyle’s terms, to “management” in Kay’s and Taylor’s, or to the “mastery” of Robison’s flow-based hydrology.

D. Flow Dynamics in Nineteenth-Century Literature and Culture

This work’s structure emerges from the contests that proponents of flow fought throughout the nineteenth century as they relate to and take shape within the narratives I have chosen. The forms of liquid movement that physically opposed, or constituted the lack of, idealized flowing that Robison sought in rivers’ and streams’ government—dissipation, circulation, or flooding—also organize the ways that flow dynamics was realized and opened to critique within economic adaptations, social and infrastructural applications, and in literary
imaginings of these. However, I will begin from the premise that scholars have not yet understood or appreciated the significance of the fact that, on the material level, serialized literature existed as flows both managed deliberately as such and demanding a distinct creative endeavor from authors who were bound to its ongoing motion in time and its existence toward an always-granted finitude. This given movement toward an inevitable, final serial issue at which the narrative flow would be released, its energy dissipate as a watercourse meeting the “sink” of the ocean in Thomson’s words, marks the reading and writing of narrative parts and the endings they always flow towards as unique, under-appreciated aspects of nineteenth-century literature.

Chapter One, “Against Dissipation,” examines this distinct, serialized form of literary narrative as resulting from the deployment of industrial technologies for harnessing flowing bodies of water toward economic benefit—via new techniques for maximizing surplus value and reducing risk and costs—as well as from an adaptation of hydrodynamic concepts for its management down channels of distribution over time that shape publishers’, editors’, authors’, and readers’ approaches to and experiences with them. Second, the discourse around serial narratives’ movement through the social body, amid the movement of social hydrology described here, produces a series of cultural debates about literature from the 1830’s to the end of the century that reveal how extensively hydrological criteria have infused moral, social, and political debates initiated by serialized narrative.

Chapters Two and Three comprise the section, “Circulation,” placing two mid-century novels in the context of infrastructural and cultural interventions aimed at securing productive flows in the face of unwanted, unintentional circulations within and against them. In Chapter Two, circulation plays a duel role. First, John Snow’s study of cholera incidence as a form of “communication” between human bodies via unintended circulations through London’s poorly
managed drinking water provision and drainage systems, exacerbated by the tidal circulation of the Thames, make the sites where sewers open into the river critical, if disgusting, locations for the meeting of dangerous circulation and flow. The novel, *The Wild Boys of London*, features a gang of child or early adolescent males who circulate from just such a Thames-side sewer through London’s topography, including through spaces affiliated with the highest classes, contacting people and places like St. James’s Park, where the 1866 cholera epidemic was actually killing wealthy Londoners and threatening the widely held, classist “miasma” theory of cholera incidence. James Greenwood’s *Seven Curses of London*, a text working from the principles of Kay and Taylor explored above, provides context for how social hydrology addressed the fearfully unsupervised, circulatory movements of London’s “neglected children,” suggesting further possible motives for the novel’s eventual banning.

Chapter Three reads Charles Dickens’s *Great Expectations* alongside Bazalgette’s Main Drainage and Thames Embankment projects, which were ongoing during the novel’s serial run. These projects that transformed the Thames into a human-created imitation of its historically conceived “natural” state and action, meant to establish effective drainage flow for the city of London against the long-acknowledged tidal (re-)circulation of its own waste through city reaches. Dickens’s placement of the novel, particularly Magwitch’s storyline, in the late 1820’s also ties these hydrological interventions to the New South Wales transportation system’s predecessors, the prison “hulks” that established riverine thresholds of criminal life at the cusp of the Thames’ London reaches (as emblematic of those of other river and port communities). The chapter examines parallels in the cultural imperatives that first determined English rivers to be apt sites for holding literal human waste and the “dregs” of society, convicted criminals, at bay in these riverine thresholds, before finally and permanently ejecting these forms of waste beyond
their thresholds to avoid any conceivable, continued threats of their circulation back into the
social body. These imperatives overrode the objections of socially and scientifically invested
critics like Jeremy Bentham and James Prescott Joule, respectively, who viewed circulation as a
potentially recuperative model for more efficient management of literal and social “waste.”

Chapters Four and Five make up the section, “Flood,” and engage with the historical
spread of industrial, hydrological-based thinking, technology, and practice from urban centers
into England’s rural, agricultural regions later in the century. Here, George Eliot and Thomas
Hardy depict cultural enforcement of intellectual and emotional mores via floods that occur in or
near the traditional water management structures they also destroy. Chapter Four shows how
Eliot’s *The Mill on the Floss* questions the cultural regulation of physiologically-granted
“streams” of intellectual aptitude and activity according to gendered and class-based prejudices,
which produce a metaphorical, familial and communal rupture that corresponds to and is
imagined in the overdetermined, final flood. Chapter Five focuses on Thomas Hardy’s *The
Return of the Native*, revealing its interweaving of the communal regulation of “feeling,”
meaning romantic and erotic desire, along accepted marriage-related and economic courses with
Egdon Heath’s traditional hydrological structures that actually stage this interpersonal,
physiological regulation. In both cases, social structures for regulating flows of intellectual,
physiological, and interpersonal “feeling” result in literal floods that kill or injure the individuals
concerned while dealing economic and infrastructural blows to their communities.
Chapter One: Against DISSIPATION: Flow Dynamics and Serial Narrative

Introduction

Serially-issued narratives gained predominance in the literary market place as flow dynamics achieved its wide cultural influence, through the 1830’s to 40’s. This chapter will show that this concurrence denotes not a coincidence but an as-yet unrecognized relationship between flow-based thinking and serial narrative. This relationship operated on two levels. First, the tenets of flow dynamics played an under-appreciated role in shaping the mode of serial publication. Its premium on profitable, forceful flows inflected the authorship and editing of segmented, regularly-delivered narratives as well as readers’ and critics’ temporal interactions with them. In effect, the management of literary production combines with, or constitutes part of, the culturally dominant discourse about managing flows—whether sanitary, industrial, human, or in this case, serial narrative ones—all of which remain subject to increasingly well-understood thermodynamic limitations over the decades. As a result, serial authors in particular faced the new task of crafting narratives in real time, over time, within the limits of regular releases that constantly drifted toward their points of dissipation in an inevitable final issue.

Second, I will show that the social hydrology established in this work’s introduction set the discourse for the ways in which Victorian culture embraced, criticized, and even feared serial narrative. Social and literary critics voiced hydrologically-imagined concerns about their ability to seize and hold readers’ attention over unprecedented lengths of time, on a massive, population-wide, scale. Such critics cited the perceived danger of the very flow-based criteria or characteristics upon which authors, editors, and publishers modeled their management of serial narratives for maximum power and profitability.
Within this context, the concept of “dissipation” that had moved so dramatically from physical, hydrological science into sanitary-social discourses takes center stage in opposing ways. From the side of serial narratives’ sellers, to forestall dissipation of those narratives’ movement down distribution channels spelled maximized profits. For concerned critics who feared for the moral condition of English society, this mode of dynamic narrative delivery of sometimes objectionable material threatened either to dissipate, enliven, or otherwise unpredictably influence the feared “masses.” As with “dissipation’s” initial movement into social hydrology also, these critics reliably targeted the same population groups whose lives and bodily presence were being addressed via that hydrological discourse. The resulting reception history, therefore, brims with concerns about serial narratives’ fluid, flowing nature in ways that closely echo concerns of political authorities and social commentators about the problematically collecting population groups in industrial English urban centers—showing how fully hydrology-based thinking permeated politicized discussions about print and literary culture.

1. Serialized Narrative as Flow

A. Serial Narrative’s Production as Flow-based Economics

“We sell our wares to the book purveyor, between whom and us there is no greater obligation than between him and his paper-maker or printer. In the great towns in our country, immense stores of books are provided for us, with librarians to class them, kind attendants to wait upon us, and comfortable appliances for study. We require scarce any capital wherewith to exercise our trade.”

~ W. M. Thackeray’s Arthur Pendennis, narrator of The Newcomes, Vol. 3, Ch. 36, (321)

Just as authorities who oversaw the (re-)engineering of rivers and watersheds to extend their usefulness, the producers of serialized narratives would have them appear and move as if “natural” despite their carefully crafted, hydrologically managed form. In The Victorian Serial, Linda Hughes and Michael Lund define a serial narrative as “a continuing story over an extended
time with enforced interruptions” (2). This brief description implies much that my attention to flow dynamics reveals about how serial narrative’s design and management inhere in flow dynamics’ criteria, as those emerged in the reshaping of watercourses and their surrounding topographies to transform naturally limited channels of flow into super-capacious power sources. In this way, criteria for managing watercourses through topographical space were adapted to managing serial narratives’ flowing through social landscapes.

A story’s deliberate *extension over time*, like the extension of a river’s forceful flowing, requires the prevention or removal of sites and means of its movement-cum-power’s dissipation, along with the systematizing of *interruptions* to contribute to a sense of narrative *continuity*. The *regularization* of time of narration, narrative (printed) length, time between narration, and even the development of plot, character, and theme(s) within that narrative all mirror the first stage of rivers’ management in the development from “canalization” to systematic management under the Thames Navigation Commission. As described in this work’s introduction, this initial response by authorities to rivers’ diminishment through industrial use focused on the principles of *segmentation* and *regularization*: of legal codes concerning the handling of banks and bed, permissions for construction of private weirs and races, of locks’ and barges size and design, of temporally orchestrated releases of weirs, flashlocks, or other “heads” across particular reaches, and of standard compensation rates for millers for opening their weirs or locks to traffic. All of these forms of regularization would render a standardized, organized set of *interruptions* into a more *continuous, predictable* means of travel or economic transport.

Two idealized depictions of paper mills as origins of serial production by men employed in it, one from an essayist and editor named Charles Knight in 1833 and one from Charles Dickens in the middle of the century, introduce the role of flow dynamics-based economics that
made serialized press and serial literary narratives possible to begin with. Knight’s paean to the making of the pages on which he says his own words will be printed actually reveals the serial literary mode’s roots in the economic applications of flow dynamics. In the *Penny Magazine* piece, “The Commercial History of a Penny Magazine,” he depicts Albury Mill in Guilford. Knight shows how serial narratives’ producers directed their production in relation to fluid dynamism, and his apparently (and I would posit, intentionally) naive depiction of industrial paper production expresses within the very elision of its dirty, industrial reality the relationship between serial narrative production and flow dynamics as an economic model. As he traces the life cycle of his pages, he effectively illustrates the fluid dynamism of the medium while invoking idealized foundations of hydrological science as it lent its structures to industrial production. Knight gravitates to his pages’ transitory state as flowing pulp, with a past and presumed future as liquids—all surrounding the flowing river which powers the mill.

Knight seems obligated to mention the owner of Albury Mill, one Mr. Magnay, in his opening, thus tracing the source and management of the paper’s production as if mapping a watercourse. He then envisions the mill’s flow-based power almost as if it exists in the pre-industrial era described in this work’s introduction: “Paper-mills in the south of England are set in motion by water-power— that is, they are placed upon some small stream, which, being dammed up, sets the wheels in motion, as in a flour-mill” (qtd in King and Plunkett 129). The traditional, partial blockage of the river’s flow provides directly-applied kinetic energy at Albury Mill, compared to heat and smoke-intensive, steam-powered paper-making which he almost judgmentally assigns to the coal-rich north of England.

The nostalgic register with which he describes this water-powered production recalls the idealized descriptions of the “naturalness” of utilizing flowing water for economic ends in
Combe, Robison and others mentioned earlier. Thus, “[a] paper-mill moved by water-power, is generally a very agreeable object,” he writes, crediting it with “picturesque” aesthetic value as a piece of the watershed’s topography (129). “It is in most instances situated in some pretty valley,” he writes, where the mill itself becomes an object “through which the little river glides” (129). Notably, powering a mill becomes simply “gliding”—as work performed via deliberate, industrial intervention onto a watercourse takes metaphorical form as natural movement. All the same, the mill remains utterly dependent on the flowing stream.

Because it powers the mill and works in the chemical and mechanical “conversion” of rags to paper, Knight writes, the water “should be of the purest quality,” as from a “stream [that] is generally one of those transparent ones which are so common in England—now bubbling over pebbly shallows, and now sleeping in quiet depths” (129). Calling for a clean flow of water in order to utilize (and pollute) it denotes another moment of idealization of water-powered industry as “nature.” Knight also elides from his nostalgic image of flow dynamics the smell of a paper mill whose first stage of production would have been “the rotting and mechanical reduction of discarded linen into pulp” (Rosenband 167).34 This rotting typically preceded mechanical, water or steam-powered stamping and/or maceration, and a finishing step involving emulsions of noxious “hides, hoofs, tripe, and alum” to fill the paper’s pores (168). In encouraging his readers to understand the entire process as “natural,” he focuses on the stream as both energy source and source material.35 At no point during his exploration of the “cycle” of this paper’s life does he acknowledge the chemical pollution suffered by the inevitable draining of all these

34 In “Comparing the Combination Acts: French and English Papermaking in the Age of Revolution.” Allen’s Cleansing the City references Anthony Wohl in showing that Victorian paper production involved the use of carbonate of soda, lime, wash from old rags, and bleaching powders (110).

35 Attempts to remove or elide the noxious odors that result in the overuse of rivers and flow dynamics go hand in hand, as Bazalgette’s embankment-bound sewers show in the aftermath of the Great Stink.
Graber

materials back into what had been, if we are to believe the earlier description—the “purest” kind of stream to be found in “the south of England.”

While Knight may have wanted his serialized medium to seem like a naturally occurring outcome of a picturesque English stream, he effectively emphasizes its nature as an artifact by consistently showing flow dynamics’ role in its production. The management of a mill around the watershed that it uses, pollutes, and transforms, in order to fill the “Society for the Diffusion of Useful Knowledge’s” (SDUK) order as Knight describes it, focuses on material conversions that always come back to that stream’s utilization. Water-powered machinery processes the scavenged rags, which then mixes with the same water in a transformational stage as a manageable liquid “pulp” that flows through subsequent processing. Knight describes a series of movement-based conversions and translations of the stream’s energy and self-reflexively traced the movement and conversion of a literal liquid medium to a culturally-socially dynamic medium that is made to flow through the populace hydrological principles in mind (toward the “diffusion” of knowledge). The man-made interventions on flowing water constitute an economic process that, in turn, creates the physical medium of *Penny Magazine* which his publishers will manage by adapting hydrological concepts to industrial-economic endeavors.

In a similar vein, Dickens rhetorically transmutes industrial production into natural process of positive transformation in 1850’s “A Paper-Mill” (with Mark Lemon). He does so in a way that even more starkly belies the context of industrialization’s development over the time between Knight’s writing and that of the *Household Words* issue containing the piece. This approach would, again, conceal the realities of paper production as a dirty, environmentally damaging, and sensorially repellant set of operations—given the combination of chemicals described above. Furthermore, just as with the stream in Guilford, we clearly understand that
some if not all of this polluting material would have drained directly back into the “the pleasant little river Darent” that powers Dickens’s mill, either through spillage or the intentional discharge that was common practice for Victorian industry (137).36

Much like Knight had done almost twenty years earlier, “A Paper-Mill” adopts an already-anachronistic vision of suburban, developing-rural England. “Down at Dartford in Kent, on a fine bright day,” Dickens begins, “I strolled through the pleasant green lanes, on my way to a Paper-Mill” (137). After establishing the backstory of the 14th-century, democratic rebel, Wat Tyler, who came from that area, Dickens pictures the Darent as running “the same course” as back then, “sparkl[ing] in the same sun” with “its tiny circles made by insects; and its plumps and plashes, made by fish,” “blowing…wild flowers,” and larks singing over “verdant fields” while the trees “were rustling as they rustle to-day” (138). The only change, Dickens writes, “since Wat the Blacksmith, bending over with his bucket, saw his grimy face” is that now, “there are indeed books in the running brooks—for they go to feed the Paper-Mill” (138).37 Thus,

36 In Cleansing the City, Allen reads Dickens’s depiction of Our Mutual Friend’s paper-mill also as an idealized process of positive transformation into cleanliness—in that novel’s plot, in contrast to the filthy, dangerous Thames. Allen reads the upriver locales—the locks and the paper-mill where Lizzie works—as parts of a nostalgic vision of a “mythic serenity” of the Thames of the past that contrasts clearly with “the grim urban Thames” and even “the recreational river at Greenwich” (110). “To follow the Thames upstream” to this mill and the non-tidal, lock-controlled river, Allen writes, “is to return to a kind of golden age” or “an Edenic paradise” away from deadly, dirty London (110). “The mill community, as uncorrupted as the river that powers it, thrives on honest labor and innocent amusement. The daily exodus from the factory is marked by “the sound of laughter” and the appearance of “fluttering colours” rather than by the fearful “pouring forth” of “aggregate masses” described by Taylor in the Lancashire manufacturing towns. I posit that this nostalgia intentionally contrasts with the apex of infrastructural flow dynamics implementation, the embankments taking place in London and surrounding the sites of the novel’s more gothically-scened Thames, where bodies are scavenged, robbed and dragged ashore, only for the river’s metropolitan management to fail to make it safer for those living near and from it, like Gaffer and his children, Ms. Potterson, even “Mr. Dolls” and his daughter. Allen similarly reads the paper mill as “a literal vehicle of purification” in “the novel’s sanitary process,” as “the purer atmosphere upstream” cleanses characters “like rags in the mill…of the stain acquired through urban experience, while others less worthy are discharged like so much moral effluent” (a theme of Chapters 3 and 4) (110).

37 Stone notes that the phrase “books in the running brooks” comes from As You Like It, II, i. 16.
Dickens imagines the Darent as *the same* stream, with the same purity, as its 14th-century predecessor. The difference here is that, rather than an ancient Saxon mill overseen by the equally ancient, local “reve’s” authority, the river’s energy “feeds” the production of serial literary flows within a distribution network orchestrated from the nation’s capital (138).

Furthermore, even though I will show in Ch. 3 that Dickens becomes critical of the environmental and social outcomes of flow-based practices, “A Paper-Mill” makes no mention of its river’s dissipation via that “feeding.”

When Dickens does acknowledge the reality of mid-Victorian industrial production, he does so in an almost Romantic moment of sublime shock, which fades quickly back into his earlier idyl. Following the Wat Tyler-infused scene setting, he writes, “as I turn down by the hawthorn hedge into the valley, a sound comes in my ears—like the murmuring and throbbing of a mighty giant, labouring hard”—the mill’s steam engine (138-9). At this moment of sensory assault, Dickens bizarrely refers to the criminals’ severed heads mounted about the Thames at Temple Bar and London Bridge, before declaring, “[a]nd now, before me, white and clean without, and radiant in the sun, with the sweet clear river tumbling down merrily to kiss it, and help in the work it does, is the Paper-Mill” (139, emphasis mine). Just after strangely invoking judicial violence and monstrosity in context of the “Steam Engine,” the essay replaces, or follows, those two with a hyperbolically positive depiction of the river that drives the production of reams of paper for serial press as part of what is, by 1850, a full-scale industry.

“A Paper-Mill” then follows through the actual processes that clean, treat, and transform rags to pulp, with the only fundamental difference from Knight’s version being the strange adoption of a first-person focalization (“I am to go, as the rags go, regularly and systematically through the Mill. I am to suppose myself…rags. I am rags.”) and the level of descriptive
precision (139). The “regular” and “systematic” the transformation of rags into paper that the narrator-rags subsequently endures indicates its endless repeatability, its mechanization, and its run-of-the-mill similarity to any such manufacturing process. Though the details approach the arcane, Knight’s and Dickens’s depictions of paper-making do reveal the depth of hydrological criteria’s role in Victorian thinking about manufacturing and production—here of the medium that both enables and is demanded by the literary forms that will be printed on it.

The absurd-sounding positivity of the narrator-rags reaches its most obvious height in he Cutting Room, where he declares his gratefulness for being doused in water once again and then “subjected to the action of large rollers filled with transverse knives, revolving by steam power upon iron beds, which favour me with no fewer than two million cuts per minute” (140). Clearly, no one will ever be grateful to be “favoured” with rolling between steam-driven cylinders mounted with “transverse knives,” but Dickens’s choice to portray such production in this as-if-beguiled tone shows an intention to retain an almost magical whimsicality around the paper onto which his own words are printed—perhaps even more strongly than did Knight, whose work was not conceived as art. Surely also, the “baths” of clean water that “rid” the narrator-rags of its dyes will drain those dyes into the stream, producing something like the dyed water in which Steven Blackpool drowns in *Hard Times* (141). And the turning of these rags into “gruel,” which a “wonderful machine” then “receives” and delivers out the other end as paper,

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38 The similarity between the two writers’ joy over the rags’ provenance also borders on suspicious. Knight cites the transformation of a Hungarian shepherd’s frock, an Italian sailor’s shirt, coat lining from St. James’s, St. Giles, Bond Street, and Monmouth—ranging the classes and demographics associated with each. Dickens’s narrator wonders over the “coarse blouse of the Flemish labourer,” “the fine cambric of the Parisian lady,” “the miserable garb of the Italian peasant,” “the Cardinal’s hat, and the ploughman’s nightcap”—equally explicitly ranging nation, class, and religion in the rags’ origins (139).

39 The narrator-rags also reiterates the role of the stream’s water in the Cutting Room: “I am very grateful to the clear fresh water, for the good it has done me; and I am glad to be put into some more of it” (140).
through “the miracles it does!” again intends to re-enchant what actually is a paradigmatic, flow-based mode of manufacturing (141). As the narrator-rags undergoes the final treatments that turn the him/it into sheets of heated and pressed paper, he uses the metaphor of a stream flowing through a watershed. The “subtle mind” of this “Leviathan” machine takes the narrator-rags in his “gruel-form,” then “slides” him along, where he “gradually assum[es] consistency—gently becom[es] a little paper-like,” while all the mechanical action is captured in the metaphorical action of a stream moving down a watershed: “smoothly ascending Witney hills, lightly coming down into a woolly open country, easily rolling over and under a planetary system of heated cylinders, large and small, ever growing, as I proceed, stronger” (141). The echoes of Robison’s definition of “river” present themselves clearly.

In the piece’s final paragraphs, the narrator-rags describes the regularization of the long reams of paper into precisely measured, taxed, and subsequently deliverable sheets, reiterating again how wondrous and easily manipulated it all seems through “intellect at second hand” in steam-powered machinery that makes “any sort of paper that is wanted” (141). After the conclusion of the narrator’s “metempsychosis” into rags, he pronounces his pleasure at the mill’s “beautiful order,” as well as the “thriving…workpeople” as the narrator and mill owner “come out upon the sparkling stream again” (142). The Darent sparkles, as if it has been maintained or even improved by its use. This perhaps feigned naiveté closes the piece, returning the reader to where s/he started—“back by the green lanes, and the old Priory—a farm now, and none the worse for that,” where clean, peaceful nature abides (142). Upon seeing a paper kite in the sky, Dickens declares his social responsibility and the cultural benefits he intends for his literary flows to deliver: “May all the Paper that I sport with, soar as innocently upward as the paper kite,
and be as harmless to the holder as the kite is to the boy!…May I always recollect that paper has a mighty Duty” whose “names are love, forbearance, mercy, progress” (142).

Adding to the unspoken industrial reshaping of natural streams and materials made into, and as, managed flows is the equally unspoken problem with rags as the basis of paper-making, especially by the time of Dickens’s piece. Hugh Burgess applied for a patent for his method of making paper from wood pulp (by boiling wood in “alkali”) already in 1851, based on his accurate perception that England’s demand for printed pages had begun exceeding the actual supply of rags (Chiang 557), and, by the time of Dickens’s writing, Esparto grass had been introduced as an ersatz medium to help alleviate the rag shortage (Cronin 574). As Anne Cronin puts it, “massive shortages of rags for the papermaking industry which led to the import of vast quantities” from the middle of the century—as Knight and Dickens do indicate—to meet increasing demands for flowing streams of pulp and reams of paper, turning rags into valued “raw materials” (588). The repeal of paper duties in the 1860’s, which assessed value by sheet and could not address printing of continuous reams, accelerated demand even further (Brown 8). Eventually, after practicing it in the US, Burgess’s wood method took precedence, and the general shift to wood left Knight’s and Dickens’s nostalgic metamorphosis of variously nation- and class-affiliated rags behind. Again, flow dynamics’ principle of transforming, reengineering, and (unsustainably) depleting natural resources in order to increase the capacity of one or more profitable, useful flows wins the day, as trees are harvested, stripped, broken down, liquified, and exported to English paper mills, which had been converted to utilize wood pulp. Flows of paper for the serial press had been rendered more capacious.

I am wary of over-reading any negative, manipulative motive in Knight’s and Dickens’s transformation of the flow dynamics-based economics that enable their serial authorship into an
unrealistically, almost magically “natural” flowing of two streams to produce paper for them to fill with words and send along their channels of distribution. However, these hydrologically-oriented, industrial economics steer even the manufacture of paper from the turn of the nineteenth-century a condition that helps induce (rather than follow or coincide with) the fluid dynamics of serial publication, authorship, and readership.

I will not claim that “hydrodynamics” alone structured the development of capitalist production in England, but I do posit that flow-based models of useful, productive movement had an effect on literary outcomes of that development. The fixation of the two serialized authors just discussed on the literal and figurative ways in which rivers’ management led to the form of their own writing introduces this influence (especially when we bear in mind that even steam-driven mills’ names, locations, and designs have watercourse-based roots). This hydrology-based structuring, and the whitewashing of its damage to and dissipation of the watercourses involved, signal the powerful status of flow dynamics in England’s industrialization. While the advent of serial literary material has been extensively researched, its chroniclers have not fully recognized the role of flow dynamics in giving it shape and, perhaps even more importantly, how that shaping influenced the writing, publication, and reading of serial material.

The breadth of existing material histories of the serial press move well beyond my current scope, but key points from N. N. Feltes, followed by more recent work by Linda Hughes and Michael Lund, Kate Flint, and Andrew King and John Plunkett, will help to demonstrate the role of hydrological thinking in serial narrative’s rise. First, I would like to touch on Feltes’s argument in *Modes of Production of the Victorian Novel* that “genius, luck, and the shrewdness of Champan and Hall” do not explain Dickens’s surprising, career-launching success with
*Pickwick Papers* (Feltes’s choice of *Pickwick* also acknowledges the common premise that it denotes the advent of successfully serialized fiction) (3). I certainly value the author-illustrator combination’s unique skill at manipulating their media and ability to engage with their audience as key factors worthy of study. However, I posit that vital parts of the “historical processes which shaped and determined the material production of *Pickwick Papers*” and, by extension, that of serial literary narratives generally, show signs of flow dynamics’ influence (3).

In what Feltes calls the transition from “petty-commodity production of books” to capitalist manufacture of “commodity-texts,” he focuses on the changes in the “specific form of control over the labor process” of the serial novel’s writing (3, 8). The professional serial narrative writer was engaged by a press to provide text “of a determinate length, produced regularly, and to be collected, complete, in a stated time” (13). Thus, Feltes describes Dickens’s first contract with Chapman and Hall as the publishing house having “bought” his “intellectual labor power for nineteen months, divided into monthly intervals” in order to satisfy the conditions “imposed by capital and adjusted” to a model of producing cheaper works at higher quantities in hopes of accruing surplus value (13). This observation about the temporal nature of serial writers’ labor stands—and vitally so as I will show in the following sections.

This mode of engagement set out a known temporal and material endpoint of narrative activity to which, ideally, readership interest will have been maintained and at which it will be allowed to dissipate. It also mandates precisely-shaped releases of narrative flow with the enforced breaks that so closely imitate a systematically-managed locks and river system that produces continuity in motion over time. Thus, as Knight and Dickens labor at their portraits of paper mills, they are writers filling a void in their outlets’ production, those outlets having purchased the paper whose creation the articles trace, so that those journals can be edited into
issues, printed, and shipped to distributors on schedule. As such, a new narratological approach to fiction authorship would be enabled, rather necessitated, by serial publication, which Thackeray’s narrator Pendennis equates to that between the publisher and the “paper-maker or printer” and which George Eliot also compared to spinning out material, as if in mill-based labor.

Any narrative techniques developed in this context related to the mode of publication’s ability to fine-tuning production by time, rate, and volume. Feltes has argued that the “structures of magazine serial publication…allowed a far more subtle and effective form of control” over publication than had ever existed previously (64). However, this control came part-and-parcel with dependence on “literary reviews, commercial travelers, prospectuses and catalogues” that placed new works into position to succeed in the system of rapid narrative delivery, in Flint’s words (5). This distribution speed depended on “the development of paved roads, fast coaches, canals, and eventually, railways” (Flint 5), and only via such avenues of commercial delivery could “metropolitan newspapers…rea[ch] an increasingly national market and challeng[e] the local dominance of provincial papers,” according to King and Plunkett (122). W.H. Smith and Son led the way, they write, by organizing their paper’s distribution through the railways, opening the first of what eventually became “ubiquitous” bookstalls at Euston station in 1848 and eventually using the rail system as a combination of “distribution network and retailing space” by allowing books to be lent and returned at different stations (122). These points of delivery, as outlets for serial narratives, could lie increasingly beyond the new metropolises “which provided concentrated markets,” as Flint writes, stretching to overseas readerships in colonies as well (15). Serial narratives could interact with the immediate present of readers largely because of reduced costs in paper-making and printing—which, as I have shown, utilized
literal flows of managed waters as well as adaptations of those waters’ movement in manufacturing processes that could take advantage of such new distribution networks.

In the piece discussed above, Knight praises these same delivery channels for literary material that enabled its nearly global, simultaneous release. He credits the production of US editions from stereotypes, along with the shipping of woodcuts to France and Germany with effecting a “literary intercourse…which has a tendency to direct the popular reading of four great countries into the same channels” (133, emphasis mine). Not only does this system “leave some capital free…to be devoted to other intellectual objects,” Knight continues, but it “enables [publishers] now, to adjust the supply exactly to the demand” (134). Writing in 1833 (a year after Kay’s *Condition of the Working Classes*), Knight’s language connects the literal role of flowing water in the production of paper to the figurative flowing of literature through closely managed, calibrated “channels” to specific endpoints.

Feltes cites Graham Pollard’s “turn toward specialization” in serial publication to argue that the key development in early nineteenth-century publishing was many houses’ new approach of selling exclusively their own books. Once widespread, this effectively establishes a system of source-to-outlet delivery channels for narratives across the British Isles and global colonial holdings (qtd in Feltes 5). This, again, affects writers who wish to publish in such magazines and journals, forcing their literary narratives into close interaction with other forms of writing and, often, advertising. Novel writers, according to Feltes’s perhaps overly pessimistic take, “entered their pages as hand-loom weavers entered a factory, knowing that within that space the publisher had a wide choice of methods with which to capitalize ‘the goodwill of a
Publishing writers have always dealt with some material preconditions, but the point that writing began to be thought of as similar to laboring in a mill does tie both the act of writing and author him or herself to the media-level means and forms of publication.

Eschewing the safe predictability of demand, profit, and author pay that existed in the older, triple-decker, to pre-ordering bookseller, to separately-owned circulating library mode of making and selling books, the concrete structures of the serial mode put the production of a serial magazine or weekly newspaper under close control that allowed for “simultaneous and reciprocal” calibrations of production, delivery, and retail (Feltes 63). Thus, serial publishers’ activity centered around the real-time management of a moving product down channels of production and dissemination, applying a hydrologically-influenced model in making themselves into an increasingly condensed “nucleus of very large firms” (Pollard qtd in Feltes 63).

Speaking of North and South (N&S) in an 1855 letter, Elizabeth Gaskell complained to her friend Anna Jameson that if “the story had been poured just warm out of the mind, it would have taken a much larger mould” than that which she was allowed (Hughes and Lund “Textual/Sexual” 156, emphasis mine). Dickens had recruited N&S into his journal, Household Words (HW), after perceiving its “character and power” and “strong suspended interest in it (the end of which, [he did not] in the least foresee)” (qtd in Hughes and Lund, “Textual/Sexual”153). The perspectives motivating these comments about the same story demonstrate the tension at the heart of flow dynamics’ influence on serial literary production. For the author, who complained that “[e]very page was grudged [her],” the mandated shaping of her narrative into regularized and regularly released segments was an artificial, stifling restriction, especially “just at last, when [she] did certainly infringe all the bounds & limits they set [her] as to quantity” (156). For the editor-publisher, Dickens, the attractiveness of the story lay in its promise to maintain dramatic movement and tension over time, promising to help make HW profitable. Melissa Schaub argues that such shaping by Dickens, in coordination with the unique narrative style of Hard Times, aims at making HW a “corporate text” that addresses the social problems of the northern manufacturing cities with one anonymous “voice.” Schaub argues, “Victorian readers saw individual volumes of periodicals containing serialized fiction as having ‘corporate authorship’” to posit “that serial fiction blurs the boundaries between” both texts and authors (182). This blurring produces “a reading experience that weaves together multiple novels into larger composite beings” that move much like Robison’s ideal river: collective, collecting, and, ideally, garnering more dynamism as they flow (182).

The Copyright Act of 1842 did not consider newspaper and magazine copyright, but the 1870 commission recognized the growth of serial publishing in creating protections for them (Feltes 59).
Such close control over the production of serial publication allowed the attempts of John Murray’s failed “Family Library” from 1829 to 1834 and the aforementioned Charles Knight’s project with the “Society for the Diffusion of Knowledge,” which preceded Penny Magazine by just a few years (“Society” was founded in 1826) (Feltes 10, 11). Murray’s “Library” sought “to shape social attitudes through the use of literacy,” while SDUK specifically pioneered the concept of “sharply increasing the number of copies printed of its nonfictional publication to achieve a dramatically lower unit cost” and literally producing each subsequent issue after the prior issue’s distribution and relative success “so as to lessen the attendant risks” (Feltes 11). Though Knight’s superintendence of SDUK and Murray’s “Library” ultimately failed, they signaled the “clear emergence” of serialized material, especially fiction, “as the most saleable commodity on the market,” according to Scott Bennett (140). Equally important, they established the precedent for specifically socially-oriented publications, hinting at their possible financial viability, readership intensity, and criticism of that intensity.

Thinking back to Knight’s idealized version of the Arbury Mill or Dickens’s paper-mill along the Darent, then, the direction, control, and use of the stream’s flow according to the needs of the mill’s customers like Penny Magazine, we see a chain of kinetic and chemical conversions of a literal, flowing stream. The production turns this watercourse into a flowing, liquid paper pulp and finally into paper (in various sizes accordingly taxed), with byproducts washed out of mind downstream. The paper then distributed to periodical outlets takes its final form at the printers and moves to its distribution outlets into the reading public. Thus, publishers’ control over the making of serial literature originates in literally harnessing flows, after which the model

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42 In “John Murray’s Family Library and the Cheapening of Books in Early Nineteenth Century Britain.”
of well-managed flow lends shape to the development their businesses. This model then shaped the ways that authors and Victorians consumers participated and talked about participating.

**B. Social Hydrology in the Cultural-Critical Reaction to New, Serial-reading Masses**

It should not be surprising that a primary forerunner of successful serial publication announced its desire to “diffuse” knowledge through English society via its publication. While *diffusion* had historically meant both “the action of spreading abroad” or “dispersion through a space or over a surface,” the word took on a new meaning via physical science at the beginning of the nineteenth century related to the interaction of two or more liquids (*OED* “diffusion”). The *OED* tracks the word’s first such use to Dalton’s 1808 *New System of Chemical Philosophy*, in which it indicates a “spontaneous…interpenetration of two fluids” or “the permeation of a…liquid between the molecules of another fluid placed in contact with it.” Later in the century, a chemical tract defines the term as contact between two fluids, which then exchange molecules or suspended material (*OED* “diffusion”). As in nineteenth-century biology, the SDUK’s invocation of that term then clearly leans on concepts of healthy physiological delivery or transmission. Many subsequent critics utilized images of serialized narrative material as a liquid whose primary feature was its seemingly ceaseless flowing through society’s “masses,” which seemed to threaten existing class relations by invigorating them as it moved.

King and Plunkett’s collection of Victorian commentary on serial press and literature show how intensely upper-class Victorians focused on the effects they would have on the unnamed “masses,” whose dynamic potential *(and perceived stagnation)* was so feared in commentaries like those of Taylor, Arnold, and Kay already described. As King and Plunkett also point out, the term most often invoked by such commentators is its “influence” on its
readers. Coming from Latin meaning “to flow in,” the discourse and descriptions of serialized
literature’s powerful and, for many, fearful possible influence reveal “a hydraulic notion” about
how cultural production and the social body interacted (35).

Understanding flow dynamics’ cultural sway, it becomes clear how the concept’s social
applications permeated commentators’ concern over serialized literature, with their underpinning
in hydrodynamic understandings of energy and motion. Concepts of media “safety-valves” that
allow social machinery to carry on or “media regulation” based on the “stop-cock model”
demonstrate this, just as, for conservative political bodies, the objects of fear were “unchecked
floods of print through the social body,” or, more specifically, the “flow of media into the lower
classes” (King and Plunkett 35). Both the kind of pestilent stagnation Kay described in
Manchester and dangerous invigoration like that feared by Taylor worked within a hydrodynamic
concept of society. Preventing both required there be flows of literary material, indeed, but ones
managed properly to regulate what they contained, where they found outlet, and what their effect
would be on the minds and actions of those whose consciousness they flowed through. Not
unlike Dickens’s and Knight’s paper-making mills, the work performed by these groups depend
upon the perceived “quality” of the literary streams they are built around and consume.

The overseeing of narrative flows, like the provision of healthy drinking water and
drainage channels in the new towns—especially when done to maintain useful “operators’”
physical capabilities à la Taylor—denoted the management of “proper” intellectual consumption.
The penetration of flow-based thinking into multidisciplinary conversations about physiological
and cultural health, and even city planning, stages the rise of the term “dissipation,” which found
ever-increasing uses as an often classist or racist-tinged, qualitative descriptor of individuals and
groups with negative economic and moral connotations.43

“Dissipation” becomes central to Victorian sanitary, temperance, and morally-themed
debates about serial narrative by moving within the social applications of flow dynamics from
literal “hydrodynamics” or “hydraulics.” In its first, now obsolete, primary meanings,
“dissipation” indicated explicitly physical qualities, as in the sixteenth-century’s “action of
dissipating or dispersing” or “scattering,” or “the fact of being dispersed,” a material’s “dispersed
condition” or existing in “complete disintegration or dissolution” (OED “dissipation”). At the
beginning of the seventeenth century, alternative definitions emerged in which the term meant a
form of wasting or wasteful action—either “through continuous dispersion or diffusion” or as
“expenditure or consumption of money, means, powers,” or “faculties.” William Thomson used
“dissipation” in this way in an 1881 essay as a quantifiable loss of heat (OED “dissipation”).

Only in the era of industrialization and urbanization, first in 1785, does “dissipation”
begin to mean a “[w]aste of the moral and physical powers by undue or vicious indulgence in
pleasure,” or an “intemperate, dissolute, or vicious mode of living” (OED). Cowper is credited
with this use, followed by Radcliffe in The Romance of the Forest (1791, as Mylne and Jessop’s
“Reports” begin). Pickwick Papers’ use also gets credit, in which the narrator comments,
“Tupman was not in a condition to rise, after the unwonted dissipation of the previous night.”
The correlation of “dissipation’s” move into moral discourses of vice and overconsumption, as
part of flow dynamics’ social applications, within the much-debated “rise” of the novel—the
same era of serialized publication’s rise—constitutes not a coincidence but a diverse set of
concrete ways that a hydrologically-based conception of productive movement shaped Victorian

43 Regarding bodily “flows” and urban planning, see Richard Sennett’s Flesh and Stone.
culture. That one of the scenes intended to bear the most significant moral ramifications in *David Copperfield*, the serialized version of Dickens’s personal development to middle-class subjecthood, bears the chapter title, “My First Dissipation,” suggests this as well.

I have no intention to catalog the entirety of public arguments about serial publication through the nineteenth century. To a large extent, others have already done this. The examples that follow here, however, make clear the role of hydrological discourse in shaping the social aims and/or concerns that permeated public discourse around mass-scaled, serialized literary production. The discourse of social hydrology helped concerned citizens envision a range of possible implications for serial reading’s influence on readers’ attitudes about political practices and social formations, as well as it seemed to indicate either intriguing or alarming changes in the body, mind, and morality of reading English subjects. On one hand, social and literary critics with democratic sympathies might see the new array of serial narratives as a potentially invigorating, galvanizing stimulus for the stagnant masses. On the other hand, the very same dynamism seemed a threat to politically and socially conservative critics. Much as Carlyle and Taylor had, these critics worry over the country’s industrial, productive power as it might be misdirected or dissipated through the reading material flowing through the bodies and minds of the laboring populations still necessary to the nation’s economics.

This two-sided fight initially took shape in less literary and more directly political, editorial-based serial publications. Those who embraced serialized reading invoked its likeness to a well-managed flow. Reviewing the first two volumes of the *Edinburgh Review*, James Mill wrote of serial literary matter generally, “[o]n the favourable side it may be affirmed, that as the diffusion of all the good which is derived from reading, must be in proportion of this which is its instrument,” “periodical literature’s” dependence on winning an immediate readership is an
“eminent advantage” (qtd in King and Plunkett 15). Not only the scale, but the steps its producers and managers take in consideration of its hydrodynamic limitations make it promising. It has the power to “diffuse” through its manifold outlets with equal power upon arriving at each, regularly choreographed over time. It has immediacy and suspends tension throughout the reading public and the sanitarians’ social body. Henry Brougham, writing for the *Edinburgh Review*, also lauded serialized reading’s fluid dynamism, celebrating “that hundreds of thousands crowd round the sources whence the streams of pure and useful knowledge flow” and that “the numbers who thirst for it, and can thus slake that thirst, may be reckoned by the million” (qtd in King and Plunkett 22). Thus, those who could see positive potential in the “masses” could also see how serialized literature might, as Dickens put it, “rais[e] up…those that are down,” to “the general improvement of the social condition” (qtd in Schaub 184).

With similar optimism for its social outcomes and a more directly hydrodynamic metaphor for describing it, William Rathbone Greg advocates the positive moral-social effects of serial material’s liquidity in an 1855 issue of *Edinburgh Review*. He argues that serialized literary material works like “a safety-valve in moderating discontent by allowing it vent, in expending the energies and exposing…demagogues” (qtd in King and Plunkett 47). For Greg, such a functional, in-motion social hydrology was a far superior model to others’ proposed regulation of materials expressing political and/or social discontent. Rather than censor or ban certain types of press and literary material for fear of its effects within the social body, Greg’s

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44 Brougham also criticized privileged detractors of supposedly “poisonous” material read by the working classes, censuring their classism with reference, once again, to liquid consumption: “That they should grudge the poor man his cheap book…and complain of those who provide him with it, is about as reasonable as it would be for a sot, whose vitiated palate can bear nothing weaker than brandy, to accuse the brewer of encouraging dram-drinking, or to denounce the water-drinker as intemperate” (22).

serial literary flows reinforce social relations that favor their managers’ economic and political status. Less explicitly, Greg endorses this argument by declaring serial publications “invaluable to the Government” as medium for “ministers (to) instruct and inoculate the nation,” or use as “an engine which they or their friends can use” just as their opponents use it against them (47). Finally, Greg warns that the effects of stemming such flows “[could] only be fully estimated by governments which have tried the opposite scheme, or observers who have closely watched its operation” (47). Where there is social or political stimulus, the resulting fluxus must be allowed to flush the social body and prevent dangerous unpredictable floods of violence or dissent.

Even at serialization’s apex for maximizing the effect of regularized, intermittent releases in 1860’s “sensation novels,” its proponents remained optimistic about the perceived liquidity of the narratives’ dynamic interactions with audiences. One Macmillan’s contributor 1866 declared in that the “heart of the plebs in this country is not to be reached but in gushes of moral wisdom” (qtd in Flint 26-7). While strikingly classist, this positive view even of increasingly “sensational” fictional narratives promises that even masses of “plebs” might accept “moral” instruction when and if it came in appropriately calibrated, liquid “gushes.”

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46 As early as 1788, Vicesimus Knox, in Winter Evenings, wrote of the role of English literary “flows” in spreading English culture to (if not in “civilizing”) colonial holdings: “English literature is of course the literature of America. The learning of England has long been flowing from the Thames to the Ganges. The late amicable connection with our neighbours…will contribute greatly to extend the language and learning of Great Britain” (qtd in Leah Price, The Anthology and the Rise of the Novel 73).

47 King and Plunkett show that both Whigs and Radicals believed in a serial press “founded on an enlightenment ideal…that human improvement might be achieved by the diffusion of print media through the social body” (12, emphasis mine). Both groups argued, therefore, against “taxes on knowledge” like stamp taxes placed on serial publications “designed to restrict the spread of political information. Opposition to these restrictions stemmed, in part, from a faith in human rationality: they believed that a free market in print media (as in all commodities) would ‘purify the public taste even upon topics which too naturally excite the worser feelings of our nature’” (13, emphasis mine).

48 Originally from “Penny Novels,” Macmillan’s Magazine, 14 (1866), 97.
In contrast, a large body of negative criticism against the same serial material equally relied on social-hydrological discourse. In “The Influence of the Press,” Archibald Alison credits “the terrible ascendency of democratic ambition…to the lower orders” to the “extension of political reading” via serialized journals, lamenting that “no one thinks of considering how this new and terrible power” of serial reading “is to be mastered, and the dissolving principles with which it is invested” are to be “brought under the dominion of virtue and religion” (qtd in King and Plunkett 25, emphasis mine). Where Mill affirmed the “diffusion of knowledge” which serialization could bring, here its supposed “dissolving principle” endangers Alison’s preferred version of English society. Where Mill indicates a form of transmission or transportation through liquid medium with connotations of healthy physiological or biological function, Alison rues a weakening or lessening of strength—of collective, productive energy, or of social or political bonds. In all, Alison sees serial material in general as likely to produce an unruly, unproductive liquid mass like Kay’s Irish immigrants in Manchester.

Furthermore, in stark contrast to the positive possibilities for the tens of thousands or even “million” people who might be “raised up” by serialized literary production and consumption in Dickens’s view, Alison sees that scale itself as a dreadful danger. The “immense circulations” of such material frighten Alison because they “stimulate the political or the private passions” on such a massive scale (26). In addition to this massive scale, Alison also fears the potency of periodical reading and the problematic dynamism it can inspire in individual readers.

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49 Originally published in Blackwood’s Edinburgh Magazine, 36 (September 1834), 373-391.

50 Also in the background in these considerations of mental, physiological consumption, as Dames points out, was “[p]hysiological psychology’s interest in standard responses” which “still spoke of individuals as the unit of experiment” so that “the novel is the literary form of standard responses, the form that, through a mechanical, even industrial, perfection of its working parts creates a reliably similar response through a population, thus effacing the idiosyncrasies of individual reading” (67). For such physiological psychologists, “the individual novel-reader is the general novel-reader” (67).
While a man with “twenty years in the study of history or politics” will be wise enough to withhold an opinion on the problems facing English culture, according to Alison, “a ten-pounder, who has read the Radical journals for a few months, will experience no such hesitation,” because of its potency (26). Writing in 1834, Alison’s “ten-pounder” is the man newly enfranchised by the 1832 Reform Bill; his ability to show ownership of a property whose rent was at least ten pounds per year qualified him for the franchise. He will act, according to Alison, “without any other instructors but his favorite political flatterers”—meaning his preferred periodicals (27). For this reason, such reading’s “diffusion” seems so threatening. Like topographies through which energy-providing streams flow, the readers—the seemingly uncountable, uneducated masses—will move and work differently after that flow of narrative moves through them. The impressionable mind is in a sense the last channel through which the serialized flow of narrative is passed, after its release at resale outlets.51

Like Alison, Fanny Mayne attacked the influence of serial publications in 1850, not only on the grounds of cheaper, possibly salacious issues’ content, but also explicitly on the massive scale of their sales and implied audiences.52 According to her own statistics, more than 62,000 “decidedly pernicious penny or three-halfpenny works are sold weekly from one shop in

51 George Eliot famously described the influence of reading on its audiences: as people are “imitative beings,” she wrote, “those who ever read to any purpose at all…[cannot] help being modified by the ideas that pass through our minds” (Haight 1:23). As Flint points out, in Felix Holt, Eliot’s narrator describes how Esther’s sense of self and belonging relates to her reading experience. In an early scene, she “found it impossible to read” because “her life was a book which she seemed herself to be constructing—trying to make character clear before her, and looking into the ways of destiny” (qtd in Flint 26). This scene is echoed in Daniel Deronda as Gwendolyn finds no reference in all her books to which she might relate her own difficulties. Stevenson also hailed “the transformative power of fiction,” which he argued “could consolidate one’s sense of belonging to a particular sector of society,” or even “confirm one’s belief in the security, stability, and communality of the life one led” while also offering “a space for exploring the self, and trying out new thoughts, new possibilities, in private” (Flint 31).

52 In “The Literature of the Working Classes,” Englishwoman’s Magazine, and Christian Mother’s Miscellany. The managers of this publication have chosen a title that already begins its calibration of consumption, targeting the demographic for whom its material is likewise produced.
Liverpool” (qtd in King and Plunkett 41). Keeping in mind that Liverpool only had somewhere around 77,000 inhabitants at the beginning of the century and 376,000 by 1850, not including some large suburbs (according to Farrer and Brownbill), this sheer number of Liverpudlians seeking this outlet’s serial releases surely alarmed many of Mayne’s readers (King and Plunkett 22). She calls for Englanders “who love their country” to “assist this work” of “improving” the content of cheap periodicals, because “the lawlessness and chartism disseminated by the penny press, is undermining foundations of our tranquility” (42-43). Mayne’s “our” clearly indicates the privileged classes of British society for whom Chartism constituted a threat, and the social equilibrium implied by her “tranquility” appeals to Mayne’s advantageous position. She does not acknowledge as Mill had that, in writing for a serialized publication herself, she is helping to produce a literary-cultural flow that also has outlets and consumers through which her words move and upon which they have some effect. This lack of acknowledgment demonstrates that what commenters in privileged positions prefer is not simply a lack of literary-cultural production, but a set of flows managed carefully, conservatively, that will reinforce political stratifications and race, class, and gender relations—not ones that will excite the “masses” but that will channel them into clear flows of work and consumption and forestall their “dissipation.”

Such active, normative reinforcement of serial flow management via censorship or “Bowdlerization” aimed at supervising content as that Mayne calls for, so that what “flow[ed] into the non-patriarchal was only the pure,” thus “teach[ing] and maintain[ing] appropriate
gender roles and identities (King and Plunkett 35-6). In this way, managers of serials exploited the close control their mode of production afforded to produce and maintain a general political status quo, or what Kate Flint deems “reading material that reinforces moral norms” (26). Overall, such management produces a positive, active movement—one maintaining “tranquility” via the meeting of economic, social, and artistic versions of flow dynamics.

Social concerns based on serial reading often targeted particular subpopulations in the same way that the sanitary movement’s social hydrology did. One commentator, Edward G. Salmon, so fully embraced this approach that he wrote a series of articles criticizing popular reading of three target demographics: boys, girls, and the working class. In “What Girls Read,” Salmon employs a hydrological discourse to lodge his criticism of supposed “girls’ reading” in the serial press (King and Plunkett 68). He invokes a model of flow as a distinctly and deliberately managed object-in-motion that makes the mind and body of the reader into, again, a variably productive, intermediary site.

For Salmon, the content and delivery of serial narratives are the responsibility of those selling them in the same way that water companies would come to be held responsible for the content of the water they delivered into customers’ homes in this era. He traces the narrative flow backwards from the problematic site of the individual reader in her poor home to the narrative’s “source,” claiming that the rarity of “an account of a girl committing any very serious

53 King and Plunkett note the 1877 arrest of Charles Bradlaugh and Annie Besant for publishing information about the practice of birth control (105). Thomas Hardy famously argued later in “Candour in English Fiction” that there ought to be separate channels for fiction designed to be read by adults only, rather than the by largest possible cross-section of families. Because the latter was, in fact, the case, the kinds of criticisms made by Mayne here held sway, resulting in Hardy’s words, in the author “bel[y]ing his literary conscience…despite…his best imaginative instincts by arranging a dénouement which he knows to be indescribably unreal and meretricious, but dear to the Grundyist and subscriber” (21).

54 Published in Nineteenth Century, 20 (1886), 515-529.
fault through her reading” is only through previous critics’ inattention to this source’s actual effectuality (70). “[L]et us go into the houses of the poor, and…discover what is the effect on the maiden mind of the trash which maidens buy,” he says (70, emphasis mine). Pairing his critique of these young women’s perceived improper desires with that of the people (presumably men) who manage the flowing “trash,” Salmon argues that if “we were to trace the matter to its source, we should…find that the high-flown conceits and pretension of the poorer girls” and “their dislike of manual work and love of freedom, spring largely from the notions imbibed in the course of a perusal of their penny fictions” (70, emphasis mine). Much as Mayne feared for the loss of her (and her expected readers’) “tranquility,” Salmon believes that the wrong kind of flowing reading material gins up dangerous sentiment—and potential loss of economically-vital, menial labor in favor of “freedom” and a desire for social mobility.55

Similarly, an “Agnes Repplier” complained that “[t]he clerks and artisans, shop girls, dressmakers, and milliners, who pour into London every morning by the early trains, have, each and every one, a choice specimen of penny fiction” to pass the journey’s time (qtd in Flint 18, emphasis mine). The telling carry-over of Kay’s and Taylor’s “pouring” masses, deployed here in 1893, combines with the flows of serial narrative through those masses in a doubly-agonizing

55 Greg also completely generalizes and dismisses women writers through an invocation of flow dynamics. Like watercourses lacking any signs of effective management, Greg characterizes their experience as “seldom wide and never deep,” with “sympathies have not yet been chastened or corrected,” leading readers to “imbib[e] false morality” (qtd in King and Plunkett 54, emphasis mine).

56 From her perspective, “Mrs. Repplier” perhaps had good reason to worry about the influx not just of poor workers, but the number of serial-reading workers suggested by Liverpool bookstores’ sales, as Flint notes the sizes of some notable works’ initial numbers: Nicholas Nickelby’s first issue sold 50,000 in 1838, Our Mutual Friend’s first part sold 30,000 in three days in 1864, the first two parts of the The Soldier’s Wife that cost a penny each sold 60,000 copies, G. W. M. Reynolds’s 1854 The Bronze Soldier sold 100,000 copies of parts that cost a halfpenny each, and Hall Cain’s The Christian sold 50,000 copies in its first month in 1897 (28). Even Stowe’s Uncle Tom’s Cabin (1852) sold 1,500,000 copies through ten transatlantic editions and throughout the colonies (28). Flint echoes the hydrological register of her historical sources, arguing that “libraries in Newcastle feared that if they were to allow them (novels) on their shelves’ their library would be flooded with unmitigated trash” (17, emphasis mine).
set of movements for Ms. “Repplier.” Thus, while managers of serial narratives benefit from the economic adaptation of flow dynamics to manage profitable flows against their dynamic dissipation, conservative social critics apply social hydrology’s paradigms in attacking serial narratives for encouraging aimless stagnation, unpredictable bursts of emotion or patriarchy-threatening desires in their reading masses—for threatening utter moral and social “dissipation.”

Richard N. Price has shown that social hydrology-influenced concerns about particular population groups and the flow dynamics-based economic strategy of serial publication (and according narratological strategies) met in the “Working Men’s Club” movement.57 In these clubs, alcohol was replaced as an item of consumption for working class men in favor of “educational” readings, lectures, and music with “elevating and refining influences,” and— when it came to literature—with Dickens’s respectable tales (122).58 In theory, his novels and stories could entice men into these clubs and run through their minds rather than have them in pubs where alcohol was sure to run through their bodies. Price calls this movement “one of the most successful of the many social reforming institutions and organisations of the Victorian Age” because of “its enduring nature” and “its consciously designed role as an agency of social control,” in this case over the literal and figurative flows consumed by working men (146).59

For those attacking, defending, or otherwise addressing the new phenomenon of serialized reading material, the rhetoric of flow dynamics and social hydrology set the terms of

57 In “The Working Men’s Club Movement and Victorian Social Reform Ideology.”

58 Much like degenerationist branches of the sanitary or temperance movements’ anti-alcohol rhetoric, Salmon argued that “the bad influence of these works on themselves is handed down to their children and scattered broadcast through the family” (qtd in King and Plunkett 71).

contention. Hydrological criteria and images created a way to conceptualize what the phenomenon of serialization might produce in English culture, or what it might be made to produce. Moreover, this entire debate followed the physical application of flowing waters and flow-based economic models that initially shaped the production of serialized literary medium.

2. Temporal Dynamics of Serial Literary Production and Its Reception

In their introduction to *The Victorian Serial*, Hughes and Lund declare that “the dynamics” of serial reading and, by implication, production are “less familiar” to us than they ought to be, given how they dominated Victorians’ experience with literary material (2). The moment that one invokes “dynamics,” one is speaking of energy and time. In the case of serialization as a flow dynamics-guided economic and narrative venture—just as with the engineering of canals, lock systems, or the Embankment and Main Drainage projects on the Thames in London—its producers and managers aimed at managing two temporal aspects of narrative drive and readership: powerful, immediate movement and duration against dissipation of that movement. That movement, also, must always be uni-directional, toward a distant but unavoidable ending. However, many Victorians concerned about the state of British society worried over what the effects of just such dynamic characteristics would be on its people.

A. Time — Immediacy


According to Robert Patten, Robert Seymour’s death early in the course of what became *Pickwick Papers* produced a “blank” or “void” which Dickens’s narratives had to fill. In the
work’s second issue, Dickens declared that the work’s producers could “hardly hope to see” this void “supplied,” unless given time (qtd in Patten 127). However, as James Mill wrote in *Westminster Review* in 1824, a “periodical production must sell immediately,” must be “read the next day, or month,…otherwise it cannot be carried on” and “will not be read at all” (qtd in King and Plunkett 15). Thus, though Dickens may have wished for more time in which to generate a narrative in the space left by Seymour’s death, he had to produce more narrative immediately—and in such a way that “prompt[ed] to the study of immediate effect, of unpostponed popularity, of the applause of the moment,” in Mill’s words (qtd in King and Plunkett 15). As would be the case for the rest of his career, and as would become typical for most serial authors, Dickens had to supply regular sections of *Pickwick* on the predetermined plan announced at the work’s outset. If the narrative did not move forward by his contribution of timely work, it would cease to exist.

Therefore, in 1844 when G. H. Lewes judged Dickens favorably on the criterion that “a story-teller and story-reader should establish a mutual understanding as soon as possible,” he was commenting on the temporal ramifications of the mode of publication as much as on narrative techniques that took shape within it (qtd in Flint 18). Writing had to be performed in real time in conjunction with an already-in-motion medium and in a way that produced immediate, positive response from readers. The creation of serialized narrative fiction was thus carried out under the understanding that time itself was at stake for those very narratives—even before the

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60 There are far too many examples of Victorian authors addressing the difficulty of producing compelling narrative at the required intervals and lengths to comment on here. However, it does bear mentioning that an author like Hardy, for example, who ascended to professional authorship via *Far From the Madding Crowd* in 1874, had to meet the same kind of temporal demands that Dickens did with *Pickwick* 40 years before. In his “Recollections of Leslie Stephen,” Hardy recounts that what would prove to be his first commercially successful novel was accepted on “enough matter to make a first number” in *Cornhill Magazine*, “with something over” (qtd in Millgate 260). When Stephen wished to begin publishing it, he asked Hardy whether, “if he began to issue the story in the coming January number,” he could “keep in front of the printers month by month” (Millgate 260). The author “keeping in front” of the editor’s pen, the paper-mill’s deliveries, and the printer’s press illustrates the process of publication described above.
first “number’s” publication. Even if the planned duration of a narrative stretched, commonly, to twenty months or, exceptionally, up to the four years of Hardy’s *The Dynasts*, the measurable consumption of a novel’s first pieces could determine whether it would find a place in the outlet’s next issue (Hughes and Lund, *Victorian Serial 8*).

The challenge to produce downstream demand from a narrative’s very beginning was the responsibility of the assemblage of publishers, editors, and authors, and it necessarily worked in real time. Hughes and Lund show that nineteenth-century “[e]ditors and publishers knew that creating a readership for a novel…involved generating favorable early reviews and making use of promotional techniques,” because the “beginning and the middle of an installment text would establish its fundamental success and sales, delaying and perhaps reducing any disappointment the ending might later create” (“Linear Stories” 171). The quantifiable feedback of sales figures could be added in to calibrate the ideal volume of copies for subsequent editions and even the narrative construction, given sufficient sales to justify them at all (when it came to new authors or publications dealing in cheaper editions and smaller margins). Authors, Flint notes, necessarily “entered into various types of dialogue with their readers, attending to their desires in various ways, and…trying to ensure that their potential purchasers chose them,” which could entail “acting on the responses of readers in their intimate circle, seeking to please both them and the wider audience whose reaction they could be seen as anticipating” (20-21).

The serial narrative took shape, then, not as a collaborative form, but one that established an *immediacy of relations in real time* between the same kinds of elements that Robert Darnton’s “What is the History of a Book?” names (a writer responding to previous works’ reception, anticipating criticism of new texts based on that previous reception, and addressing “implicit” readers while planning or writing subsequent works in a “circuit” of writing, to print, to planning
However, this circuitous model only holds for Victorian serial authorship if one considers each issue its own, distinct work, and not an ongoing, single work, which its authors and publishers explicitly did. Though something like Darnton’s circuit exists, it does so not as a structure active before and after a text’s composition. Rather, all levels of feedback are interwoven with the work’s ongoing composition. As opposed to an author’s management of his or her career whole-work-by-whole-work, the serial narrative author had to manage his or her literary flows while they moved, like watercourses managed from source to outlet as they collected material, gained force, and/or were diverted or dissipated along the way.

Rather than to recapitulate their works, I would direct readers to Hughes and Lund’s *The Victorian Serial*, along with their articles “Textual/Sexual Pleasure and Serial Publication,” and “Linear Stories and Circular Visions: The Decline of the Victorian Serial,” Mark Turner’s “‘Telling of my weekly doings’: The Material Culture of the Victorian Novel,” Robert Patten’s “Serialized Retrospection in The Pickwick Papers,” and Kate Flint’s “The Victorian Novel and its Readers” to find detailed readings of Victorian authors’ and editors’ methods for connecting their narratives with a present moment and imbuing them with a sense of historical immediacy, as well as earning them immediate commercial success. I will, however, point out the primary categories in which these management practices operated, because provide evidence for the shaping of serial narrative as a form of flow management, as I posit.

The first of these categories concerns the sequential, irreversible nature of serial narratives that bonds them with senses of both “progress” and “history.” These senses hence became key thematic, if not also ideological, ramifications which authors involved in their narratives, creating a relationship between all parts of the writing-publishing-reading assemblage *in real time* and eventually became not just part of readers’ expectations for it but a theme of
narratological, if not directly content, interest. Paired with its dependency on immediacy, on its relation to the real-time experience of its readers if not also its mapping onto actual, seasonal or contemporaneous time, serial narrative publication established a sense of history occurring, of communally sharing moments of irreversible time, within its narratives. As Thomson defined the expenditure of energy in the image of a river flowing downhill to the energetic “sink” of the sea, the irreversibility of serial publication and authorship defined its narrative structure and construction as distinct in the body of English literature, as a form which only authorial work put into it its attachment to the irreversible progression of moments could bring it to its end.

Patten and Turner both show how authors and publishers helped readers to identify with the immediacy of their narratives. Patten traces the advent of *Pickwick Papers*’ “refracted present” that would come to characterize most serialized narratives, which was established through forms of “mensural dating” that allowed readers to find “topicality in sequentially-released pieces of narrative” to grasp that the narrative was being “manufactured concurrently” (128). Turner says such exploitation of the serial form helped to make “the lives and times in the fiction” reflect “the lives of readers” (though it also encouraged them to send in authorial suggestions for future issues) (117). Paired with the medium’s relative affordability, such identification encouraged ever wider publication and readership.61

Audiences who found immediately relevant material in a serial narrative subsequently found themselves dealing with “a work issued in process,” in Patten’ words, that sometimes even recalled or summarized previous issues’ central plot movements to maintain a continuity of narrative current and to provide new readers access to the already in motion narrative (128).

61 Hughes and Lund argue in *The Victorian Serial* that this arrangement in the real and/or refracted present constitutes the “literary analogue” to predominant, early capitalist mindset, in that “the part was a thing to be had for the time being yet also promised more to come” (4).
Hughes and Lund posit that such a scenario meant that readers “found themselves living in history, being carried along by the rapid pace of events toward uncertain destinations” (Victorian Serial 66). This apparently progressive, developmental movement in serials correlated to theories of “organic evolution as a historical process,” in Hughes and Lund’s words, that were not exclusive to Darwin and had been on the minds of readers since the 1830’s and “widely accepted” by the 1840’s (“Linear Stories” 187). While such conceptions of history do not cause serialization, they “would have worked to make the serial form an acceptable format for the era’s best works” that “emphasized non-reversible sequence(s) of events” (“Linear Stories” 187, 169).

Vitally, serial authors frequently explored the concept that history was in motion, progressive, and irreversible via the flowing bodies of water their stories featured, or in the ways that their narratives’ serial structures and/or movement imitated the movement of watercourses. Hughes and Lund remind us that many serialized works, like David Copperfield, included the term “history” as part of their titles to affiliate them with such progression (“Linear Stories” 169). In two of the most famous such “histories,” Daniel Deronda and David Copperfield, both title characters’ efforts to advance to higher socioeconomic and/or personal developmental states is written into their respective relationships to the River Thames. Both young men spend significant time learning to row the river, to use its ebb and flood stages, to clear its dangerous obstacles and high-traffic locales in a typical leisure activity for middle or upper middle-class males. Copperfield consciously links this hobby to his class progress, and Nicholas Dames notes that in Deronda “images of progression or seriality” attach to Daniel’s rowing on the Thames, to the river’s movement itself—and, I would add, to his sailing up the Main to Frankfurt in search

62 This comment bears striking similarity to Magwitch’s assertion that neither he nor Pip can see into the future any more than they can see through the dark water of the Thames near the end of Great Expectations, not long before his arrest and his own subsequent death.
of his familial roots (157). Both men also rescue women about to throw themselves in from the banks and draw them into the novels’ central plots.

Enriching this structural and thematic shape, Dickens inserts pauses at the beginnings of select chapters in which Copperfield steps outside his own self-narrative’s flow in order to allow parts of his life to pass by, to comment on it, and to wait for later moments when he reengages. 63 In all these cases, the sense of immediacy combined with actual time passing over the audience’s time of reception bring “history” and sometimes “progress” into direct, real-time experimentation and observation for readers. At the same time, by invoking rivers as bases both of serial structuring and of the serially-narrated life’s shape, we must recall Robison’s invocation of Pliny’s river as the life of a human that can only end in “rest” in the “abyss” (if not also Thomson’s image of a river reaching the sea). Precisely this limit of thermodynamic potential

63 In the opening paragraph of Chapter 18, “A Retrospect,” Dickens’s self-narrator pictures the “progress of [his] life” as “that flowing water, now a dry channel overgrown with leaves” and wonders “whether there are any marks along its course, by which [he] can remember how it ran” (274). Chapter 43, “Another Retrospect,” begins by furthering this image, with the request of the narrating Copperfield to the reader: “Once again, let me pause upon a memorable period of my life. Let me stand aside, to see the phantoms of those days go by me, accompanying the shadow of myself, in dim procession” (632). “Weeks, months, seasons, pass along” as the narrator stands outside the flow of his life and watches on (632). Then, “[i]n a breath, the river that flows through our Sunday walks is sparkling in the summer sun, is ruffled by winter wind, or thickened with drifting heaps of ice. Faster than ever river ran towards the sea, it flashes, darkens, and rolls away” (632). This chapter, and the serial number, end with the conclusion: “I have stood aside to see the phantoms of those days go by me. They are gone, and I resume the journey of my story” (640). The final such “retrospect” occurs in Chapter 53, before Dora’s death.

Similary to Copperfield, Hughes and Lund write that Eliot’s Romola “often pauses in Eliot’s world,” where rather than being “caught up in the flow of time” like Lorry, she “stands at the end of a phase,” which many readers found bewildering for its apparent lack of promising a subsequent direction for her (Victorian Serial 74). Further, they write that the character Tito “is unaware…that he is controlled by events, just as he will be in his final drifting down the ‘dark river,’” referring to Eliot’s image in the July 1863 issue of Romola: “The current was having its way with him: he hardly knew where he was: exhaustion was bringing on the dreamy state that precedes unconsciousness” (qtd in Hughes and Lund Victorian Serial 78). Even Eliot’s punctuation here enacts a typographical, rhythmic set of interruptions of the sentence which reminds readers—even if unconsciously—that the apparent flow of time is actually delivered via a succession of self-contained, regularized, and regularly-interrupted segments of narrative. Henry James notably criticized Daniel Deronda in his strange review constructed in the form of a play, “Daniel Deronda: A Conversation,” as not river-like enough. His character “Pulcheria” denounces that “Daniel Deronda doesn’t have a current; it’s not a river but a series of lakes” (684).
implicitly, if not always as explicitly as *Copperfield* does, reminds authors and their readers of the unavoidable, finite nature of life in and outside the narration—heightening anxiety and/or interest in exactly how that finitude will be met as it grows ever nearer to the ongoing prose.

Finally, as the first interventions onto English rivers and streams in response to industrial pressures was a systematic segmentation and regularization of structures and practices that affected their flowing—aimed to preserve their immediate power and continual usability—regularized interruptions in serial narrative flows created a form of ongoing immediacy. The progress of a serial narrative’s course depended on the regular delivery of standardized narrative segments and the pauses between them, so that in the experience of reading, if not living in, the real time of ongoing narratives, audiences had to endure interruptions of characters’ lives, of mysteries’ unraveling, of promising romances, of any number of other plot lines. This “characteristic alternation between progression and pause…intensified hesitation and progression,” which authors used to maximum benefit for ginning up interest and expectation (Hughes and Lund *Victorian Serial* 175).

In this way, apparent interruptions actually completed narratives’ wholeness, largely by making space for literary reviews and the inevitable, informal discussions of popular works that occurred in homes, pubs, or otherwise. Hughes and Lund call these gaps “key points” when “characters paused amidst the hustle and hurry of life to assess where they stood and to understand the shape of history” (*Victorian Serial* 61), while Patten calls them a “kind of *petit mort*,” often “foregrounded as artificial stops,” where readers also “paused along the line of the narrative” and could “attemp[t] to define the shape of the whole” (127). Routinely combined with contextualizing or summarizing material in each issue, these announced stops also allowed
new readers to enter into the current of each history. As Turner reminds us, too, the regularity of immediate reviews providing talking points which, in fact, helped to boost sales (117).

By inducing contemplation about their narratives in the times when they were not visible to readers, then, skilled serial authors crafted them so that the pauses between issues, perhaps counterintuitively, built a sense of continuing, present experience. Hughes and Lund posit that Dickens’s careful narrative planning with these gaps to “place[e] his readers along a line from beginning to end of his novel, suggesting how events will end, but also letting his audience live in a moment” of time narrated in each installment, as if in imitation of “Providence direct[ing] history to a final, appropriate conclusion” (Victorian Serial 73). In this way, Dickens strengthens the belief of his audience that “history is a journey in stages from past through present toward the future,” just as his serialized narratives are (Hughes and Lund Victorian Serial 73). This concept of historical “progress”—even if individual—stands, except for (but reinforced in principle thereby) instances in which his characters’ own poor choices or behavior flout that providential progress, as in Copperfield’s narration of his own “first dissipation.” It is a telling authorial choice that a moral “dissipation” involving overconsumption of alcohol occurs in the energetic “dissipation” of a narrative’s forward flow in a moment of pause and rumination on a past mistake. Likewise, the moment of narrative pause which Copperfield draws overt attention to as his own narrator highlights his “dissipation” as an interruption of his development toward respectable, middle-class manhood.

The immediacy of the reading experience, then, exists in the reader’s attention induced both by the segments of narrative material and its gaps, where Dames posits that “the reader is
most visible…between engrossment and release that we might call distraction” (106). When successful, the social events that this monthly reading cycle created—lost as those are in our reading of standard editions—turned on the future directions their authors might give their courses. Precisely this intense sense of immediacy in readers’ minds motivated Victorian critics of serials. These critics’ reactions to the ways serial fiction’s producers captured the present moment of, or in, readers’ minds induced a relatively limited scope of critical discourse. Mostly penned by privileged, male commentators, this discourse again demonstrates social hydrology shaping of concerns about particular population groups and even their recreational pursuits.

The same James Mill who lauded the democratic potential of serial literature in the 1824 article, “Periodical Literature,” also understood its distinct relationship to time and accurately, though regretfully, forecasted the form that author-publisher-reader relationships would take in the future as a result. Because the “one law to which the periodical is subject—as if a thermodynamic constraint governing motion—was that a serialized narrative “must have immediate success, to secure so much as existence,” serial outlets would do harm by too fully relying on methods for calibrating production to public demands (qtd in King and Plunkett 15). Without naming it as such, Mill perceives an economy of pleasure which must develop in this system, judging that “[b]y consulting the public taste with continual anxiety, the pleasures of reading are perpetually supplied to the greatest possible number,” though without regard to the effects of such immediate, widespread indulgence of momentary appetites (15). He fears the massive scale on which serial narrative could quickly and simultaneously occupy readers’ minds.

64 Thackeray draws attention to this dichotomy of attention and distraction by writing characters whose own reading-induced reveries are interrupted in the foreground of his narratives (Dames 86). Perhaps coincidentally, Dames notes, “what is continually disrupted in Thackeray,” in “the language of modern cognitive science and information theory…is ‘flow,’” the “effortless and atemporal focusing of consciousness on one task, a pure…state of immersion that is not exhausting so much as enlivening” (91).
Along these lines, a combination of physiological and hydrological considerations led to the representing of serial narratives as a kind of liquid whose proper management could lead to a social version of Kay’s ideally-drained Manchester, or whose mismanagement could lead to the dangerous floods of uncivilized populace that Taylor feared. Though they acknowledge Janice Radway’s warning that “reading is not eating” and that ingestion is not the same as “capitalist commodification of representation,” King and Plunkett’s *Victorian Print Media: A Reader* brims with historical criticism that does equate serial material to food and drink, the reading of which either “nourished or poisoned bodies” of the readers through whom it ran (36). Thus, literary producers’ desire to ensure an immediately powerful narrative and accompanying reader reception threatened others concerned with whether such material posed a threat of individual and social, moral “dissipation” couched in similar language as that of the temperance movement. As in the sanitary movement the last line of thinking considers the reading populace as a kind of social topography whose manageability remained vital to the established political, social order and through which various flows of narrative moved to assist or impede such manageability.

In the piece just mentioned, Mill denies any inherent “evil” in serialized material, depicting it instead as a fluid medium whose managers could either “promise to keep (free of) the poison which all other men yield to the temptation of putting in,” or “imbue with evil” and
“add to the supply of a noxious commodity” (qtd in Kind and Plunkett 20). He ensures his readers of his journal means to “diffuse” socially beneficial material—under the banner of Knight’s “Society for the Diffusion of Useful Knowledge.” But who, and by what criteria, would determine the healthful from the “noxious”? The evaluation of the social ramifications or desirability of text’s immediate effect seems to have depended to a large extent on whether or not that material came from an established, trusted, “moral” source like Charles Dickens.

Praise for the first issues of *A Tale of Two Cities* (*TTC*), which the 12 November, 1859 issue of *Illustrated London News* claimed “probably carri[ed] most of its readers along with it,” clearly deems such a phenomenon desirable (qtd Hughes and Lund *Victorian Serial* 65).

Dickens had orchestrated tight, short parts that “led to a drive and density” in its first issues that, according to *Illustrated London News*, had “the effect of keeping up the desire to ascertain what it is all about through every successive number” (qtd Hughes and Lund *Victorian Serial* 66).

John Forster’s positive review in the 10 December, 1859 issue of *Examiner* included a similarly thermodynamic, if not hydrological, register that noted the issues’ “energy,” “single purpose,” and “force”—as did *Bell's Weekly Messenger* the following week in praising its “unalterable

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65 This ambivalence also recalls that within the temperance movement about ale as an invigorating, recuperative, healthy form of liquid to consume, while gin was demonized as too quick-acting, to quickly consumed (in dram shops), unhealthy, and dissipation-inducing. William Rathbone Greg’s “False Morality of Lady Novelists” for *National Review* in 1859 “compares” the kinds of materials men write and (presumably) read to the novels women write and (presumably) read in terms of bodily consumption. The latter act too potently on their readers than what Greg’s patriarchal stereotypes of them can allow for their health. “Histories, philosophies, (or) political treatises, to a certain extent even first-class poetry,” he writes, “are solid and often tough food, which requires laborious and slow mastication” (qtd in King and Plunkett 51). On the other hand, “[n]ovels are like soup or jelly (that) may be drunk off at a draught or swallowed whole, certain of being easily absorbed into the system” (51). That they are overly liquid, that they act too quickly on the mind and body of their readers, and that their segments can be “drunk off at a draught,” all constitute threats. The complete orientation of such narratives around instant or near-instant potency, and the expressions of this potency through female readers’ dynamism are not endurable for Greg. Edward G. Salmon also parrots this rhetoric in the 1886 article, “What Girls Read.” “If choosing the books that boys shall read it is necessary to remember that we are choosing mental food for the future chiefs of a great race,” he posits, “it equally important not to forget in choosing books for girls that we are choosing mental food for the future wives and mothers of that race” (qtd in King and Plunkett 71).
purpose from the very first” (qtd in Hughes and Lund *Victorian Serial* 66). Such an immediate exertion of downstream-driving force promised a gripping and profitable narrative, and apparently one deemed acceptable to the managers of the social landscape through which it ran.

In other instances, based more on political, religious, or moral beliefs than on artistic quality, narratives that immediately consumed the minds of readers seemed to present danger. By 1863, Mill’s prediction about the consumer-producer relationship inherent in serialized fiction found perhaps its apex in the “sensation novels” that Mansell critiqued for *Quarterly Review*. Mansell rued that it was “[w]ritten to meet an ephemeral demand, aspiring only to an ephemeral existence,” and, thus, naturally “ha[d] recourse to rapid and ephemeral methods of awakening the interest of their readers, striving to act as the dram or the dose, rather than as the solid food, because the effect is more immediately perceptible” (qtd in King and Plunkett 56).

Where traditional notions of a skillfully-wrought novel assumed it would require slow, long digestion, serialized narratives utterly and instantly captured their readers’ minds and bodies (here upsetting, as Dames has also argued, moralized understandings of physiology at the time).66

G. H. Lewes expresses a major social concern for Victorian medical science regarding how quickly and fully serialized narratives captured the public’s attention. “Attention is the direction of the consciousness—not the consciousness itself,” Lewes writes in 1860’s *Physiology of Common Life* (53), in which “attention” denotes “a selection of perceptual channels” (Dames 95). Lewes counterposes “attention” with “a massive and diffusive sensation arising from the organic processes…a vast and powerful *stream of sensation*, belonging to none of the special

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66 In considering readerly attention, Dames notes that, in *The Newcomes*, Thackeray himself “pursues the comparison between book and food, linking novels…with sweets as agents of voracious, if ultimately wearied, appetites” (75). Similarly, Henry James’ review of *Daniel Deronda*’s first number, expresses joy at “a month to think over and digest” the work (qtd in Dames 123).
Senses, but to the System as a whole (*Physiology of Common Life* 68). As such, Lewes warns that “[t]o the extent that attention is intensified or extended, distraction is necessarily more pressing, and will have its revenge” (Dames 100).

Like Victorian concerns about the productive management of flows, whether of natural rivers, canals, mill races, or influxes of populations “choking the drains” of factory towns, critics of attention-seizing serials feared for a public that would be led into mental, if not also moral, dissipation. Thanks to the flows of narrative built to continually hold their attention in real-time, they might lose their ability to control their “oscillation…between alertness and drift, focusing and diffusion” (Dames 99-100). The effective construction of serial narrative for maximum immediate effect, thus, promises a catastrophic, social-mental “diffusion”—a “revenge” in the dissipation of reading “masses”’ capacity for attention that might render them unruly.67

**B. Time — Duration (against Dissipation)**

“When duration is of more importance than intensity.” ~ Whitwell Elwin, in a review of Thackeray’s *The Newcomes*, *Quarterly Review*, 1855.

When Henry James denounced Thackeray’s *The Newcomes* in his preface to *The Tragic Muse* as one of the worst examples of the “large loose baggy monsters” that Victorian authors had yet produced, he identified what was—if not for him, then for many other authors and publishers—the guiding principle of enduring dynamism—the putting off both a narrative’s and its readers’ energetic dissipation (4). Where Dames sees Thackeray as “push[ing] against expected, valorized norms of readerly alertness and concentration,” I posit that he also simply

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67 Dames shows that physiology-based judgments often focused on “the problem of reading in bits,” despite Price’s demonstration that Victorian authors knowingly inserted set pieces into their serialized issues in hopes of being anthologized (196). One *Quarterly Review* editor, in “Books and Reading” from 1886, “warily admits that some books…could be profitably read by a ‘snatchy method of perusal’” that should, in general, “be guarded against with the utmost care” (qtd in Dames 196).
extends this standard principle in doing so (79). And when another of Thackeray’s critics charged that his novels were “merely a matter of going on and on,” they intimated the dominant hydrological principle of the era—the extension of powerful, useful movement over time and distance—as it was being applied to serialized narrative (F. R. Leavis qtd in Dames 79). Like Arkwright extending the capacity of the stream driving Shudehill Mill’s mill-race or Bazalgette enhancing the flow of the Thames as London’s economic engine and material drain—serial narratives’ authors and publishers endeavored to extend their dynamism over unprecedented temporal and geographical courses of distribution in order to maintain the downstream pull of reader demand and to continue collecting readership along the way.

The truth of such dynamic extension, however, must always be—as the Second Law of thermodynamics taught Victorians—an inevitable point and time of dissipation, no matter how distant. Even when work (or energy) was added to a system in motion, it would always, eventually, reach a state in which entropy had reduced possible energies to equilibrium. The energetic terms that first came to the fore in the 1790 engineers’ report to the Thames Navigation Commission in acknowledgment that humankind had no power to “encrease [sic]” the quantity and power of England’s rivers spread into the discourse of publication, editorship, and even authorship by the end of the 1830’s. Thus, as Patten writes, serial “[b]eginnings are determined by endings” and the “death” that looms over *Pickwick Papers* (a “posthumous” collection) calls up Dickens’s creativity (132). In cases of less well-established periodicals and authors, who simply followed the course of any narrative that proved profitable from week to week or month to month, the goal was simply, continually to *not end* (*The Wild Boys of London* seems one such case). All serial authors, therefore, faced the challenge of writing through time but against a
guaranteed, eventual end—whether, as Dickens knew after two issues of *Pickwick*, in “about twenty numbers,” or under constant threat for publication to cease if not successful (Patten 127).

The distraction from, or apparent putting off of, this point of dissipation became the goal of authors’ “invention,” even if they acknowledged these endpoints to their readers.68 Ironically, just as Bazalgette’s engineering so fixated on extending the apparent flow of the Thames that it fought known energetic principles from physical and chemical science—only to move the point of London’s drainage flows’ dissipation a matter of miles downstream—authors put work into the their plots meant hold readers’ attention until their end, all the while in tacit agreement that it would have to end. As Feltes puts it, the only question that remains is “where shall we go next?” in meandering from the present to that promised end (14).

For Dames, the literary version of prolonging the engagement, intimacy, or shared understanding between a text and its readers situates well within the context of developments in opera and symphonic music. Across these three artistic mediums, Dames argues, two questions came up ever more frequently: “How might temporally elongated forms adapt themselves to consumers?” and “How, in turn, must aesthetic consumers adapt themselves?” to such forms (124). In this way, as Hughes and Lund posit, serial literary production not only exists as an “economic strategy” but as “a literary form attuned to…tendencies in the age at large”—which, I posit, constitute material and artistic models or adaptations of the hydrological principle of extending flows against dissipation (*Victorian Serial* 8). The literary version of this principle

68 See Patten for more extensive explanation of death’s presiding over *Pickwick Papers* beginnings. *Bleak House*’s (1852) opening passages also portray London as if in the midst of “heat death”: “London. Michaelmas Term lately over, and the Lord Chancellor sitting in Lincoln’s Inn Hall. Implacable November weather. As much mud in the streets, as if the waters had but newly retired from the face of the earth, and it would not be wonderful to meet a Megalosaurus…Smoke lowering down from the chimney-pots, making a soft black drizzle, with flakes of soot in it as big as full-grown snow-flakes—gone into mourning, one might imagine, for the death of the sun” (13).
emerges from hydrological adaptations and origins like Knight’s and Dickens’s idealized paper-mills: powered by idealized yet real streams, with their channeled flows of water and pulp producing regularized reams of paper to be sent to printers, whose own water or steam-powered machinery reproduces the texts sent by publishers, who have hired authors to fill those numbers of pages with narratives to appear in regular intervals perhaps indefinitely into the future.

The parallels between the Robison’s criteria for a well-managed watercourse and serial narrative as a profitably, enduringly dynamic medium begin with the principle of collection-in-motion. Whereas any other literary material that appeared complete could “gathe[r] and dispers[e] narrative energy in a single burst,” according to Hughes and Lund, serialized literature was a “slowly accreting” form (“Textual/Sexual” 147). As Turner puts it, *Pickwick* set the model for the slow accretion of attention and readers “accidentally” by combining Dickens’s writing with the plan for its publication that preceded his primary authorship (117). The combination “enabled the work continuously to gain new readers, month to month” while “consolidat[ing]” those “already purchasing shilling copies” (117).69 And if Dickens and Chapman and Hall stumbled onto this form, they and most other publishers subsequently adopted it wholeheartedly —embracing a tenet like that of Robison’s capitalized “River” as “appropriated to a considerable collection of waters,” always increasing in volume, draining a watershed ever more forcefully by the constant collection of increasingly large tributary bodies (369, emphasis mine).

The serialized novel must continue to move with narrative power in every moment, never stagnating, in order for such collection of readership and cultural power to occur. Readers had to be induced to commit to remain with a novel through its “delay of gratification,” and constant postponing of revelations of characters’ or plots’ outcomes, and even if such endurance through

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69 See Turner for more on the economics of purchasing serial narratives. Hughes and Lund also address this as a didactic model for learning middle-class “investment” practices (in *The Victorian Serial* 4).
time “dovetailed…with the new awareness of time’s extended duration” in contemporaneous biological and geological discoveries (Hughes and Lund Victorian Serial 4, 5). Human beings do not naturally invest their time over weeks, months, or years without effective inducement. How, then, do authors, editors, and publishers create a situation in which “the experience of literature is…more powerful and meaningful than any specific conclusion drawn from it,” which traditionally came (in other forms) in works’ endings (Hughes and Lund Victorian Serial 71)?

I will again rely on the critical texts mentioned above to provide detailed elucidation of the specific plotting and narrative techniques Victorian writers used to extend the duration of their stories’ energy across the long temporal channels their narratives traveled. I will simply highlight the types of techniques they used (in coordination with their publishers) to do so, in order to understand subsequent, cultural and critical responses to them. Within the confines, as Flint reminds us, of simultaneously filling three volumes over time while never overflowing the bounds of any individual serial issue, authors employed forms of retrospection that maintained a sense of continuity across the past and present of the narrative, deflections of the course of a narrative in apparent “byways,” and, most importantly, a variety of forms of repetition that maintained tension for the work’s temporal duration.

Patten shows the importance of a serial’s narrative past, of what he calls its “retrospective potential,” to the continual building up of interest in its the future and providing access to newly-gained readers. In the hands of skillful authors (he discusses Trollope, Collins, Eliot, and Dickens) this systematic view of the entirety of a literary flow mirrors the establishment and interventions of new political bodies incorporated to handle entire watersheds, which aimed to maintain temporal and geographical tension of their flowing bodies of water. Patten cites Collins’s “unraveling a past event over many installments” that also contain ongoing material,
Trollope’s “compulsively reiterating in *Phineas Redux* a moment” from a preceding narrative, *Phineas Finn*, and Eliot frequently “reinvoking a past time in the service of a humane understanding of historical processes, consummated and exploited in the backward-looking dynamic of periodical fiction” as examples of this practice (138). According to Patten, *Pickwick* sets the stage for such exploitation of serial literature’s ability to combine the duration of real and narrated time. That novel “gains propulsion as a story and a commercial venture from its suffusion of pastness,” he writes (124), uniting “past and present and future, documents and editor and consumers” (138) through a double-faced relation to time that simultaneously looks to the narrative present—or, in my terms, downstream—and past—upstream.

Successful serial writers also developed plot diversions which intentionally stalled the main current of the plot or briefly deflected readers’ attention away from it. Dillane argues for Eliot’s deliberate managing of her narratives’ rate of forward motion or progress as compared to many popular novels’ unchecked, sensationalist drives. Her narrators often closely elaborate upon content like setting, according to Dillane, to fight the “usual ‘breathtaking peripety’ of the (serial) mode” (130). Such narratological resistance against “sensationalist” flow-based models of serial literature can then bear particular meaning within a given narrative’s content, as it constitutes a challenge to the wider cultural embrace of flow dynamics-based thinking.  

Various forms of narrative repetition proved to be most vital among authorial approaches for successfully extending serial narratives through time while collecting readers along the way. Victorian authors like Eliot, according to Dames, modeled “the recurrence or repetition of thematic material over long stretches of intervening time and space” on something like the

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70 Dames reads an example of this in *Daniel Deronda*, in a conversation between Gwendolyn and Grandcourt. Here, Eliot punctuates the conversation with repeated “parenthetical dilations of conversational time” that are intended to bring a sense of immediate importance, immediate experience, within the extended experience of reading the novel (even in its relatively long parts) (Dames 159).
musical concept of *letimotif* (to which Dames shows she was exposed via Wagner’s England performances) (127). Dames posits that these “self-quotations…elaborately point the reader back to earlier situations and events” in order to “mnemonically organize distant thematic and plot material”—as “signposting in an elongated narrative” (155). Such repetition took care not to allow particular characters or figures to be absent so long as to lose readers’ interest in them, thereby making a subsequent issue less likely to be purchased even if it promised their return.

Hughes and Lund identify Dickens’s orchestration of Florence’s appearances in *Dombey and Son* as an example of an author forcing his audience to personally live through his “and other mid-Victorian novelists’ aims of drawing readers into a long story that required patience and an interest in others” (*Victorian Serial* 31). In their words, Florence’s own “patience and compassion, operating over great distances, become models for Dickens’s” readers themselves, reinforcing a didactic function in the intentional, temporary blocking narrative flow (*Victorian Serial* 31). They also posit that this temporal extension functions thanks to Dickens’s by-then familiar format that signaled to audiences that they were “invited to join” in the waiting (31).

Finally, authors utilized a more complicated and important form of repetition by orchestrating repeated phases of arousal, deferral, and sometimes partial release of desire as a form of tension. Whether inside the narrative, as in characters’ own romantic or sexual desires, or on the behalf of readers who could be lead to yearn for plot resolutions over the course of months or weeks, desire plays a central role in serial authors’ regular recalibration or regeneration of tension. Near the end of the century, Wilkie Collins had identified this constant need in his oft-quoted line about making audiences laugh, weep, and wait—identifying a

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71 *Deronda* was critiqued by one reviewer for too frequently repeating particular tics or idiosyncrasies of characters which likely were meant to function in just such a way, a literary analogue to the melodic, rhythmic repetition of *leitmotif* accompanying those characters.
systematically repeating call to readers’ emotions as catalysts for maintaining tension for the next issue. Hughes and Lund’s “Textual/Sexual Pleasure and Serial Publication” details techniques of Dickens, Gaskell, and Eliot for “prolong[ing] the duration of desire” of their audiences which involved “making desire, more than its release, the focal point” of narrative construction (158, 157). The exploitation of real time in the breaks between issues, combined with narrative diversions or other particular intricacies of plotting over any number of those breaks, forces audiences to wait and to do so full of anticipation—creating enduring emotional dynamism.72

Eliot developed a particularly effective twist of this generally popular serial approach. She took advantage of the serial’s “periodicity” and “persistence” as “structures attuned to actual female experience in an era when women were major consumers of literature” by raising the specter of an unwanted pregnancy for Gwendolyn after Grandcourt dies in Book Seven of Daniel Deronda, in August 1876, which she could only confirm in Book Eight, in September (Hughes and Lund “Textual/Sexual” 147). Her audience—particularly her women readers—then experienced the same period of waiting which is implied to be occupying Gwendolyn in the un-narrated interim.73 Until the process of repetition begins again, the partial release of tension before its recalibration, the desire of (many of) her readers to know Gwendolyn’s fate coincides

72 Hughes and Lund identify North and South as an example of the use of “waiting, anticipating, and postponing of fulfillment…to further prolong the duration of desire” within the context of a romance narrative (“Sexual/Textual” 158). By seizing the potential of serial plotting in, they argue, Gaskell creates a particularly “feminine economy of desire” in which “serial issue…allowed erotic tension to fade in the intervals between parts only to revive and extend its duration with each succeeding part” (“Sexual/Textual” 158). Hardy teases the later audience of The Dynasts that he may revise past serial parts over time and that future issues may not even appear, endangering the prospect of an eventual release of desire and tension that audiences had come to expect after a series of deferrals, reversals, and delays. In doing so, he further exploits the suspense that serialization enables, as readers might have been induced to see each subsequent issue as, perhaps, the final issue (Hughes and Lund, “Linear Stories” 181).

73 Hughes and Lund show that Gaskell also uses un-narrated moments regarding the changes in her female characters’ bodies, showing “that a female subculture emerged from a whole array of physical experience…that was shared but could not be openly articulated” in novels at the time (147).
with a personal, bodily experience which, as Hughes and Lund point out, is also “not subject to willed intentions” in a way that a serial narrative also is not for its readers (147).

Non-canonical serial narratives like *The Wild Boys of London*, which I will turn to in the following chapter, also deployed techniques of repetition, sometimes more complicated than those of their canonical counterparts. *The Wild Boys’* length (over 800 pages in 103 issues) testifies to its achievement at putting off its own dissipation, and judging by the meandering, repetitive currents of plot and character introduction, suggests that an energetic readership determined its length far more than did any artistically-conceived resolution. Most interesting are *Wild Boys’* use of two forms of media-level repetition.

First, it uses its images in a proleptic fashion. That is, in each issue readers find an illustration that depicts violence of a frightening or (intended) humorous nature. Under each image, however, the words, “See next number,” or “For type see next Number,” indicate that the illustrated scene itself has not yet come (and one wonders whether it had even been written yet). Second, *Wild Boys* continually promises “pantomime sheets,” most of which seem to have been lost or disregarded but one of which remains in the digitized British Library copy of the novel.74 These sheets constitute material to be played with outside of the novel’s pages—literally, as cut-outs set against the scenes provided—yet including some of its characters. These toys bear direct connection to the narrative in a way, yet allow the presumably mostly young, male audience to do whatever they please with them (without requiring literacy), all of which provides extended inducement for readers to continually return to the novel.

74 This pantomime sheet features “The Wild Boys of London in Abyssinia” where they might fight “The Giant of the Mountain” and his demonic cronies. Its far-flung, fantastical material seems to echo that which Dames draws attention to as William Dobbin’s reading in Thackeray’s *Vanity Fair*, which commands the boy’s attention: “William Dobbin had for once forgotten the world and was away with Sinbad the Sailor in the Valley of Diamonds, or with Prince Ahmed and the Fairy Peribanou in that delightful cavern where the prince found her…” (*Vanity Fair* 51, qtd in Dames 86).
Unsurprisingly, not all members of Victorian society found the seemingly ceaseless excitation of readers’ emotions and mental attentions to be desirable. The Reverend, Thomas Arnold’s November, 1839 sermon at Rugby Chapel attacks the “lack of seriousness” he sees in his current students, and he quickly identifies its cause. It is, he says, “the number and character and cheapness, and peculiar mode of publication, of the works of amusement of the present day” (qtd in Hughes and Lund, *Victorian Serial* 2). Non-serialized novels published “only a very few years since,” in Arnold’s mind, inflicted far less damage and on a far smaller scale because they were “dearer, and therefore less accessible,” while also being “less exciting and therefore less attractive” (2). Most of all, though, Victorian serials were draining the seriousness out of England’s social landscapes due to the length of time over which they kept readers invested. The earlier, less dangerous works, according to Arnold, “did not occupy the mind for *so long a time*, nor keep alive *so constant* an expectation; nor, by thus dwelling upon the mind, and *distilling themselves into it*, as it were *drop by drop*, did they possess it so largely, colouring” the mental processes of their readers to the point of infiltrating many of their conversations and even their own language (2-3, emphasis mine). Nonetheless, Arnold adds, they cannot be said to be obscene nor denounced as “sinful” in order to keep them from adherents’ hands and minds. “They are not the more wicked for being published so cheap, and at regular intervals,” he says, “but yet these two circumstances make them so peculiarly injurious” (3).

Arnold decries precisely the effect that the managers of serial narratives had intended for their works’ diffusion through readerships. Similarly, an anonymous editor in *Sharpe’s London Magazine* about thirty years later—after serial writing and publication might be said to have been perfected—claims that not only the unprecedented *duration* of serial reading poses a threat, but the *aimless duration*. In “Reading as a Means of Culture,” the editor wonders about the fate of a
“new class of readers” who “feel attracted to the page of a book…just as they are…to a winding river” without any conscious thought of what resides in or makes up that “winding” (read, “weak”) current, or about how their delving into it might affect them (61, emphasis mine).

Just as authors and publishers considered the courses of their novels to be destined toward but fending off the dissipation of their narrative energy, Sharpe’s writes that because “[t]he act of reading terminates in itself,” serial fiction’s readers merely continue to pursue weeks and months of “present gratification” with “no purpose in view” and “no object to be accomplished” except for the delaying of that attention, interest, or gratification’s end (62). This mutual desire to see the narrative and its resultant enjoyment simply continue as if without, but knowingly toward, the point of its dissipation in the last “number” goes against, from Sharpe’s perspective, the very canonical notion of literature and its instructive role in English society—the “true end” of which is to “appropriate” the “concentrated wisdom of past ages” (62).

In his 1863 “Sensation Novels,” Mansell similarly regrets that a traditionalist “we” must look on at serial readers “advancing through the intricacies of the plot, as we trace the course of an \( x \) or \( y \) through the combinations of an algebraic equation” with “about as much consciousness of individuality in the ciphers” and simpleminded regard “to know what becomes of them at the end” (57). By invoking the term “course,” Mansell does not simply equate serial narrative structure and/or plotting both with flowing water \( \text{and} \) with mathematical calculation. He does so to question what about that model of plot structure could possibly be redeeming, given the pointless, almost endless fixation that he believes it creates in readers who simply go on reading.

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75 This critique also bears reminders about the economics of serialization. The “commercial atmosphere” that produces such works is to blame. They are “redolent of the manufactory and the shop,” he says, in which “so many yards of printed stuff, sensation-pattern” must be made to meet the public’s “want” (56). This “stuff” would be milled at the most profitable rate, so that “if the demands…were to increase to the amount of a thousand per season, no difficulty would be found in producing a thousand works of the average merit…by the beginning of the season” (qtd in King and Plunkett 56).
Each of these criticisms against the management of literary flows through time and against the dissipation of narrative and reader interest also come immersed in a hydrological linguistic register, showing how deeply the criteria of flow dynamics inflected social concerns (exemplified here from the 1830’s and through the 1860’s). That hydrological language runs through both descriptions of serial literature’s supposed social dangers and its managers’ approaches to “prolong[ing] and intensify[i]ng” readers’ desire over time reiterates hydrology-based criteria’s role across social, artistic, scientific, and moral landscapes (Hughes and Lund “Textual/Sexual” 157). The enduring generation of interest, emotion, and desire, rather than their release, seems to have been achieved by authors, editors, and publishers who made “waiting, anticipating, and postponing fulfillment” the most “salient features” of reading serial narratives—causing men like those above to fear (in patriarchal terms) for their students, for women and children, and for the new reading “masses” (“Textual/Sexual” 157-8).

The economic advantages of prolonging interest in serial narratives are clear for its authors, editors, and publishers, and they prove capable of forestalling the dissipation of narrative and reader interest by enrapturing the Victorian reading public. As a consequence of their successes, the points at which serial narratives dissipate—their final “numbers”—take on a distinct, new nature in the serial form. As I will show in the following section (“Circulation”), flow dynamics’ emphasis on delivery downstream—as far as possible after making maximum use out of a flow—places a premium on such points of narrative dissipation and changes their

76 Dames shows that Victorian interest in extending of attention also had economic ramifications. G. H. Lewes entered public discussions about the limits to humankind’s ability to perform physical and cognitive labour that surrounded political topics like the 1844 “Ten Hours Bill,” for example, while factory owners “sought continually to increase the duration or intensity” of their mental attention and physical labor potential, despite physiologists arguments that the energetic potential of the human body and mind was “incapable of either extension in time or intensification without needing relief” (98, 99). (Recall that Taylor admits in Notes on a Tour of the Manufacturing Districts of Lancashire that mill “operatives” might as well be fed enough to actually perform labor, if they were to be fed at all.)
character compared with those of other forms. Thanks to the effectiveness with which serial narratives carried readers’ tensions, desires, and expectations over many weeks or months—having reached their ending through the maintenance of these forms of “attention”—the way that they achieved narrative dissipation drew intense interest from readers and critics. A narrative’s dissipation, its final “rest” in the “abyss,” bore potentially emotional, moral, even intimately personal and present real-world ramifications for readers. Even a well-managed flow must always, eventually end in dissipation, in release into equilibrium. Its course in and through time cannot endlessly be maintained.

Rather than aiming for ideal compositional wholeness of the Romantic *Bildungsroman* model, then, serial narratives’ endings simply needed to satisfactorily release narrative tension. An ideal ending thus became a crowning release that discharged, or dissipated, both narrative and reader interest and energy, clearing the way for the next one to begin, rather than a masterful stroke of encapsulating, completing, or reflecting back onto narrative beginnings. This “particular type of satisfaction is promised to the reader by the long Victorian novel,” according to Flint, especially as, not despite the fact, that “not every thread is…tied up, and although the sense of completion may be accompanied by feelings of depletion and loss” (27). In this way, as Hughes and Lund argue, such narratives might help to instill in their readers a sense that concepts like biblical creation “as an instantaneous and full-blown event” held perhaps less actionable, rich potential than the “slow unfolding of life…over vast amounts of times with pauses…between developments” and, most importantly, not as “a finished aesthetic product to be read and considered as a whole all at once” (“Linear Stories” 169).

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77 As Helmut Müller-Sievers has shown in *The Cylinder: Kinematics of the Nineteenth Century*. 
Tradeoffs did result from investing the endings of serialized narratives with so much tension and its release, however, as authors opened themselves up to the real-time feedback of fellow authors, editors, friends, and fans even after the completion of a serial narrative that sometimes resulted in changes to subsequent volume editions. For example, Dickens was convinced to rewrite the ending of *Great Expectations* after he had already sent one to the printers, thanks to Bulwer-Lytton’s sense of how readers would receive its disappointing narrative cessation, just as John Forster successfully lobbied him not to lead *Dombey and Son’s* Walter Gay “into negligence, idleness, dissipation, dishonesty and ruin” as planned but instead to lead him toward ending “well,” “with an eye to sales” (Flint 21).78 Showing his distaste for standardized, flow-based narrative management (as well as social management, as Ch. 5 shows), Hardy threatened during *The Dynasts*’ publication to subject parts to future revision and that he might not produce the promised full complement of issues, forcing his audience to wonder when the novel would end, not only how (Hughes and Lund “Linear Stories” 181). That ending a serial narrative was a task of determining how narrative strands are allowed to come to “rest,” rather than one of completing an aesthetically ideal whole, marks this form as a unique one in literary history, managed along the models of useful, profitable, flow-based practices.

The serialized narrative (within the serialized magazine or journal) formed as the literary incarnation of flow dynamics-based understandings of England’s rivers and streams as cultural and economic drivers. The same kinds of hydrological criteria that lend themselves successfully to the business of serialized narrative grew from the industrial transformations of traditional uses of watercourses as power sources and drains. The reengineering of such watercourses, along with new, topographically-conceived management, allowed political and economic bodies to

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create versions of them with expanded capacities over longer topographical distances and durations. Ironically, the wild economic successes that flow-modeled, serial narratives produced raised fears about the dynamism of readings “masses” that consumed them—engaging the social hydrology that had applied flow dynamics to social concerns. Thanks to this multivalent, hydrologically-oriented nexus of practices and concerns around serialized narrative, its crafters frequently took up hydrological problematics within their narratives’ content.

In the following chapters I will explore four serially published novels that directly engage with social problems that relate to or are explored via problematic movements of water within Victorian landscapes and cityscapes. We ought to bear in mind while reading these novels that their authors could not help but be cognizant of the flow-crazed, dissipation- and stagnation-averse critics and commentators addressing their medium, in order to fully grasp the political, social, and hydrological ramifications of their depictions. Beyond this, we must remember that these narratives we now generally regard as “novels,” implied to be wholes, were not first created and then subsequently subjected to segmentation and incremental publication. Rather, authors created them within a responsive, though irreversible, dynamic system that existed in time and which indisputably conditioned their prose. The narrative and the condition of its appearance—as a managed flow—cannot be separated. Thus, the thematic hydrological concerns found in the narratives I address in the following chapters and the serial narratives that carry them all constitute equal subjects of flow-based management under the auspices of flow dynamics’ principles of productive movement.
SECTION TWO: CIRCULATION

The mid-century water crises in London staged contests between forms of unwanted circulation and sanitarians’, public health officials’, and engineers’ attempts to establish and maintain powerful, productive, healthy uni-directional flows on the model of Robison’s *Theory of Rivers*. The River Thames became the most problematic site for this battle, especially after 1858’s “Great Stink” demonstrated the relative weakness of its flow in the face of tidal circulation. In the next two chapters, I will show how hydrological interventions aimed at ending unwanted, dangerous liquid circulations interact with two serialized narratives that feature the Thames and London’s water provision and drainage infrastructure. *The Wild Boys of London* specifically invokes the role of Thames-side sewers and faulty water provision and drainage practices in its depiction of a target population of social hydrology—“neglected children.” As I will show, the Boys’ movements within the city relate to the physician, John Snow’s, arguments about cholera’s circulatory path of communication, which compounds the perceived danger of their culturally divergent economic and social organization. I will then show how Charles Dickens’s *Great Expectations* invokes Joseph Bazalgette’s Main Drainage and Embankment projects on the River Thames that sought to extend the power and length of its flow against tidal circulation in its critique of New South Wales transportation as an incarnation of social hydrology—demonstrating how both flow-based endeavors constituted wasteful attempts to more effectively drain the social body of its real and perceived refuse.
CHAPTER TWO: The Wild Boys of London’s Sickening Circulation

Introduction

The Wild Boys of London ran serially from 1864 to 1866. That lifespan, and its subsequent publication as a single volume, suggests that it won a profitable, consistent readership. No author ever took credit for the narrative, however, and police later suppressed the single-volume version under the 1857 Obscene Publications Act. The narrative features fictional Londoners of all classes committing both petty and capital crimes and a band of orphaned, neglected boys outsmarting and outfighting police, street thugs, and wealthy, roguish antagonists. However, the novel contains nothing like the kidnapping-for-rape-murder-and-subsequent-cadaver-sale-scheme that Thomas Frost imagined in The Mysteries of Old Father Thames, for example. Nor does it rival the explicit violence and sex of other non-banned penny dreadfuls. While I will not attempt to wager which particular features explain the novel’s eventual banning, I do take as my premise that it suggests the novel struck a highly sensitive nerve for some social or political authorities. To this end, I will show that The Wild Boys of London threatens the dominant model for productive movement in Victorian culture which I call flow dynamics. It does so by violating both flow dynamics’ socio-economic and medical-sanitary applications. Specifically, Wild Boys gleefully circulates the bodies of its “surplus,” sewer-dwelling, epidemic-threatening children through London. In moving this way, the Boys contravene two culturally and politically dominant motives in 1860’s England—a general desire for well-channeled flows to drain inhabited topographies more completely, and the frenzied call that followed “The Great Stink” of 1858 for finally and permanently flushing the noxious wastewater that had been circulating through the city’s pathways of consumption from the River Thames. Additionally, the
specific nature of the Boys’ home and the alternative economic and political model they develop there levies a strong critique against the dominant paths of economic and social consumption and excretion.

1. Flow and Drainage

The discourse of flow dynamics emerged from early British hydrologists’ inability to allay the problems that industrialization’s demands on the country’s inland, flowing waters caused. It then pervaded the sanitary movement’s criteria and prescriptions for the nexus of public space and individual cleanliness, and even continued to shape discussions around public health and infrastructure after the calamitous eradication of cesspools it encouraged. Though too large a topic for this work, flow dynamics also played a formative role in the development of economic production and distribution models, along with the kinds of dynamism those models required of their contributing workers and consumers.

Most simply, flow dynamics’ has three basic criteria or goals. First, the ideal, sustained motion of a simple, flowing body of water motivates it. Second, a hydrology-based understanding of movement considers environments (including social ones) as topographies to be drained of surplus material, and through which well-channeled, well-contained flows should move. Third, interventions made in consideration of such flows address everything in and around them whose manipulation might help to delay their inevitable dissipation while making the most possible use out of their finite quantity and energy. The Main Drainage of London and the River Thames Embankment projects perfectly embody flow dynamics’ implementation in mid-Victorian London, as I will show.
The early British hydrodynamicist, John Robison’s, definition of a “river” aptly describes what hydrologists today call a “watercourse” in its most ideal form, and provides that watercourse’s ideal relationship with the surrounding topography. In his 1822 “Theory of Rivers and Hydrodynamics,” Robison defines a river simply as “a current of fresh water, flowing in a Bed or Channel, from its source to the sea” (369). What makes it a compelling model for a whole set of sanitary interventions and encourages its eventual application in economic and socio-political practice, though, is Robison’s understanding that a flow unites productive dynamism with its capabilities to collect and void material redundancy (369). From the beginning a “considerable collection of waters,” a river both aggregates and has already been aggregated (369). It exists as a dynamic phenomenon which contains in itself an entire past chain of collections-in-motion—forming “by the conflux of two or more Brooks, which deliver into its channel the united streams of several Rivulets,” which in turn “have collected the supplies of many Rills trickling down from numberless springs, and the torrents which carry off from the sloping grounds the surplus of every shower” (369, emphasis mine). By promising to repeat this dynamic chain over time and distance (given slope), a flow’s usefulness then revolves around this “surplus” material (369). Flows work, he writes, “as voiders of all that is immediately redundant [of] rains and springs” (369, emphasis mine). Thus, as the model of “flow,” a river dynamically drains “surplus” or “redundant” material by its very formation and movement. Given that various forms of managed, flowing water powered both small and large-scaled economic production in England at this time, a well-managed, consistent flow became the ideal model of movement for industry and later for social and political authorities.

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79 At the time theoretically-oriented, math-based hydrologists called their field “hydrodynamics” while those with practical, experience-based orientations called their subject “hydraulics” (Darrigol, vi).
Robison’s “hydrodynamics” came to prominence because he specifically addressed his work to the ways that industrialization and urbanization stressed naturally occurring English watercourses. While “[n]either (England’s) wants, our comforts, nor our pleasures, can dispense with an ignorance of” hydrodynamics, his countrymen “are in a manner totally ignorant” of the answers to questions like, “[W]hat is the velocity of a river of which you (know) the breadth, the depth, and the declivity?” or “[H]ow much (a river’s) waters will be raised by turning another stream into it, or sunk by taking off a branch to drive a mill” to “compensat[e] for our personal weakness” and “make a few able to perform the work of thousands?” (388, 392). These questions capture water-dependent industrialists’ fear that formerly powerful watercourses had noticeably dissipated by the end of the eighteenth century, while unprecedented industry and population growth in the early 1800’s only continued to increase stresses on them and threatened to reduce them to uselessness.\(^80\) The conundrum of increased dependence on decreasingly useful flows required the development of flow dynamics, which sought to shore up their energy and movement against dissipation. It then became the dominant discourse for producing as-if-natural flows whose managers could utilize them exactly where and when naturally available material and motion were insufficient. Such efforts sought to forestall stagnation or accumulation in the moving materials and to eliminate topographical features that allowed this, in favor of consistent, well-contained, manageable watercourses.

Flow dynamics then fully established its dominance in Victorian culture as two crises hit 1850’s London, each resulting from the city’s failure to manage its fluids. Its latest major

\(^{80}\) Oliver Stuart shows that as far back as a 1793 Thames Commission report, engineers raised alarm over the state of England’s rivers: “Providence has allotted a certain quantity of water, to run in the bed of this River;—Which is not in the Power of Man to encrease (sic). — In some places, it has been diminished… in former times, when the Value of it…was not so well understood, and (commerce) had not such great and pressing demands for it” (227).
cholera outbreak from 1853 to 1854 created hysteria by killing hundreds of Londoners per week. Four years later, “The Great Stink” turned the symbolically and practically vital flowing of the River Thames into a stagnant assault on the eyes and nose—to the point that riverside residents hung lime-covered sheets over their windows and Parliamentary chambers closed. While this may have proven the author of the Underground London, John Hollingshead’s, claim that “sewers, if not properly treated, have a power of making themselves felt which they are not slow to use”—which Londoners personally experienced and/or observed in mid-century, popular media representations of the Thames—it would take time for that city’s political authorities, and English culture generally, to accept that cholera and other insidious diseases also moved within this mismanagement (85). The physician, John Snow’s, cholera research only gradually gained acceptance up to and through its application by William Farr in the 1866 outbreak in London (Bynum 170). But even his 1849 findings showed that mismanagement had produced unintended circulations of human “excreta” and drinking water that threatened every Londoner’s biological existence, because they ideally matched the disease’s natural, circular transmission pathway.

Among all the frightful facts that Snow’s epidemiology revealed to Londoners, his description of cholera’s fecal-oral pathway stood alone. His reports following earlier outbreaks had argued for this pathway, but his isolation of the Soho water pump as the 1854 cholera epidemic’s incidence point finally, gradually convinced the public of its veracity. In his 1849 version of On the Mode of Communication of Cholera, Snow had asserted that “it ha[d] always appeared…that in cholera the alimentary canal is first affected, and that all the symptoms not referable to that part are consecutive,” meaning subsequent (7). Identifying the digestive tract as cholera’s first target within a patient, he concludes that the disease moves not via “effluvia” or
blood poisoning as others posited, but is “communicated by something that acts directly on” it (8). Putting these two observations together with the fact that “ejections” from a cholera patient “are voided with such suddenness and force that the clothes and bedding scarcely fail to become soiled, and being almost devoid of colour and odour, [such that] the presence of the evacuations is not always recognised,” Snow posits that “the excretions of the sick…[contain] some material which, being accidentally swallowed, might attach itself to the mucous membrane of the small intestines, and there multiply itself” (8-9). In other words, “a portion of the ejections or dejections must often be swallowed by healthy persons [as]…a matter of necessity” to explain cholera’s incidence. The spread of cholera, thus, occurs by the microorganism’s circulation to and from the human digestive tract—its constant movement to and from the same spot within the human body. He appeared to prove this theory when the removal of the handle from the Broad Street pump, which he suspected of spreading the disease, coincided with the decrease of cases in that neighborhood.

Most importantly historically and for *Wild Boys*, this city-scaled fecal-oral circulation can exist because the city’s historical water source is a river, and because of the tidal movements within it. Snow writes in his first version of *Communication* that “in most towns in which the malady has prevailed to an unusual extent,” a river that both receives drainage and provides drinking water has existed as “means of communication” (11). Though he cannot prove the connection yet, Snow states that because the Clyde “is a tidal river in that part of its course, the contents of the sewers must be washed up the stream” (11). This bore ominously on London, because just like the River Clyde in Glasgow—and the River Nith in equally affected Dumfries-Maxwelltown—London took drinking water from the same river into which its sewers drained and whose flowing motion contended with the tide. His maps of cholera’s spread in the 1832
London outbreak made clear that Thames had not functioned like Robison’s ideal river (12). It did not drain away the city’s waste, the tide clearly limited its flowing motion, and the resulting circulatory movement most obviously was not self-cleaning.

Ultimately, Snow’s studies provided two shocking images for Londoners’ imaginations. First, while consuming one’s drinking water, one might be consuming human waste, either from a nearby neighbor’s leaking cesspool or from a private company’s pipe as it diverted water from the Thames. Second, such sickening waste had been collecting in the Thames for years, only becoming obvious through the unusually hot and dry summer of 1858. Also, importantly for *Wild Boys*, Snow had effectively steered the public’s attention to London’s sewers as incidence points for disease and affiliated them in Londoners’ minds with the anal, or excretory, portion of the fecal-oral circulation his studies proved. Additionally, Snow’s work disproved miasmic understandings of cholera’s incidence, which had comfortably reinforced accepted class and race differences in English society and replaced them with the threat that improperly flowing liquids, or unintended circulations of those liquids, threatened every Londoner, galvanizing public opinion and political action.

Parliament responded to these 1850’s crises by reaching for flow dynamics’ promise to produce well-contained, consistent, manageable flows. London’s drinking water would be made clean by finally draining the city of its garbage, runoff, and human waste via a new version of the Thames that *always* flowed powerfully and ejected its contents permanently from the reaches of London. Joseph Bazalgette led the endeavor, which took shape as the “Main Drainage of London and Sewage Interception” and “Embankment” projects. The two complementary efforts treated the whole of London as a watershed to be drained and utterly restructured the topography in and around the river. Additionally, the plans Bazalgette drew up would circumvent even the
the physical laws governing fluid motion over distance by the artificial production of well-concealed wastewater flows.

The projects’ details are too diverse for the constraints of this work, but quite vitally, among all the opponents he identified to the river’s flowing, the tide’s dynamic effects on the river proved the most daunting. Through various “float studies,” Bazalgette quantified the power of the tide to flout the river’s currents by returning material up to 12.75 miles upriver from a point in London where it originated (11). So that the “fastidious moon” would “no longer be disgusted” by the way “its tidal influence [was] only washing backwards and forwards a stream which in decency ought to [have been] covered over as a main-main sewer,” and so that “the almanacks” would cease “to register the dates of high sewage at London Bridge” instead of high tides, in one contemporary’s words, Bazalgette went beyond simply designing a topographically-oriented, systematic drainage infrastructure (Hollingshead 98). He also directed the construction of two strategically located pumping stations, which literally put tons of coal-burning energy into lifting wastewater at crucial points along the river. From elevated reservoirs there, it would flow downhill and out of sight under the embankments also being constructed, then released from “outfall sewers” further downriver in conjunction with ebbing tides. All of this so that London’s waste would cease to circulate through its water companies’ pipes and public pumps—so that it could continue utilizing the Thames as its toilet. In the end, the river would look and smell better, while the Londoners’ waste flowed out of sight and mind under new embankment green spaces. The Thames’ highly engineered, unnatural “flowing” could now meet London’s demands—well beyond its natural capacity.
2. Social Hydrology — Draining Districts, Draining People

Perhaps because Robison’s hydrology promised well-managed and manageable flows that would “void…all that [was] redundant” of the materials they collected and set in motion, English political and social authorities adopted that field’s discourse to address one of industrialization’s biggest unforeseen side effects—explosive population growth and urban concentration (369). In this process, such authorities began discussing populations as if they were liquid matter, which then allowed the already existing imperative for drainage to bridge the gap between flow dynamics and what we might call social hydrology, its application to populations. If arguments could be made that the drainage of communities, as topographies or watersheds, vitally influenced their residents’ healthfulness and productivity in the workforce, then a similar discourse addressed to populations also seemed to make concrete political action plausible. In other words, framing the issue as one of drainage gave social commentators, sanitarians, and politicians a way to intervene on human populations. As such, social hydrology’s central aims were to disallow dangerous stagnation by setting in well-channeled motion of what were treated as “surplus” or “redundant” aggregations of people.

James Phillips Kay, William Cooke Taylor, and James Greenwood each addressed populations that threatened their conceptions of desirable community environments, social order, and public morality, and each of them explicitly framed the problems these people posed in the discourse of what I call flow dynamics. In 1832, Kay made the initial move of equating the people who lived in poorly drained areas of Manchester with the qualities of a poorly managed watershed, adding a moral register based almost solely in hydrological terms. Taylor then extended Kay’s thinking a decade later, directly discussing workers (whom he called “operatives”) as pieces of productive systems and as liquid matter to be managed or, if not, to be
feared. Finally, in the 1860’s Greenwood took a flow dynamics-based approach influenced by Kay and Taylor to define a more specifically problematic population—unsupervised children in London whose presence in avenues of productive movement and unruly circulation threatened the city’s very life.

Kay’s *The Moral and Physical Condition of the Working Classes Employed in the Cotton Manufacture in Manchester* first establishes his topographical criteria around fluid movement. Then Kay conceptually links poorly drained districts that lack productive, healthy water and waste flows to the morality of their inhabitants. In describing a particular district whose “evils” are “so remarkable as to require more minute description,” Kay’s zeroes in on improperly moving and stagnant water and (implied) human waste (21). “[I]ncluded between a high bank over which the Oxford Road passes, and a bend of the river Medlock, where its course is impeded by weirs,” he writes, this district is “inhabited by the lowest Irish” (21). Those people’s “lowness” corresponds to the circumstances of their physical relation to the nearby river, whose use by poorly-handled weirs contributes to flooding, and to the lacking drainage among the nearly 200 houses in that floodplain (21). He claims that their chimneys lie lower than the road and that their cellar floors are “scarcely elevated above the level of the water flowing in the Medlock,” where they are “liable to be frequently inundated” (21). Combined with the fact that their “soughs are destroyed, or out of repair,” their homes are constantly damp and “on the slightest rise in the river, which is a frequent occurrence, are flooded to the depth of several inches” (21). Kay fixates on the neighborhood as an inhabited topography that no political

81 See Figure 1, “Table No. 2” which Kay’s agents used to evaluate Manchester districts. Three of the six questions concern flow and drainage specifically, while four can be seen as concerning liquid movement.

82 The *OED* defines “sough” as “a small gutter for draining off water; a drain, a sewer, a trench.”
authority has addressed to rectify its lacking drainage. This poor drainage results in a “watershed” in which residents’ cellars are the points of collection for surplus water.

Then, as if drawing an obvious cause-and-effect conclusion, Kay declares about the people whose basements flood so frequently, “[t]his district has been frequently the haunt of hordes of thieves and desperadoes who defied the law, and is always inhabited by a class resembling savages in their appetites and habits” (21). His writing thus connects negative moral evaluations of whole population groups (here, unsurprisingly, mainly Irish immigrants) to failed drainage within their district—bonding the managerial criteria of literal, practical hydrology to the evaluation of urban poor populations’ character, morality, and even humanity. In the process he creates an appealing, useful tool for subsequent economic, social, and political authorities.

William Cooke Taylor’s 1842 work, Notes of a Tour in the Manufacturing Districts of Lancashire, further develops Kay’s principle, not only drawing parallels between human inhabitants and the hydrological problems of their neighborhoods, but actually contemplating people as if they were merely liquid matter. As they collect in newly crowded districts, urban populations become “an aggregate of masses,” which “hourly increase in breadth and strength,” like an unchecked or flooding stream, or as “the slow rising and gradual swelling of an ocean” (6). Taylor sees a crisis point in the present moment, claiming that, “[h]itherto, the manufacturing towns have absorbed the surplus labourers from the agricultural county; but the drain is now choked, and the stream, driven backwards to its source, threatens a fearful

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83 Such an image seems a clear precursor to the literary imaginings of what happens in and potentially comes out of such areas, like the muddy, damp basement apartments in the Manchester of Gaskell’s Mary Barton from which political unrest emerges, or the “skimmity-ride” that lurches free from Mixen Lane—home of “much that was sad, much that was low, some things that were shameful”—in Hardy’s The Mayor of Casterbridge (252).
overflow, which may sweep away the very elements of civilisation” (81, emphasis mine). Furthermore, as with stagnating water wherever it might mix with sewage, runoff, or manufacturing pollution, political and social authorities also feared the dangerous potential of such masses when these masses stood still, when they seemed not to be flowing through well-managed channels and moving only within them. Taylor specifically fears the “mighty energies slumbering in those masses” as they stagnate in poor districts and insists that, “had [his] ancestors witnessed the assemblage of such a multitude as is poured forth every evening from the mills of Union Street, magistrates would have assembled, special constables would have been sworn, (and) the riot act read” (255). Given his previous book’s title, The Natural History of Society in the Barbarous and Civilized State, we can assume that the “mighty energies” lurking in stagnant pools of population threaten to flood and thereby erase the civilizing movement of (Western European) history.

Much as Kay’s and Taylor’s works targeted particular urban population groups by associating them with improperly drainage districts and problematic liquid movement, James Greenwood’s The Seven Curses of London (1869) begins its analysis of “neglected children” by honing in on their visibility in a way that doubly reflects the influence of flow dynamics’ social application. First and very simply, they gather and stagnate in public ways and streets. Second, they swarm and collect in unmanaged, dirty locales like the Covent Garden market’s offal piles and then move unchecked and un-channeled through the city. In his first complaint, Greenwood

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84 Taylor’s “choked” drain harkens to Snow’s 1849 report on cholera’s transmission. In an exemplary case of a London row-house called Albion Terrace, one apartment’s “choked” drain leads to the diversion of feces into the entire house’s drinking water source (“The cesspools at both these places were quite full, and the overflow-drain from that at No. 1 choked up…” [15, emphasis mine]).

85 Carlyle’s Chartism, for example, (in “Laissez-Faire” and “Not Laissez-Faire”) argues for such populations to be guided by the upper class rather than be left to determine their own direction, or not to be directed at all.
bemoans their mere appearance. If not for “the ravening appetites of cholera and typhus,” he writes, these children “would breed like rabbits…and presently swarm so abundantly that the highways would be overrun, making it necessary to pass an Act of Parliament…against the roaming at large of unmuzzled children of the gutter” (4). The “gutter” along any given street constituted the first channel in a system of drainage, intended for runoff more than for refuse but often collecting both, and Greenwood hereby associates these children with the city’s then infamously inadequate drainage system. Moreover, as nomads with no clear point of origin or of destination (he uses the common epithet, “city Arabs”), such youths also form blockages in important channels of economic, social, and literal drainage flows (5). To that, Greenwood laments, “[n]ot only does the youthful ragamuffin cry aloud for remedy in every street and public way of the city, he thrusts his ugly presence on us continuously, and appeals to us in bodily shape,” vitally emphasizes the children’s biological physicality—that their dirty, living bodies threaten healthful, productive movement in public space (5).

Greenwood then fully removes the children’s humanity in depicting them as dirty, threatening bodies as circulating vectors of disease. He illustrates this by exploring a mode of survival they have adopted—the consumption of refuse from the city’s markets. The children he sees every day scavenging, eating, and removing that refuse so startles Greenwood that he calls on Covent Garden’s and Farringdon Market’s “officials” to create a disposal apparatus for “fruit offal during the sickly season” (9). “It is not improbable that, in many cases, [these children] slink home to die in their holes as poisoned rats do,” he writes, invoking the common sanitarian belief that certain fruits, or fruits in particular stages of aging or decay, could spread cholera or other diseases (9). Vitally for Wild Boys of London, Greenwood’s “curse” melds two levels of circulation that he finds unacceptably threatening: such children’s physical movement that
connects the gutter, the offal pile, their “rat hole” homes, and the respectable public walking in
the street or square; and their consumption of others’ waste, which disregards the accepted,
separate flows of consumption and discharge (and subsequent influx of new goods for
consumption) by consuming the “waste” directly. *Seven Curses* thus completes the translation of
literal hydrology into social applications. It takes Kay’s melding of moral and hydrological
criteria and Taylor’s literalizing of that criteria into treating people as *liquid matter* who must be
channeled into flows, then uses it to argue for the banishment of a population whose self-guided,
waste-consuming circulations preserve their own lives but threaten to infect the social body of
London and violate seemingly every literal and social application of flow dynamics.

3. *The Wild Boys of London’s Sickening Circulation*

*Seven Curses of London* appeared in 1869, a year after *The Wild Boys of London*’s two-
year serial run and parallel to its single-volume edition. Thus, the novel’s fictional children lead
precisely the kind of self-directed yet marginalized and impoverished lives that Greenwood
attacks in *Seven Curses*. As I will show, the Wild Boys’ indefinite aggregation literally inside a
main drain, combined with their daily routine of circulation to and from that point, defies the
social and sanitary-medical applications of flow dynamics. In addition, since Snow’s illustration
of the city’s mass-scaled, fecal-oral circulation had drawn the reading public’s attention by then
as well, the sites where London’s raw sewage entered the Thames metonymically served public
consciousness as the city’s excretory canals (as in the famous example of Cruikshank’s “Salus
Populi” engraving). And because the engineering response to the Thames’ condition had only
just begun in 1865, it obviously still held this waste and formed the repulsive link between
ingestion and ejection in cholera’s fecal-oral pathway. Naturally, then, the Wild Boys’ sewer
home invokes this image and the Boys themselves become like sickening, circulating liquid waste matter itself—dangerous, disgusting life-forms flouting Greenwood’s social hydrology. The biological conditions of the Wild Boys’ lifestyle founds their metaphorical connection to excretory sites of urban London drainage, just as their physical movements from that site exemplify the failure of that excretion. They have established a home in a main sewer drain’s apparently unintended side-chamber, which they access through the main’s brick wall. Either in or directly under the Thames’ banks, readers would have directly associated this chamber with human waste and sensory memories of abjectly revolting strength, along with the likely transmission of disease both from miasmatist and contagionist perspectives. I also posit that the first subtitle of the novel—*The Children of the Night*, which a Wild Boy speaks during the reader’s first encounter with their sewer home—may have recalled “night-soil,” or human feces, which “night-soilmen” or “nightmen” traditionally hauled away from houses’ cesspools at night. (And the Boys are by no means more nocturnal than diurnal.) Furthermore, during the novel’s serial run the ongoing Main Drainage excavations along the river’s banks consistently revealed how leaky, incoherent, and ineffective drainage and waste removal system had been lurking there. In every way, the setting of the Thames’ muddy banks at this precise moment invokes a topographical, infrastructural mess of political failure and sensory disgust.

The *in medias res* introduction of a new Wild Boy named Dick Lane into the already established group immediately confronts the reader with the Boys’ repulsive physiological reality. Shortly after his father loses work and begins drinking and neglecting his family, Dick meets the Wild Boy, Sam Bateman, otherwise known as “the Dolphin.” No one ever explains this name’s background, but it bears relevance here in so far as the only common form of

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86 This likening constitutes an extended version of the rhetorical device, “antiprosopopoeia,” or “antipersonification.”
filtration for drinking water that came from the Thames at the time—including from private companies—occurred via basic sand-sediment filters placed at intake points of pipes called “dolphins.” On the other hand, it might simply foreshadow Dick Lane’s impending, first contact with the polluted Thames water.

David L. Pike has introduced the “physical ordeal” of Dick’s dive into the river, with a string binding his wrist to the Dolphin’s ankle, to reach the Wild Boys’ home (62). While Pike rightfully focuses on the novel’s unconventionally positive description of the sewer home, once reached, I would add that Dick’s exposure to the river’s mud and water on the way to that home denotes a more transformative, potentially lethal encounter. Prior to the dive, Dolphin exchanges whistles with a lookout named Spike who “[comes] out from a cavity in the wall” under a London Bridge wharf, wearing “tattered garments, covered by the mud” (7). A Victorian reader might have recognized the “mud” that seems to encase him more than his tatters do as something closer to feces and detritus than water-suffused soil. In fact, a physician named Etheridge had studied the river’s “mud” for an 1857 Parliamentary report and found that, at London Bridge specifically, it consisted of between 27.69% and 19% decomposing organic matter depending on the tidal stage (qtd in Hollingshead 152). Added to his emergence from a “cavity” which likens him to bodily excreta itself, Spike’s almost chthonic filth appeals to readers’ wariness of the

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87 An 1827 publication criticizing the river’s management called itself “The Dolphin; or, Grand Junction Nuisance,” and a Cruikshank cartoon from during the 1832 cholera (“Salus Populi Suprema Lex”) features “The Water-King” atop the Southwark Water Works “dolphin” (Cordulack 574). Also, according to Hughes’s Fatal Shore, “pricking in the wicker for a dolphin” was a mid-century “criminal argot” for stealing loaves of bread from bakers’ baskets (172).

88 A key connection to Wild Boys’ and other contemporary depictions of the Thames’ and sewers’ “black slime,” Etheridge repeatedly describes the “black-looking or black and brown ochreous-coloured” matter suspended in this “mud.” His microscopic investigations reveal in “large proportion...human faeces disentegrated” (sic), “the remains of digested and chemically altered food” including “muscular fiber” which is, on the whole, “fecal, [he has] no doubt, and from the slaughter-houses, etc., etc., in large quantities (qtd in Hollingshead 135).
Thames’ unwanted “offspring” (as in the famous \textit{Punch} depiction, Fig. 2). As a preview of his own coming baptism in the mud and river, it certainly astounds Dick.

Before jumping in, Dick contemplates the water briefly. During this pause, readers may remember familiar images or personal experiences with that barely-flowing liquid, filled with human waste, decaying animal bodies, and trash. Likewise, the narrative stops to focus on how its “blackness” and minimal motion convey a sole, desperate promise—death. The view strikes Dick as “cheerless,” “desolate,” and “dark” while the river slowly moves, “splashing against motionless craft,…beating with ceaseless monotony” (8). The “monotony” of its dissipated dynamism, its lack of power to drain and cleanse, appear quotidian despite equally threatening both Dick and the city. The narrator describes a river “[d]ismal and dreary enough…to chill the heart of the poor despairing” and “houseless” who might “gaze upon its blackness” and “think of it as a refuge from the sorrowful world” in suicide (8). For Dick, though, an immersion in Thames water initiates him into the group not just because it is an elusive, “queer way of getting in doors” but because it consists of moving through both literal and symbolic layers of ejected filth which the others have already penetrated (8).

A London reader’s personal experiences with the extent and nature of the pollution would have been tied to the over 130 public common sewers which delivered waste for the river to eject, according to \textit{The Dolphin}—a number which had increased to 167 by 1862, according to Hollingshead’s \textit{London Underground} (Spar and Bebenek 676, Hollingshead 54). Well-known to the reading public, the excreta delivered by these sewers included “the drainings from dung hills and laystalls, the refuse of hospitals, slaughter-houses, color, lead, gas and soap works, drug mills and manufactories, and…all sorts of decomposed animal and vegetable substitutes” (Spar and Bebenek 676), as well as the results of the allowance of direct connections between
household drains and sewers in 1815 (Hardy 263) and the full legalization of “miscellaneous discharge” of private households into sewers in 1848 (Hollingshead 49). When it comes to the river at London Bridge, where the Boys live, Hollingshead counts 39 “outlets and sluices” in the segment of river above that bridge to Blackfriars and 45 in the immediate, downriver segment (51). And let us not forget that the London Bridge sewer itself drew fire many critics and would-be managers like Hollingshead (54).

Thus, Dick’s dive legitimately constitutes an encounter with death, not just through a potential drowning but through contact with any number of infectious, not to mention repugnant, materials or contagions like *vibrio cholerae*. Dick certainly needs courage to overcome what his senses of sight and smell must tell him about the water—regardless of how intellectually he might or might not understand its nature. And though a woman’s suicide attempt earlier that day pertains more to the following economic aspect of *Wild Boys* I will discuss, Spikes announces it prior to Dick’s dive and adds another connotation to the river’s already fraught description. People also use the river to remove themselves or others from the social relations and economic realities of London. In this way, Dick not only risks his physiological well-being via exposure to contagions; he willfully crosses over a threshold that others do in order to free themselves from variously painful lives. He crosses with skepticism, though, prompting the Dolphin to declare, “It’s nothing when you are used to it. We gets wet, and we gets dry again; the mud makes us dirty, and the water makes us clean” (8). Even if, like the Dolphin promises, the Boys’ fire warms their bodies, their beds, and their food, the Victorian public would have had grave doubts about the effectiveness of the “cleaning” he embraces. And as for the transformation into a Wild Boy, that remains with Dick after drying.
If the Thames water of 1860’s London contains that which the city has collectively excreted, then the drain itself denotes the site and vehicle of that excretion—like a less desirable “gutter” in which the Wild Boys loiter. Thus, as the narrative moves Dick from the shores of the Thames, into its water, and then inside a sewer main, it moves him from a kind of liminal space on the surface of the social body, into a stream of its excretion, and then into its very excretory “cavity.” Upon entering the Wild Boys’ home Dick observes a multitude of piled rugs, mats, and carpets of “luxurious woollen” with various boys stretching out over them under vaulted ceilings and antiquated stone walls (8). Far beyond anything the Lane family could afford, the Boys’ home features a burning stove whose smoke exits through another main, a table, and a series of lamps hung from the ceiling. Its apparent overall warmth has legitimate basis, too, in Hollingshead’s studies, which found the actual sewers to be 11.61°F warmer in the winter than the surface of London, cooler in the summer, and with a less drastic and more moderate temperature range overall (215). As the Dolphin explains it, he cannot locate their home precisely—in the bank or under the river—but they are “underneath London somewhere, high and dry and out of the way” (8). The apparently paradoxically lavish standard of living the Boys enjoy here introduces the novel’s threat against London’s socio-economic hierarchy, but that threat follows the more immediate, physical one made via their daily movements.

From this home in the city’s worst filth, the Wild Boys enact a circulatory routine through London like that of the “neglected children” Greenwood condemns. Neither could one imagine a more perfect violation of Taylor’s managerial fear for unsupervised, “redundant” population groups or Kay’s desire for well-drained environments to make moral, productive subjects which founded Greenwood’s perspective. The Boys’ lifestyle puts them into contact with dense crowds of people in “gaffs” (cheap plays for adolescent audiences) and markets, with inhabitants of
upper-class streets like Eaton Square, and just as importantly, in parks. As Nan Dreher, Tom Crook, and others have shown, city governments built parks not just to bring healthful air into the urban environment (the “lungs of the city” concept) but to provide a showplace for the upper and middle classes, where the lower classes might learn from their assumed models of reputable behavior. However, near the beginning of *Wild Boys*, the Dolphin and a group of Boys proceed directly from their sewer home to St. James’s Park, not only undoing any intended cleanliness by bumping into rich men and women there but also recovering the pocket book of a gentleman after an indecorous scuffle, which leads to further, more intimate contact. Upon reaching the address he finds in it, the Dolphin enters the gentleman’s private sitting room despite the butler’s disgusted desire to hold him at the door.

Each such contact between a Wild Boy and a middle or upper-class individual or public space connects those people and places to the biological reality of the Boys’ collective sewer dwelling, tainting their physical cleanliness and the morality it ought to inspire, in the same way that Greenwood feared being connected to the “rat holes” of his “neglected children” by meeting them in the street. Each serial issue features multiple such contacts, and after each, the Boys return to their sewer home, their constant point of origin and destination. With particular historical intensity, given that cholera visited St. James’s during the 1866 outbreak, the Wild Boys’s contact with upper-class Londoners St. James’s Park constitutes one of the novel’s most direct metonymic, if not also literal, examples of a reconnection between London’s upper class and the kind of material drained from its then-standard, flush toilets. It also simultaneously embodies how cholera’s incidence dethroned classist beliefs that assumed cleanliness and geographical separation protected London’s rich districts from epidemic disease. Just as Snow said cholera did in his 1849’s *Communication of Cholera*, the contagion moves “along the
channels of...human intercourse” and not through some atmospheric or other effect, the Boys’ move through from the unmanaged London Bridge sewer and back into a space of cultural consumption (1). Though Snow’s work did not catch on until the time of Wild Boys’ publication, it did so via Farr’s work, which helped to undo public ignorance of what Spar and Bebenek call “network contagion” (678). That is, in addressing wastewater and water supply problems, managers and scientists continually failed to recognize that faulty “service provision anywhere in the system could create risks that extended far beyond the network itself” (678). In other words, the Wild Boys serve a doubly-loaded representative function. Like the network cholera, in a mismanaged water supply and wastewater system, their circulation threatens both bodily health and socially constructed hierarchies of cleanliness and healthfulness. As I will show as well, the way the Boys confront the upper crusts of London with their own bodily excretions matches how their communal mode of economic survival confronts that same upper crust with the excreted waste of its socio-economic consumption.

Dick’s entry into the Wild Boys’ home introduces him immediately to this communal approach. While several Boys relax on their comfortable rugs and carpets, the Dolphin remarks how good of a “picter” they would make considering that “[t]here ain’t a soul here among all this lot as knows how to get a dinner on his own hook, and there ain’t a soul here as ever goes without one” (8-9). The Dolphin credits their paradoxically comfortable lifestyle to their leaderless, collectivist economy and political organization, in which they all work “hand in hand” for each other every day (9). Schooly Bright—a former Ragged School student—further

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89 The 1828 Royal Commission on water supply addressed only private water companies’ provision (Hardy 261), and Hollingshead’s London Underground quotes a sewer “flusher” who practically verifies that “that neither central nor district Boards consider themselves bound to repair” private sewers, even ones that flow with or into public “main drains” (those under the Metropolitan Board of Works’ jurisdiction) (Hollingshead 55).
explains how they exploit the advantage of their large numbers, directly contradicting the way that Taylor and Greenwood stoked fear of “surplus” peoples. The “nearly fifty” Boys leave the sewer “every morning…to look for anything that may turn up,” he says (10). “Some take a crossing, some go as shoeblacks…some…sell things, run of errands, carry parcels, or do anything in the world” (10). In other words, in their voluntary, anarchic collectivism, no one Boy survives from individual success (10). “Fifty boys can’t all be out and earn nothing,” he explains, so that “if one does not earn a penny, another may earn enough for two. Then luck changes, and those who made most to-day, get the least to-morrow; and so it goes on” (10, emphasis mine). What “goes on” are their lives, because “all [they] all get is put together, and each chap has a little for himself if the bank’s all right, and if it ain’t he goes without; we never let the bank be quite empty, in case a cove might want” (10).

After this pithy description the Dolphin adds, “which Dick does”—meaning, he wants. The Boys determine to feed Dick his first meal in days from their stores. Initially Dick protests against joining them because he “would rather work” and because he has been taught to believe “[t]his kind of life cannot lead to any good” (9). But Schooly’s assurance that “The Children of the Night are honest, every one, and…all do the best we can for each other” encourages him on (9). Afterwards, they also give him money to take to his suffering mother and sister, merely suggesting that he eat from his “own account” once “he’s got some money for his mother” (10). The humanity of the Boys’ collective, self-sacrificing generosity quickly wins over Dick, if not also the reader (10). And perhaps the ease with which it does so—particularly its younger readers—presents problems for those who later ban the book.

Though shockingly contrary to flow dynamics and social hydrology as possible, the Wild Boys’ sewer-chamber home directly fosters this humane, honest solidarity. Its liminal position at
the confluence of wastewater and Thames water enables the Boys’ mode of economy and community just as it does Snow’s fecal-oral circulation of cholera bacteria. In direct contradiction to Robison’s ideal flow that delivers a watershed’s aggregate surplus and waste to a distant, permanent endpoint, their home expressly allows stagnation and collection. For a “hydrodynamicist” this confluence of wastewater and river water denotes a problem calling for intervention. But it helps the Wild Boys’ create a home through recovering and depositing what does not flow away, just as it provides them bodily with a place to remain immobile rather than being chased off, moved on, as occurs in public spaces throughout the narrative. In contradistinction to idealized economic and even social consumption and excretion flows, they find and hold others’ discharged food, furniture, firewood, or jewels as collective, aggregate wealth. They evaluate and store these materials, allowing them the choice of using or returning them to the surface economy of London to best convert them into something more useful to the group. Thus, the sewer encourages them to profit through recovery aligned with collection and circulation rather than through production aligned with flow, which lies beyond their means.

This recovery and recirculation-based mode of collective economics in turn initiates the novel’s potentially most problematic critique for authorities—its threat to dominant social formation and consumption-based economics. For any privileged readers, particularly patriarchs, who find *Wild Boys* after its likely target, adolescent readers, the story that unfolds from the Boys’ “recovery” of Lady Isabelle makes for uncomfortable reading at best. The prejudices that underlie the established social hierarchy, as in Greenwood for example, do not comport with Grantham’s murderous, hunger for power as it contrasts to the Boys’ active benevolence. Just prior to Dick’s first appearance there and without knowing more about her than that she “did the leap” from London Bridge, the Boys pull a woman from the river and into
their home (8). Isabelle’s rescue begins an ongoing connection throughout the novel’s 103 issues between the Boys’ circulation-based economics and a critique of greedy, privilege-based use of people as objects for consumption and discharge—which Pike sees in the eventual transportation of some Wild Boys (63).

The Boys effectively block the flowing out of the city of Lady Isabelle’s identity and social relations in London as much as her flowing to death. While saving her, they recover the proof of her having been deceived—the “things,” Grantham says, “I want,” a “certificate of marriage, a ring with our family crest and my initials on it, and a photograph containing portraits of herself and me” (14). After recovering in a separate, warm and dry room, Isabelle flees the sewers hurriedly, leaving these objects behind. The Boys find and hold them until the opportune time comes to present them to a helpful sort of vigilante and condemn Grantham while returning her to her rightful social reputation and position. Precisely according to their normal mode of economic recirculation, then, they effect Grantham’s demise.

Fittingly, from his position of wealth in Eaton Square and even despite his criminal activities, Grantham is fully unaware of the Wild Boys’ network contagion-like existence, let alone that they possess and can recirculate the “things he wants.” In explaining the feigned marriage to a thug he sends after the objects, Grantham says, “I could make her mine in no other way” (14). In other words, he gained access to her body, violating the “beauty” and “truth” he claims to have admired in her, through an insincere marriage, and after a “love fit” simply discarded her like one of the rugs lying in the Wild Boys’ home (14). If she did not stand “much in [the] way” of his scheme to usurp an inheritance because of the objects that prove the marriage existed, he would not think of her at all. As seen above, when she succumbs to the prospect of the moral judgments and social ramifications that will result from her “fall,” she
resorts to the suicide attempt that the Boys deny. Not insignificantly, too, Grantham’s family’s crest, his initials, along with the rings and photographs, all wind up in the Wild Boys’ sewer home, immersed in its excremental “black slime” but not flushed away. The signs of his class and patriarchal title, simultaneously the proof of his social crime, receive the Wild Boys treatment—they get “wet,” then they get “dry” again, used in the end to damn him.

As nearly the only “well-bred” male character in the novel, when the Wild Boys expose and help foil his schemes, they not only beg the reader to wonder how many equally innocent “suicides” may have been “flushed out” of London life due to the misbehavior of male malefactors. They also raise the possibility that such patriarchs exist among the most corrupt members of London society—as much as Mat the Mongrel, Savage Mike, or the secret “Companions of the Silver Dagger” might. To make matters worse, Grantham repeats nearly the exact same plot with the boy, Arthur Grattan, who stands to inherit the title of “Lord Wintermerle” that Grantham desires and whose rescue closely follows the pattern of Isabelle’s. After being knocked unconscious and left in a basement room just above the sewer to die in “obscurity and horror,” the Boys rescue Arthur through the sewer (54). “[D]ressed in tattered garments and wild of aspect,” the Boys stand “up to their knees in the black slime” as they skillfully work the trap door and lower him into their realm and safety (54). Again and not for the last time, either, the repulsive, infectious nature of the home environment through which the Wild Boys move and with which they are so familiar and comfortable, allows them to flout the schemes of a London gentleman, despite their fearful wildness.

Thus, while the Wild Boys’ inhabit an infrastructural site in need of flow dynamics’ literal hydrological interventions, they also survive in a location and via problematic movements that make them exactly the kind of “surplus,” liquid matter social hydrologists want to set in motion
—an “aggregate of masses” whose collection Taylor so dreads. Instead, though, they expose the kind of men who would be their managers—the rich, educated, city gentlemen looked to as models of English virtue—as selfish abusers of their power. All via a home, community, and economy that violate the literal and social applications of flow dynamics. However exciting as this challenge to dominance in Victorian London sounds, though, especially given its origin in a once-banned book, I would not elide the fact that these Wild Boys’ home and lifestyle—had it pertained to historical and not fictional children—would almost assuredly have killed them in the shorter rather than the longer run. It would have likely made them very sick, if not with sewage-borne cholera then with any number of other waterborne diseases or those resulting from malnutrition. They would have clearly had no access to healthcare or other support. Furthermore, the embankments that did follow Bazalgette’s would have soon erased their home from London’s topography—and not incidentally, as Michelle Allen’s Cleansing the City shows.

Perhaps more because of this dire reality than despite it, The Wild Boys of London posed too great a threat to English society to be allowed an existence in a more permanent, single volume. On the surface, other penny dreadfuls’ combinations of sex and violence likely seem far more problematic from our historical remove. Even the magistrate who oversaw its censure struggled to name its offense(s). He declared that it was not “so openly obscene as the books generally” banned under the 1857 Obscene Publications Act but simultaneously feared that it had not been poorly written enough that it would naturally “excite the same disgust as the other books did” (Springhall 239-240). In other words, its aesthetics would not turn off readers from its objectionable content, which remained unclearly objectionable, nonetheless. Further, the sole vendor who opposed the book’s banning claimed “that worse books were sold every day,” to which the magistrate responded that the vendor could not be the respectable man he claimed “if
he sold indecent books” (240). For lack of particular grounds, the charges themselves serve as proof of indecency. Likewise, from his scholarly perspective, Springhall wonders why the ban came during the later single-volume reprinting rather than during the novel’s first serial run, merely suggesting that England may have simply grown more “puritanical” over time (240). I believe that the somehow unspeakable inappropriateness for which *Wild Boys* was banned (and existing copies destroyed) relates directly to its luxuriating precisely in the city’s abject physical and social “waste” and to its knowing violation of flow dynamics’ deployment for removing that waste from London’s sight, smell, and consciousness.

Understanding how flow dynamics shaped mid-Victorian concerns about urban topographies and populations reveals *Wild Boys* as a *danse macabre* that flouts its every possible social and medical-sanitary application. While do so it openly encouraging a lifestyle based on the same revolting, disease-spreading circulations that the city’s poor liquid management had unintentionally created (“Boys…of every community and class, will read our book and that will tell them all they have to do,” it declares in its opening pages [2]). This wide-ranging rejection of flow dynamics starts with the novel’s insistent focus on the Thames, where the feces, dead animals, and rubbish of its “black slime” did circulate up and downriver over a nearly 25 mile range, and where nothing like the surplus-voiding, topography-invigorating flow of Robison’s ideal river existed and where the “mud” and water were filled with decomposing filth. Then, the novel dwells in the Boys’ sewer home, a site where the public knew its own waste met the same river from which it took drinking water. And the physical “communication” wrought by their their constant circulation to and from that point brings the threat of cholera’s “communication” from a “choked” drain to everywhere from working class pubs, to mansions’ sitting rooms, to St. James’s Park. Each issue seems to contribute to endless physical and metonymical contact
between the main characters and the city’s abject waste, recalls the city-scaled, fecal-oral circulation whose repulsiveness almost could not be discussed publicly. All the while, borders between classes and genders established through policing, social decorum, and geography break down.

The potentially infectious, biological-level circulation their bodies make also introduces the social threats of *Wild Boys*. By refuting excretory flow in favor of collection and recirculation, the Boys refute the shapes of dominant socio-economic ideologies. Whereas Kay began a century-long tradition of judging residents in poorly drained urban areas as “always…a class resembling savages in their appetites and habits,” the Boys’ intelligence and creativity leads to their development of a self-determined, divergent, and successful politics and economics (21). Not to mention that they constantly outsmart both educated and non-educated adult males like Grantham, the “Peelers,” and the street thugs, Mat the Mongrel and Savage Mike. They are not only not brutish (or not fully); “a strange mixture of nature and the want of education” has made them “tattered, meagre,…untamed; full of life, low cunning, and vivacity” but also “good at heart and kind to each other” (20). As their caring for Dick demonstrates early on, they seek to survive but not at the expense of their fellows, unlike their adult foes. That they do so while bearing no semblance of religious training or belief reveals an inherent goodness, meaning that this particular “aggregate of masses” should not be thought considered of the city’s moral “curses” but perhaps one of its blessings. Though no space remains here to show this in detail, the novel’s frequent citation, and theft, of literary and political texts (like Dickens, Melville, and a beautifully ironic quote by Lord Brougham about a nation’s “progress” being reflected in its “literature” in Chapter 48) suggest that its author considered and expressly intended these radically alternative ways of living as cultural critiques.
This goes for the Wild Boys’ equally radical socio-economic system, in which no one and no thing is considered redundant or as surplus in need of draining away. Perhaps most unacceptably of all, the Wild Boys celebrate their home’s comfort and safety, not viewing it as at all dangerous. Seemingly, their understanding of what poses danger or promises value diverges from everything flow dynamics seeks and most Londoners’ senses would have suggested. Following Bataille, if the abject lies in an object’s “incommensurability,” or “resistance to cognition and sublation,” then the Wild Boys themselves become abject in London society’s eyes because of their reconciliation to, or rather, their gratefulness for, its excreta (excreta the city so detests that it has fully consumed the Thames’ power trying to drain it) (trans. in Lazier 294). The Wild Boys choose to live among the feces and other appalling content of the Thames’ water and the sewers’ “black slime,” and for as long as the narrative continues, at least, it serves them well.
**TABLE No. 2.**

**INQUIRIES CONCERNING THE STATE OF STREETS, COURTS, ALLEYS, &c.**

<table>
<thead>
<tr>
<th>District No.</th>
<th>Inspectors</th>
<th>Name</th>
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<th>Name</th>
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<tbody>
<tr>
<td></td>
<td><em>Names of Streets, Courts, Alleys, &amp;c. &amp;c.</em></td>
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<tr>
<td></td>
<td>Is the street, court, or alley narrow, and is it ill ventilated?</td>
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<td></td>
<td>Is it paved or not?</td>
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<td>If not, is it under the Police Act?</td>
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<td></td>
<td>Does it contain heaps of refuse, pools of stagnant fluid, or deep ruts?</td>
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<td></td>
<td>Are the public and private privies well situated, and properly attended to?</td>
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<td></td>
<td>Is the street, court, or alley, near a canal, river, brook, or marshy land?</td>
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<td></td>
<td>General Observations.</td>
<td></td>
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</tbody>
</table>

Figure 1.
From Kay’s *The Moral and Physical Condition of the Working Classes Employed in the Cotton Manufacture in Manchester*, 1832. “Table No. 2,” used by Kay’s agents to evaluate Manchester by police district (15).
Figure 2.
From *Punch*, July 3, 1858. “Father Thames Introducing His Offspring to the Fair City of London.” Of particular note in the illustration are the dead animals’ bodies circulating through the image and the very premise of the image itself—that ragged children best symbolize the epidemiological threats posed by the improperly flowing river (diphtheria, scrofula, and cholera). The dirty clothing, almost prematurely aged, and overall sick, starved, and impoverished appearance of the children hearkens to many illustrations of “neglected” and/or “pauper” children in contemporary Victorian books and papers. Also, interestingly, the illustrator sarcastically submits his drawing for consideration as a fresco for “the New Houses of Parliament,” while also including symbols of both religious and economic authority (the dome of St. Paul’s Cathedral, top left, making the visual counterpoint to the polluting industrial smokestacks, top right).

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Figure 3. George Cruikshank’s “Salus Populi Suprema Lex,” 1832. Courtesy British Museum.
From *The Wild Boys of London*, 1866, illustrating the “ruined” Lady Isabelle’s recovery from the Thames. The Boys’ physical contact with Isabelle and her complete immersion in the wastewater form a telling counterpoint to the female “fair city of London” in Figure 2. Isabelle has crossed the threshold from which “Lady London” appears to withdraw. Michelle Allen’s *Cleansing the City* pertinently explores the highly problematically linked managerial conceptions regarding prostitutes (another form of perceived “ruined woman”) and sewers promoted by Parent-Duchâtelet in France starting in the 1830’s.

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CHAPTER THREE: *Great Expectations* and Management against Tidal Circulation

1. Death Sentence: Magwitch’s Illicit, Tidal Circulation

   After failing to escape from the country that had earlier exiled him, Abel Magwitch endures a “very short and very clear” trial (417). Regardless of the “industrious habits” he adopted in New South Wales and his “lawful and reputable” thriving there, “nothing could unsay the fact that he had returned, and was there in presence of the Judge and Jury” in London (417, emphasis mine). “The appointed punishment for his return to the land that cast him out, being Death,” the magistrate declares, “he must prepare himself to Die” (418, emphasis mine). The command for the guards “to keep life in him” until he can be put to death shows the earnestness behind his “appointed,” judicial killing (417). In his own words, after a prolonged cycle of recidivism—“In jail and out of jail, in jail and out of jail…put out of this town, put out of that town”—he “was sent for life” to end his circulation through England’s jails and towns (316, 249). Authorities had flushed him from English society— from the lurking, criminal threshold of the “black…wicked Noah’s ark” of the Medway prison hulk threshold (37).

   Nonetheless, Magwitch’s awareness that “[i]t’s death to come back” does not dissuade him from doing so, initiating the final phase of conflict between circulation and uni-directional flow in *Great Expectations* (*GE*) (294). These two patterns of movement in the social body turn on that which political authorities deem to be social waste. Circulation of criminal convicts denotes dangerous, even social contagion, while their drainage from the social body in well-channeled flows is healthy, culturally productive. Magwitch’s desire to see the effect of his benevolence on Pip’s life, combined with his familial affection for him, pose emotionally-charged questions about the system that enforces his exile under pain of death. The sympathy

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90 Dickens cowrote a study of criminal recidivism, “In and Out of Jail,” for *Household Words* (May 1853).
Dickens works to create for Magwitch breaks from the rhetoric with which “returned” convicts were often discussed—as sickening agents that “afflict[ed] their mother-country a second time with their pernicious existence” when they returned, in Jeremy Bentham’s words (191).

Dickens stages this contest between permanent, flow-based removal from society and problematic circulation to and through it via the topography of the Thames in London, where mid-century, flow dynamics-based interventions competed with problematic tidal circulation \((GE’s \text{ serial run began in 1860 while Bazalgette’s crews worked to realize his planned sewers and the Victoria Embankment).}}^{91}\) The tide functions within the novel as a topographical element that its characters physically interact with—even drown in and “tumble on.” To that, the tide’s limitation and/or refutation of the Thames’ flow within the context of Magwitch’s illicit movements reveals the role social hydrology in the form of New South Wales (NSW) transportation as imagined in the novel.\(^{92}\) The result constitutes a fictional investigation into the merits of managing England’s people similarly to its watersheds.

Furthermore, the tide’s dual role places NSW transportation’s social hydrological model inside what was an ongoing cultural-scientific fight over the relative merits of Bazalgette’s flow-obsessed approach to the Thames as London’s drain, as his plans utterly disregarded other scientists’ complaints about its wasteful fixation on uni-directional flow and advocacy for the

\(^{91}\) Dickens ties the New South Wales transportation system (1787 to 1850, other parts of Australia until 1868), to the hydrology-oriented, mid-century culture in which the novel appears through particular elements of Thames-related infrastructure in London, as I will show (Hughes 162).

\(^{92}\) In arguing for this enrichment of the narrative’s connotations through Dickens’s portrayal of tidal movements in the Thames, my premise resembles that of Cannon Schmitt’s in reading the relationship between tidal movement and Marlow’s narrating position in Conrad’s \textit{Heart of Darkness} (in “Tidal Conrad (Literally)”). For Schmitt, the tide bears a literal level of significance and contributes to the often-privileged metaphorical function of the river and tidal movements. I assume the same, though I also argue that the contest between the engineering of strengthened flow against the natural, circulatory tidal phenomenon in the River Thames in \textit{Great Expectations} inhere in predominant economic, social, and political formations of English culture influenced by flow dynamics.
recuperative circulation of its supposed waste material. The interaction between Magwitch’s physical returning the point of his dismissal from England, then failing to escape it via the tide-locked Thames, thus, features the Thames as tangible site for the contestation between literal and social-metaphorical deployments of flow dynamics, opened up to the global scale of NSW transportation while also operating at the detailed level of the Pip-Magwitch “family” unit.

2. Dangerous Thresholds

A. Bazalgette’s Thames: Transcending the Tidal Threshold of Recirculation

GE’ interest in the Thames’ movements relates to a central facet of Joseph Bazalgette’s thinking in *On the Main Drainage of London, and the Interception of Sewage from the River Thames*, published in 1865 (after the sewer system had officially opened but as Embankment work continued).  

*On the Main Drainage* obsesses over the tidal dynamics within the river as the primary challenge to its flow-oriented goals. These tidal movements caused unwanted circulation within the river—and the returning to London of what the city wanted to drain away.

Briefly, the key features of Bazalgette’s “sewage interception” are a watershed-scaled, systematic organization of drains to replace the haphazard, unintegrated mess of drainage systems built over decades by parish authorities or by the City of London without coordination with the Thames Commission or Conservancy. This included the regularization of pipe size and materials to induce consistent velocities of flow regardless of irregular influxes of rain or sewage. Where it proved impossible to achieve a slope across the whole system via “gravitation,” coal-burning pumping stations helped achieve “a constant discharge” (11). The

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“main” drains running roughly parallel with the river’s shores then collected the waste and channeled it for release further downriver, consolidating and distancing the city’s drainage flows’ dissipation.

The operative questions were how and where the wastewater must be delivered into the river to prevent its circulation back to London. His answer to the first question would be “outfall sewers” purpose-built to collect and release wastewater in conjunction with the tide, rather than attempt to outmaneuver it. Every aspect of these sewers’ design will be fine-tuned to the river’s tidal dynamics to deliver the sewage into the bed of the river exactly at the optimal moment. From the “invert of the sewer” that feeds from the reservoir, to the “culverts” which deliver the sewage into the river, each aspect of the design accommodates the highest flood and lowest ebb phases (24-25). Though he does nothing to specify what will occur after the “discharge” of feces and other organic matter into the river’s bed, Bazalgette seems to understand that a combination of ebbing tide and the river’s flow will take care of the rest, and no real concern is given to anything or anyone downstream (or at the riverbed, where critics say the waste will collect).

Next he had to determine the locations from which these outfall sewers could be coordinated with even the strongest “neap” or “spring” ebbs and floods to prevent their circulating that waste again (11). These points along the river also inadvertently become sites that function in public consciousness as thresholds holding its own waste, ideally for eventual, permanent ejection beyond sense and thought.) To identify such locations, Bazalgette needs to identify the exact distances over which the tide negates or reverses the river’s flow. He asserts at the outset that the ideal delivery point into the river would result in sewage being “carried by the ebb tide to a point in the river, 26 miles below London Bridge,” from whence “its return by the

94 “Neap” refers to the high and low tidal phases at their minimum possible difference, and “Spring” refers to those tidal phases at their maximum difference from each other.
following flood tide, within the metropolitan area, [would be] effectually prevented” (11).

Because it will be vital in this reading of GE, I would add here that 26 miles below London Bridge indicates the area of Gravesend, although Mayhew, perhaps unreliably, gives that distance as 31 miles (London Labour, Vol. 3, 334) and the 1832 Edinburgh Encyclopedia declares it to be “about 30 miles” (220). Though it remains unclear how the latter calculate their distances, for Bazalgette, Gravesend denotes a threshold point beyond which his waste must be carried.

Bazalgette seeks the emerging expertise of hydrodynamics, in particular a pair of “float studies” performed in the Thames—one by a Mr. Frank Forster, and one by Bazalgette himself, with the help of “Captain Burstal, R.N.”95 These studies operate from the questionable premise that surface floats would reveal how the tide and the river’s currents carried human waste—a weakness which Joule’s coming critique of Bazalgette’s plans begins by exposing. The river’s reeking surface did draw much of the public ire over its poor management, however, so that the engineers’ float studies in a way reflect public pressure to relieve its problems. We need not examine Bazalgette’s data, except to understand that he interprets it as showing a steady, if slow, movement downstream in the face of tidal phases, when in reality it shows floats in continual circulating over many miles up and downstream over the course of weeks.96 Through his own 1851 studies, Bazalgette’s only consistent findings are widely varying circulations.

Far from an idealized River Thames projecting English military, economic, and political power, this Thames cannot consistently move a small float—or the human waste it stands for—out of the city limits. Long gone is Combe’s river doing “all sorts of useful work” along its

95 The assertion of authority inherent in Bazalgette’s citing himself fits within the socio-political privilege underlying or asserted by flow dynamics’ advocates in general, especially in the apparent adaptation of a scientific “expertise” into an intervention on behalf of the public and on a geographical scale.

96 For example, one float in his 1851 trials traveled 6.5 miles upriver over the six days from August 6 to August 12, before moving toward sea to a point 9.5 miles downriver by August 20.
“natural” route, Robison’s river “voiding all that is redundant,” or even Pip’s description of the Medway during his growing phase of hopes for Estella and class ascendancy in *GE*. Further, if the sewage with which Bazalgette is concerned moves in any way resembling his slowly-departing floats, it threatens any communities along those reaches with potential epidemics.

The obsessive attempts to quantify the tide’s force and to design of every aspect of his outfall sewers in conjunction with that force, combined with an overestimation of the river’s supposed “cleansing” powers, all reveal the flow-based hydrological thinking that shapes interventions on the Thames. The tide remains utterly uncontrollable to the most accomplished civil engineer, and one that must be accepted as principle like “gravitation.” To achieve a forceful flow that will, as if naturally, drain and cleanse a watershed must be accomplished through reshaping the given, natural topography with infrastructural developments.

The relationship between hydrological science, engineering, and Victorians’ desire to expand watercourses’ useful capaciousness demonstrates what I posit is a new relationship to topography. We see this mentality in Bazalgette’s assertion within that allowing sewage to enter the river “at high water…at any point is equivalent to its discharge at low water at a point 12 miles down the river” (12). Temporal coordination with the river’s tidal dynamics thus “saves” twelve miles of drain, sewer, and culvert construction and equates to twelve miles of sustained flow (12). This telling displacement of spatial orientation via temporal orientation echoes the

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97 In Vol. I, Ch. 15, Pip considers the Medway, whose flowing seems to encompass all that is ideal: “It was pleasant and quiet, out there with the sails on the river passing beyond the earthwork, and sometimes, when the tide was low, looking as if they belonged to sunken ships that were still sailing on at the bottom of the water. Whenever I watched the vessels standing out to sea with their white sails spread, I somehow thought of Miss Havisham and Estella; and whenever the light struck aslant, afar off, upon a cloud or sail or green hill-side or water-line, it was just the same. Miss Havisham and Estella and the strange house and the strange life appeared to have something to do with everything that was picturesque” (99-100).

98 John Snow’s contemporary studies on the transmission of cholera focus on how human waste circulating in exactly this way leads to outbreaks of that and other related diseases.
displacement of lateral by vertical spatial orientation in the studies of “gravitation” and drainage that Bazalgette quotes within the Report. He endorses an assertion that “artificial draining by pumping” in neighborhoods south of the Thames has the same effect as “raising the surface” of those neighborhoods by “a height of 20 feet” in terms of their drainage (29). These statements reveal a mentality that sees topography as an object of manipulation, which becomes the aim of scientific expertise—especially hydrological expertise that seems to promise an increase in the population densities that particular watersheds might sustain. Inspired by idealized “natural” watercourses, flow dynamics renders the “natural” into the more capacious, manmade-natural.

On top of the limitations that the tide nonetheless places on his it, Bazalgette’s flow dynamics-based intervention disregards environmental impacts in fully embracing the usefulness that can be gotten out of rivers and streams. That his plan involves the daily collection of sewage in riverside reservoirs—which he specifically notes may not be covered—“until high water” or “for about eleven hours per tide” gives him no pause (25). Moreover, he takes pride in the tonnage of coal that his pumping stations will burn to raise the intercepting sewers’ contents uphill just to reach these reservoirs. It is “fortunate that these works were not projected in the year 1306,” he writes, “when coal…was regarded as such a nuisance, that the…nobility obtained

99 Bazalgette’s lengthy description of the problem which artificial pumping helped to resolve also provides an example of how the tide could exacerbate already-existing drainage problems when a system was not adapted to account for it: “The sewers throughout the district have but little fall, and, except at the period of low water, were tide-locked and stagnant; consequently, after long-continued rain, they became overcharged, and were unable to empty themselves during the short period of low water. The waters, therefore, were constantly accumulating, and many days frequently elapsed…before the sewers could be entirely relieved, the sewage in the interim being forced into the basements and cellars of the houses, to the destruction of much valuable property. The want of flow also caused large accumulations of deposits in the sewers, the removal of which was difficult and costly. These defects, added to the malaria arising from the stagnant sewage, contributed to render the district unhealthy; and it was with reference to the condition of this district, that the late Mr. R. Stephenson and Sir W. Cubitt so forcibly described the effect of artificial draining by pumping…” (20, emphasis mine).

100 One thinks of Malthus, Ricardo, and debates about how profitable and productive an acre of land might be made to be, considering the long-term viability of English population and economic growth.
a royal proclamation to prohibit its use,” because he expects Abbey Mills pumping station alone to consume 9,700 tons of coal annually (27). As with Arkwright’s replacement of unreliable flow via coal-powered circulation, Bazalgette happily pays these costs to achieve his flow-based goal—“the substitution of a constant flow” in place of “the tide-locked and stagnant sewers in London” (27). He says this flow will render his work efficient by eliminating the need to “remov[e] deposit” from them (27). He embraces the wasteful conversion of chemical energy to obtain a flowing river to meet London’s demands in the face of its exhaustion for that purpose.

This disregard for sustainability does not go unnoticed by Bazalgette’s contemporaries, but, following flow dynamics, it also dovetails into that set of concepts’ adaptation in social hydrology. Bazalgette gives no thought to the potential for floods or leakages from his sewage-collecting reservoirs, and his identification of the threshold of circulatory danger from London’s perspective justifies the flushing of waste beyond it, regardless of downstream communities and ecologies. If he produces well-managed drainage flows to and then beyond his pumping stations, his outfall sewers, and the threshold of Gravesend, all else, apparently, will be forgiven. As I will show directly, this mentality closely matches that which propels the initial deployment of prison hulks in England’s rivers and ports and their eventual transformation into thresholds beyond which their social waste contents must be discharged. As such, the literal, dynamic contest between flow dynamics and tidal circulation finds, and I would argue helps to produce, its metaphorical-social counterpart in the prison hulk and later New South Wales transportation systems, which Great Expectations ultimately questions together.

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101 It bears mentioning here that, as Richard Sennett and Lynda Nead have convincingly shown, such disregard for any form of possible circulatory movement in favor of single, uni-directional flows also goes against one popular line of thinking at the time, which sought to emulate anatomical circulations in the human body in urban infrastructure planning. For example, Edwin Chadwick’s plans for an “arterio-venous” system of draining London’s waste and providing its drinking water was rejected by the Parliamentary committee that eventually chose Bazalgette’s proposal.
B. Prison Hulks as Thresholds of Social Waste

GE’s familiarity with New South Wales (NSW) transportation is well documented, but my focus on flow dynamics’ application to populations as social hydrology reveals the nuances of Parliament’s motivations for initiating and developing its management practices. Specifically, the unintended creation of “thresholds” for what we might call England’s “social waste” via the initial prison hulks system, along with other colonial factors, created a scenario in which major ports and rivers became clogged with rotting, stagnant prison hulks and the criminal populations they contained. Near London, these thresholds occurred in the same reaches of the Thames where Bazalgette identified his tidal thresholds.

Like those denoting the presence or possible circulation of London’s human waste in Bazalgette’s plans, prison hulks “depots” similarly grew in the early 1800’s to be seen as thresholds at and by which the unwanted elements of its population remained in the city’s consciousness. I posit that this correlation of thresholds for both literal and social “drainage” denotes convergence rather than coincidence. Both the initial phase of “drainage” of England’s jails and its new urban centers, with the thresholds they created, and the second phase of those thresholds growing ever more problematic by the 1830’s which accelerated flushing beyond them, correlate to the initial push of flow dynamics through the sanitary movement to utilize the river as a sewer and the following work of Bazalgette to reengineer it into a healthy flow.¹⁰² In

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¹⁰² Again, the temporal setting of Dickens’s work allows the two to meet. His historical setting (c. 1800-1830) saw the sharpest growth in volume of NSW transportation, while the time of the novel’s publication (1860-1861) had brought the city’s trouble with unwanted, tidal circulation in the Thames to the forefront of public consideration, as massive infrastructural work had finally begun to confront it.
this view, the individual part that Magwitch plays within the system allows readers to explore how NSW transportation’s design can actually unfold in an individual’s or a family’s life.

Robert Hughes’s *The Fatal Shore*, W. Branch-Johnson’s *Convict Settlers*, and Alan Brooke and David Brandon’s *Bound for Botany Bay* document the advent and development of NSW transportation. This history further illustrates how *GE* places its readers into an enduring debate in English culture over the movement, disposal, and/or usefulness of its literal and cultural “waste,” within which its watercourses always played a role (even if that was to suffer).

Brooke and Brandon trace the first known mention of transportation as a criminal punishment to Richard Hakluyt, who advocated sending criminals to fell and mill trees and plant sugar cane in the American colonies in 1584 (19). In 1597, “An Acte for Punyshtment of Rogues, Vagabonds and Sturdy Beggars” (39 Eliz. c. 4), passed, which “declared that obdurate idlers…be banished from this Realm…and shall be conveyed to such parts beyond the seas as shall be…assigned by the Privy Council” (Hughes 40). Furthermore, “[i]f a ‘Rogue so banished’ returned to England without permission, he would be hanged” (40). Thus, transportation originally connected colonial settlement to a threat of execution if the “banished” criminal-laborer returned.

The NSW transportation system authorized by Act, 24 Geo. III, c. 56 (or “Transportation Act”) would carry many of England’s jail and prison ship inmates to New South Wales starting in 1784, but only thanks to a preceding phase of prison ship deployment that created thresholds along the country’s rivers and ports where social waste was visibly, problematically held (Hughes 61). After the 1776 “Hulks Act,” this phase of criminal justice saw an ever-increasing number of “hulks” filled with languishing inmate populations in England’s rivers and ports—effectively creating the problem that NSW transportation would then solve (Hughes 41).
When the American rebellion began, England lost its preferred outlet for criminals who had been sentenced with “capital offenses commutable to transportation,” or convicted of crimes “for which transportation was the normal punishment” (Branch-Johnson 3-4). With judges continuing to hand down such sentences under the assumption that the rebellion would end quickly, “the gaols were filled, and more than filled, with waiting transports for whom no destination could be provided” (Branch-Johnson 3-4). Therefore, as a temporary solution, decommissioned merchant, navy, and commandeered French ships would be stripped of rigging, moored, and filled with convicts. The Act mentioned no rebellion, and instead claimed to hold these prisoners where they might do useful work for the English homeland, at “Hard Labour,” not coincidentally, “cleansing the River Thames” (Hughes 42).

While the act posited that these convicts might “be reclaimed” through their socially-beneficial labor, the filling England’s waterways with old, immobile ships housing legitimately dangerous people, many suffering from serious disease and unmotivated as workers, quickly drew public concern. Further, foreshadowing the problems that were to come for this supposedly temporary system, the former Overseer of colonial transportation, Duncan Campbell, began the hulks system as a public-private venture in 1776, and after supplying his own ship, Justitia, and another he bought, the Censor, “anchored them in the stream of the river between Gallions Reach and Barking Reach (meaning Woolwich) and decanted into them as many prisoners as they would hold” (Branch-Johnson 4). Within months, prison hulks “dotted…the Thames and the southern naval ports of England…their masts and rigging gone, rotting at anchor, but still afloat and theoretically habitable” (Hughes 41-2). Profoundly negative public criticism hounded their deployment, and it increasingly resembled that decrying the effects of flow-obsessed, sanitary water management on the very rivers by which urban drainage was meant to occur.
Hulks began as eyesores. Lacking rigging, sails, and all but the basic identifying flags, their mooring lines and hulls grew moldy, rotted, and collected filth from the water. Metonymically, by the convicted population they contained, hulks appeared similarly stagnant, dirty, and off-putting. As they supposedly worked to improve the Thames, those who lived in the Woolwich hulks drew the same kind of negative fascination that the increasingly polluted river did by the late 1820’s. Carts or coaches delivered prisoners from jails, through public streets, chained together and/or in full irons and drawing jeers or worse. This short period of visibility gave way to mostly indirect visibility in which they performed work in public view along the banks before remaining present in the sight of the hulks.

Thus, as the first hulks convicts worked along the shores, they seized public awareness through their association with the muddy, marshy, stagnant conditions of those areas and with the equally dirty, motionless, and liminal spaces of their immobile, sail-less ships. One contemporary description shows how fully a normal day of work for prisoners at “Woolwich Warren” in the Thames revolved around the river and its problematically infirm shore. Some men worked in “lighters”—small, flat-bottomed barges—raising ballast from the river bed, from which others “threw” it to shore where still others wheeled it to sifters (Branch-Johnson 5). Crews then spread this ballast along the banks as part of an effort to shore up the river’s borders, while still others were “continually busied in turning round a machine for driving piles to secure the embankment from the rapidity of the tides” (Branch-Johnson 5). The work aimed to improve

103 As in Great Expectations, when Herbert cries out to Pip about such a procession, “What a degraded and vile sight it is!” to see convicts on their way to the hulks, in this case “[c]oming out of the Tap” and “dangling their ironed legs over the coach roof” on their way “down to the dockyards” (207).

104 Their subsequent prevalence in English thinking about these waterways, particularly with the fear and/or wonderment at the populations contained within them, is evident in the abundant paintings, illustrations, and engravings of hulks in the historical record.
the “the bed and foreshore” which had become “notoriously bad by that time,” again attaching a hydrologically-oriented nature to the treatment of a problematic population (Branch-Johnson 4).

As the number of hulks increased, such sites gained infamy. The Woolwich Warren job site drew “convict tourists” from London, which helped concretize images of these locations as thresholds where the social body collected its unwanted, human waste along the river’s shifting, muddy shoreline. In a first expression of a hydrology-based impulse to move such sites and unwanted (human) material out of the public’s senses, a newspaper reported that, within a year, “[t]he place where the convicts are now at work is enclosed on the land side by a brick wall, so that spectators will…be barred the sight of these miserable wretches” (Branch-Johnson 4-5). These walls presage the coming embankments which will deliver London’s own bodily waste downstream, always out of sight (and smell) as it flows. I also posit that this telltale corollary of social hydrology expresses its non-Foucauldian inclination to drain from sight that which is unwanted, which motivates Bentham’s criticism of NSW transportation, as I will show shortly.

Further, the walling off of the Woolwich work site makes clear that the draining of England’s overcrowded jails into its river-bound prison ships had already begun to produce a new problem, despite its design as another problem’s solution. As the sanitarian draining of urban areas— including the eradication of cesspools for drainage through sewers and rivers—simply changed the site of the filthy dangerous conditions it aimed to repair, the hulks reproduced the feared social stagnation of “superfluous” and “dissipated” urban, “gaol” populations in floating bins in England’s major watercourses and ports.

Rather than a well-contained labor force whose character improved through its captivity, hulks encouraged the combination of moral and hydrological qualities that sanitarians feared.

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105 See Pamela Gilbert’s chapter, “Medical Mapping, the Thames, and the Body in Dickens’s Our Mutual Friend,” for an exploration of the importance of perceived infirm borders of individual and social bodies.
Work was assigned arbitrarily and those not selected “remained in idleness on board” while during “wet weather and on Sundays none worked” and instead “sat about dejectedly, moped, grumbled, recounted past misdeeds…and planned mutinies and escapes” (Branch-Johnson 13). Lying about in cramped, damp, disease-causing conditions, convicts lashed out violently—seeming to confirm stereotypes about such problematic, stagnant populations. Escape attempts and mutinies featuring up to several dozen convicts wielding commandeered guards’ weapons ensued within the first years of the Woolwich Warren hulks’ placement (Branch-Johnson 24-5). Though none succeeded, these violent “leakages” or “outbreaks” from within the supposedly inescapable hulks drew ever more public concern.

It did not take long for nearby riverine communities to feel threatened, and not only by occasional outbreaks of violence or escapees running through their neighborhoods like Magwitch does through Pip’s Medway marshes to open GE. The increasingly frequent interjection of hulk life (and death) into these communities increased a sense of social spoliation at these thresholds. Repeated outbreaks of disease through the middle of the century emanated from or involved them. This included outbreaks of dysentery which spread from convicts to guards in the Woolwich hulks in 1816, of smallpox in 1818 and typhus in 1826 also at Woolwich, of a lung disease at Woolwich and Chatham hulks in 1826, and of another unidentified, “severe sickness which terminated fatally in several cases” and spread from Woolwich to Portsmouth in 1827 (Branch-Johnson 137-8). The Woolwich hulks also had a role in the cholera epidemics of 1832, 1848, and 1854 (189). In the first case, they were among the first locations to be struck, and they communicated the outbreak to Portsmouth—presumably through naval connections—in 1833. In the second case, the disease infected all major hulks locations, and the 1854 epidemic returned, once again, to those moored at Woolwich (Branch-Johnson 138, 198).
Adding insult to injury, the Woolwich hulks’ placement mostly failed to consider their relationship to the river’s tidal movements, with medical officers questioning the tide’s role in this list of devastating outbreaks. According to Branch-Johnson, a physician and Senior Medical Officer for the Woolwich hulks “depôt” named Peter Bossy derided the fact that the prison ship Warrior did not even float during ebb tide but “rested on a mudbank for about ten hours out of the twenty four” (141). A miasmatic, he blamed the nearby marshes for “producing fever,” and claimed that the “refuse deposited” during the low tide hours was “soon carried away by the stream” at the change of tide (141).

Hulks’ inhabitants and lifestyle also bled out into the life of riverine communities in the form of inquests into the deaths of prisoners that took place in a Woolwich public house (Branch-

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106 The use of the term “depôt” in these reports demonstrates how the managers of English waterways, prisons, and cities comfortably bridged a rhetorical gap between wastewater, sewage management, and prison population management. According to the OED, “depôt,” bore military, economic, and physiological connotations at the time, with an emphasis on the material which deposits or is deposited. “Depôt” indicated “a deposit or collection (of matter, supplies, etc.),” a “place where goods are deposited or stored,” or, physiologically, the “site of an accumulation or deposit of a substance…applied to any substance stored for eventual absorption by the organism” (OED “depôt”). When medical officers inspecting hulks “depôts” named them as such, then, they recognized the combination of martial, economic, and biological management that was underway. In their concern for how stagnant and infectious the results of this management were, they identified these “depôts” as what I am calling “thresholds” whose positioning and management ought to have been more fully considered. Showing this term’s relevance to the time of Bazalgette’s work, Hollingshead’s 1862 Underground London continually deploys it equally to both human waste and criminal convicts. He discusses “projectors’” plans to build “great divisional depôts, where the whole of the London sewage was to be conveyed and deodorized” in a potential, new drainage system, and says in another observation about existing infrastructure, “that great facilities are now afforded for the distribution of coal by the new system of unshipping in the docks and into railway waggons, and by various depôts on the railways and near the metropolis” (13, 238). All the while, he equates feces and convicts—all as materials that one could “ship” and/or stock at “depôts”—in reference to the 1857 Metropolitan Board of Works’ challenging tasks.

107 Bossy mistook the tide’s metronomic movements as an effective means for removing waste, despite what Bazalgette’s and others’ “float studies” were demonstrating (as was John Snow’s cholera research), the tide circulated waste within the river’s waters. At the least, this circulation re-exposed the prison hulks to their own sewage for second, if not multiple, subsequent times. Another physician named Dabbs blamed these same marshes for the cholera outbreak that erupted on board the Justitia despite noting that the ship lay on the riverbed at low tide and had “a drain both ahead and astern”—indicating outlets for the ship’s toilets whose waste certainly circulated around the ship with the tides (qtd in Branch-Johnson 141).
The holding of coroners’ inquests in pubs was a widespread practice at the time, but the fact that these processes concerned convict deaths—likely including the staging of their bodies—within these riverine community spaces denotes an intense form of unwanted contact, or infiltration, from a body of banished outsiders. Prisoners were buried in the Woolwich marshes, near the future Royal Arsenal site where they had worked, even transported by the same hand carts that were “used to take dung out in” (Branch-Johnson 181). Thus, even the corpses of prisoners who died in the hulks remained present in the nearby community’s consciousness by haunting the physical spaces of their social life. The rhetorical connection between the convicts’ bodies—living or dead—and “dung” repeatedly proves salient as well.

Such infringement into the life of nearby communities made clear that, where they had originally been placed at a point considered to be beyond a threshold of collective, public awareness, out of most Londoners’ sight and mind, as if gone or non-existent, prison hulks had become both demonstrably problematic and present to public view and consciousness by the end of the eighteenth century. In the telltale case of Woolwich, its absorption into rapidly-growing London created a conflict between the physical and moral connotations of its nature and the desperate desire of the city’s managers to drain and cleanse the urban environment. Typically, then, the Woolwich hulks depot became highly visible, tangible (even infectious) geographical sites to which the unwanted waste of society’s prison populations was being drained and held. Throughout England’s waters where hulks lay at anchor, they increasingly became thresholds

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108 This history informs, in a macabre way, GE’s opening scene, in which the Pirrip family’s gravestones slide in an almost hallucinatory way into Magwitch’s appearance from the marshes.

109 Woolwich remains a kind of “threshold” even today, where the Thames Barrier spans the river to protect the city from flooding, especially in potential confluences of storm surges and flood tide stages, though rising ocean levels imply that it will need to be altered in order to continue doing so.
demarcating the boundary between the safe and the unsafe, the clean and the unclean, the wanted and the unwanted, the included by society and the ejected from it, the useful from the waste.

Instead of solving the dilemma of where to deposit convicted criminals who had been earmarked for colonial labor in the American colonies, the hulks had earned their place in the public consciousness as “the most brutalizing and demoralizing…of all the places of confinement used in England” (Brooke and Brandon 26). At the same time, their threshold natures became increasingly infirm, as their physiological nature intermingled with or infiltrated communities in Woolwich, Gravesend, and many others along English waterways and ports. As early as the 1780’s, Independent MP’s representing constituencies in Plymouth and Portsmouth, where multiple prison ships anchored, pressed the government for a permanent solution to the problems lurking in their waters. Nonetheless, and even after requisite Acts had been passed and Parliamentary committee approval received for implementing Bentham’s proposed “permanent system” of penitentiaries that would have rendered the hulks needless, the Treasury declared that “new measures were about to be taken in respect of felons, which made the hastening of the Penitentiary Houses less necessary” (Branch-Johnson 26). As with the ideological struggle on Joule’s and Bazalgette’s sides of the sewage utilization debate which I will discuss shortly, the relevant authorities endorsed the plan that saved the most money in the present moment, compounding rather than addressing actual, future costs. Like the drainage-crazed sanitary movement that preceded and necessitated the Main Drainage and Embankment projects, the ejection of social “effluvia” from urban prisons into the country’s hulks depots eventually encouraged the Treasury’s choice to stick with the hulks only so long as they could fully and finally eject their contents from England’s social body to New South Wales.
By 1784, enough political pressure had built to spur passage of the Transportation Act, and a legal framework enabled it to begin two years later (Hughes 61). At this early point, Prime Minister Pitt promised one MP in a letter that, though he was “not at this Moment able to state to You the Place, to which any Number of the Convicts will be sent, [he was] able to assure” him “that Measures [we]re taken for procuring the Quantity of Shipping necessary for conveying above a thousand” convicts, and that “all the Steps necessary for (their) removal…may be completed in about a Month” (Hughes 65). His striking admission that no particular destination had been chosen shows that drainage of these people from the social body—a well-channeled flow of them out of the country—took precedence over any other supposed goal. “All that lacked” to begin, he had written, “was a place to receive the felons” (61). He simply promises anxious MP’s that the hulks will be emptied, the convicts will be flushed. On precisely this point Bentham will begin his critique of NSW transportation, which then finds an analog in Joule’s energetic and moral critiques of Bazalgette’s coming plans to drain London.

Though prison hulks continued to languish in the country’s waterways for decades after Pitt’s promise, their nature in public consciousness completely changed following the first test runs of convict delivery to New South Wales. Especially following changes to legal codes in 1811 that increased rates of transportation, they became staging grounds for the criminals who would still stream into them from the country’s jails to wait for eventual ejection from the realm. At this point what these “thresholds” meant within public consciousness had transformed.110

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110 By the time of an 1847 exposé in The Times which excoriated the hulks’ administration for the terrible condition of the boats and the despicable treatment of convicts that accompanied it, followed by the Parliamentary inquiry that the exposé set in motion, a wide-ranging agreement seems to have consolidated around the dangers that the prison hulks system had unintentionally created and which the locals living near them had long criticized (Branch-Johnson 177).
Problematic in and of themselves rather than holding society’s waste at a comfortable distance, the prison hulk depots at Woolwich and Gravesend, like those in other English waters, had become their own sites of water-bound crisis. Thanks to the difficulties already described, these “depôt” resembled in public consciousness the countless drain outlets into the Thames through London, where the city’s collective human waste and runoff had been dumped and then held in tidal circulation for decades prior to the Main Drainage. As effective barriers between the wanted and unwanted, the prison hulks had failed. Instead they constituted dumps to which the “waste” of England’s jails flowed, then stagnated, occasionally leaking material to recirculate through society. Thus, as Bazalgette planned to relieve London by delivering waste beyond the tidal threshold of Gravesend—hulks depots like became thresholds beyond which the unwanted had to be delivered. No patience remained for these convicted criminals’ remaining present in the social body or in English rivers, or, worse yet, circulating indefinitely to and from them.

In the historical version of transportation, colonies already existed in which forced labor could ensure profitability. In the case of New South Wales, as Brooke and Brandon write, “[n]othing” in the historical record “suggests an imperial motive at the start” (39). It had been chosen as a “mediocre second choice” after other colonial holdings (Hughes 64). That these people would be sent somewhere had been decided, without any accompanying notion that a purpose for their lives in that place was necessary. NSW transportation’s advocates’ frequent appeal to it as “the antipodes” reinforces that the feeling, as much as the geographical fact, of a
distance beyond any circulatory potential within England constituted the system’s primary aim.¹¹¹

There were never to be the colony-building conditions in New South Wales that had existed in the American colonies, either. “Thousands of men and women would be packed off,” as Hughes puts it, “in ships that would bring back no cargo, to a place expected to produce no surplus” (57). In what I would argue constitutes a similar line of thinking that motivates Bazalgette to burn thousands of tons of coal per year simply to extend the effect of flow in the tide-bound Thames by a few miles, “[t]here were no free settlers to buy the indentured labor of the felons, and every item of their upkeep would be a dead charge on the government” (57). No promise of a maritime circuit of linked, productive flows like that of Atlantic trade routes enticed NSW transportation’s designers (or investors). The repurposed English ships running convicts to New South Wales truly were carrying out a waste disposal route.

As Brooke and Brandon indicate, “[t]ransportation was not a static procedure” but one that “evolved and developed” over time, and the increasing urge to apply flow dynamics to social settings and population groups exerted a primary pressure on this evolution (89). Parliament initially authorized three “fleets” from 1787 to 1791, and despite failures like the Second Fleet’s deadly public-private venture between Parliament and former slave traders, and its immediate, vivid criticism, the urge remained not only to continue flushing convicts to NSW, but to increase

¹¹¹ Once New South Wales had been chosen as this destination, Pitt did try to appeal to the traditional Empire-building urge by mentioning potential ship-building materials in timber and flax to help sell New South Wales as a worthy destination. These could have been used for hulls or masts and for sail canvas, respectively, but neither shipbuilding-quality timber nor flax turned out to be in abundance there at all (64). Hughes also points out that New South Wales’ first governor, Arthur Phillip, later attempted to make the highly disappointing flax canvas production seem as if it would be important to England’s future colonial efforts, in order that he would be “remembered as the governor of an infant state, one with its own export economy, not just as the keeper of the human dump that New South Wales actually was” (65).
its volume and rate. As with the populations in factory towns whose numbers were seen as excessive and who, like the neighborhoods they inhabited, must be drained effectively to ensure social, moral health, the prisoner populations festering in English jails and in hulks along its most important rivers had to be flushed. Accordingly, the height of the flow-based sanitation push—the 1830’s—corresponds to when NSW transportation hit its peak volume and rate.

Hughes specifically charts this “second phase” from 1811 to 1830. Despite that “accumulation in jails and hulks had cleared” significantly by then, “the government felt that, having set up its criminal waste-disposal system, it should keep using it” (161). Hughes draws on Bentham’s rhetoric here, but it bears repeating that the urge to put this particular population group into motion in a non-productive way in which no complementary segment of motion or work would be accomplished marks a distinct cultural moment and imperative. As in the sanitary movement, the achievement of drainage flow itself seemed to warrant any costs or efforts involved in obtaining it—so long as the point to which waste was drained precluded any (re)circulation.

Wide-ranging angst about population growth also played out in reforms to the legal system in England, which were largely expressed as appetite for transporting convicts. Thus, the main result of reform was the preponderance of crimes which became “transportable.” Hughes credits Peel’s influence on these legal reforms and on the establishment of a newly effective police force for contributing to the increased flow of convicts as well. As L. L. Robson first catalogued, reforms to the criminal code began in earnest after 1818 (the same year that new legislation allowed private homes to connect their overflow drains to public sewers) and newly included forgery and counterfeiting, which bears obvious relevance for Magwitch’s story.

It became an ever simpler solution to apparent increases in crime or problematic, “redundant” population groups: eject more people. “For the next twenty years” after legal
reform first began in 1810, according to Brooke and Brandon, “sailing was determined by the concern to empty prisoners from” England, “irrespective of the time of year,” even though that predictably affected the number of convicts would “succumb to disease” along the way (110). Again, the desire to “project” prisoners, in Bentham’s words, trumped all other logic of reciprocal production from those transported convicts. If they arrived dead or deathly ill, as many did, this could hardly be expected. Not until 1836 did the government announce any intention to send its ships at times most likely to increase their chances and aid the health of their convicts. The 1830’s apex of the sanitary movement and NSW transportation, then, both bore hallmarks of flow dynamics’ social applications.

In the end, transportation to NSW continued until 1840 and to other parts of present-day Australia and Tasmania until 1868 (as Bazalgette’s first embankments neared completion). The impetus for its cessation, furthermore, in no way related to crime rates in England. Rather, as Brooke and Brandon show, three motives eventually brought it to an end. The first two—“moral and political opposition” and the “alternative (of) the English penitentiary system” back home in England—contrast with the ironic third motive, “the Australians’ own opposition to a continuous dumping of fresh criminals on what, after 50 years of settlement, they had come to view as their own soil” (160). Those who had been shipped to “the antipodes” as social waste, and their first generations of children, rejected a similar feeling that those riverine communities at the hulks thresholds had experienced decades earlier—their land was no dépôt for England’s “dregs.”
3. Joule and Bentham: Critics of Waste and Loss, Advocates of Circulatory Recuperation

A. Joule on Bazalgette’s Flow as ‘the opposition to economy’

James Prescott Joule’s fierce censure of Bazalgette’s Main Drainage and Embankment plans combines the moral ramifications he draws from his own thermodynamic research with new understandings about physiological and ecological cycles of organic compounds in chemistry, as they might apply to urban planning. Joule draws from fellow scientists like William Thomson and Edward Deacon Girdlestone, both of whom quote religious as well as scientific texts. Thus, a combined scientific and moral argument ensues across scientific academies over the handling of England’s sewage and rivers.

I will not elaborate on the establishment of the first two laws of thermodynamics here, except to point out that Joule relies on two fundamentals drawn from them in attacking Bazalgette’s plans. First, Joule believes (like Thomson and others) that the first law affirms God’s role as the universe’s sole creator (of energy). This conversation appears to take place solely among men in the pages of published scientific journals, manuscripts, and government reports—because the academies and the government both seem to have effectively excluded women from it. Ironically, though, one of Girdlestone’s favorite authors to cite in his chapter-opening epigraphs is George Eliot, and publications like the Ladies’ Sanitary Association’s pamphlets on urban drainage clearly show an investment in the topic on the part of women.

In response to an article by Count Rumford attributing the creation of heat while boring cannon to friction, called “Caloric Effects of Magneto-Electricity, and the Mechanical Value of Heat,” Joule asserts this divine design. “I shall lose no time in repeating and extending these experiments, being satisfied,” he writes, “that the grand agents of nature are, by the Creator’s fiat, indestructible; and that wherever mechanical force is expended, an exact equivalent of heat is always obtained” (“Caloric Effects” 157-8). In addition, Helge Kragh’s Entropic Creation lists Continental contemporaries who also viewed the first law as evidence for a divine creator. Among them, the aptly named, Danish engineer Ludvig August Colding published his own early version of the principle of conservation of forces in 1843, which, for him, proved that spiritual activity operated as a higher form of energy and evidenced both the immortality of the soul and that God had created world from nothing (27). The German physicist Robert Mayer posited in 1867 that the first law contradicted atheism, “materialism,” or “materialist” science, and proved the immortality of the soul (28). William Benjamin Carpenter, an English physiologist, claimed that the correlations he found between biological and physical forces pointed to divine design.
energy use. The second fundamental is Joule’s understanding of chemical potential energy that came along with Thomson’s and Rankine’s extension of his energy conservation principle. Together, from Joule’s perspective, then, Bazalgette has set about building an immoral, river-scaled waste of kinetic energy that, in turn, wastes a massive amount of chemical potential energy.

In the second draft of his “dynamical theory of heat” from 1851, William Thomson (later Lord Kelvin) acknowledged that knowing “mechanical effect” changed form in the process of work caused concern about the loss that seemed inherent in all work (Smith and Wise 329). In the end, Thomson concludes that this concern was “not accounted for in the dynamical theory otherwise than by asserting that it is not lost…in the material world” but merely “lost to man” (329). Thus, energy constitutes a kind of divine, premium commodity. When humankind seeks to seize “the opportunity of harnessing…the energies of nature (a waterfall, for instance)…to the creation of wealth,” in his words, they ought to do so humbly (329).

Smith calls this the implied “moral duty” of humankind to “‘make use of’ such opportunities” without what correspondingly became immoral waste (Smith 110). For Joule, this moral imperative gained even more import through Thomson’s work defining the second law. As the loss-to-man of energy into heat became understood as directional and irreversible, a “failure on man’s part to harness the inevitable diffusion of energy from sources of concentration to provide power for his uses…was to ‘lose’ or ‘waste’ the opportunity of benefiting from a fundamental feature of the creation” (Smith and Wise 331).114 Thus, what began as an “old problem of loss of useful work…in canal locks and…marine steam-engines…which had become

114 Thomson even included verses 25-27 of Psalm 102 in his explanation of this: “of old has thou laid the foundation of the earth: and the heavens are the work of thy hands. 26 They shall perish, but thou shalt endure: yea, all of them shall wax old like a garment; as vesture shalt thou change them, and they shall be changed. 27 But thou art the same, and thy years shall have no end.” (331, Smith and Wise’s emphasis).
identified with ‘loss’ in conduction and fluid friction” (where Thomson’s interest began) developed into “a cosmological, and indeed theological, principle” (Smith and Wise 330).

For Joule, Thomson, and their followers, an energetically efficient machine or process aligns itself with proper, religious respect when it utilizes every available understanding of energy’s conversion and conservation. Rather than “wasting” valuable chemical potential energy (alternately, “heat,” or *vis viva*) to extend a single flow that eventually must dissipate—Bazalgette’s goal—a more respectful homage to the Creator would be to build a system that acknowledged and, ideally, emulated the divine, physical order of the universe. As any river inevitably drains into the energetic “sink” of the ocean, all the energy put into Bazalgette’s infrastructure in order to achieve a further point of sewage delivery knowingly chooses energetic wastefulness in pursuit of an already-wasteful drainage.

The starkly different rhetorical approach of “On the Utilization of the Sewage of London and other large Towns” (1858) compared to those of his scientific writings demonstrates how seriously Joule took this instance of social-civil engineering. That he saw it as a dire mistake is clear from the work’s opening volley—an appeal to the very “national prosperity” which he “regret[s]” to say must suffer “disastrous consequences to” if Bazalgette’s plans are “persevered in and copied by other towns” (386). Dropping his standard, dry description of experimental
data and logical conclusions, he instead invokes his own emotions and scientific background in an ironic delivery meant to alarm his readers—before offering his solution.\footnote{In The Science of Energy, Crosbie Smith describes Joule as “a lifelong Tory…always concerned with the need for order and stability in a society” (72). As such, Joule “offered a conservative vision of the divinely ordained system of nature and allowed it to be published in a conservative newspaper, the Manchester Courier” (72). There, he envisioned a “universe” of machinery performing in conjunction, “with no tendency to failure or decay” and featuring “continual conversions or exchanges, established and maintained by God as the basis of nature’s currency system” (72). This vision differs from the drained-at-all-costs approach of flow dynamics, in his words, because of its appreciation for the fact that “the phenomena of nature…consist almost entirely in a continual conversion of attraction through space, living force, and heat into one another. Thus it is that order is maintained in the universe—nothing is deranged, nothing ever lost, but the entire machinery…works smoothly and harmoniously” (72, emphasis mine). (This 1847 vision clearly predated physicists’ consolidation of the Second Law.)}

Joule’s critique features two primary points. First, Bazalgette’s infrastructural designs are kinetically wasteful, and all the work put into them will prove wasteful as a whole, because the final product will not even function as desired—meaning any effort and energy devoted to carrying them out is essentially “lost” or “wasted.” Second, the goal of flushing the wastewater’s human excrement and other organic content is itself misguided, as it deprives England’s agricultural sector of the chemical potential energy present in this sewage. Both of these show the plans as disrespectful to science and God by embracing such massive energetic losses.

Joule says Bazalgette’s first stated “principle”—“the economical use of sewage”—ought to rightfully include the second—“the beauty and healthfulness of the metropolis” (387). However, Joule sees the first principle as having been “hastily abandoned” in favor of the second. I would add that the way in which the principle of “economy,” meaning the efficient management of energy dissipation, has been abandoned reveals the continued potency of flow dynamics in mid-century England. First it helped induce the eradication cesspools (as stagnant, dangerous bodies of waste). Then it was applied to the problems resulting from that eradication,
which was accompanied by an astonishing lack of planning for the former’s consequences. The singular drive to make things flow further “away” steers both.

After outlining Bazalgette’s plans, Joule lays out six reasons why he believes it will fail to even “answer the object for which it is solely designed, that of purifying the Thames, and increasing the healthfulness of the district”—those familiar flow dynamics-oriented, sanitarian-sounding goals (Joule 389). His six-point response in the negative engages the project on its engineering details. In doing so, he means to expose the short-sighted, dangerous, segmentary rather than systematic nature of the plans, all pointing out its wastefulness, or lack of “economy.” The third, fourth, and sixth reasons bear directly onto the struggle between natural, tidal circulation and the engineering of a one-way flow.\(^{116}\)

The third complaint against levies an accusation that, despite all Bazalgette’s claims to the contrary, the sewage dumped into the river at the planned “outfalls” will not be gotten rid of, from London’s perspective. He blames Bazalgette’s experimental methods (serious accusations among scientists), saying that “[e]xperiments with floats may induce fallacious conclusions in this respect, since it is probably that the scour of the flood-tide at the bottom of the estuary is greater than that of the ebb-tide” (390). In his fifth and sixth points, Joule considers what flow dynamics’ outcomes look like for those living near the engineered points of flow’s release—bringing questions of ethics to bear on its unfeeling criteria. Joule asks, “By what justice a nuisance can be removed from ourselves to be placed under the noses of our neighbors” in the downstream communities, given how “particularly noxious those nuisances are?” (390). Naming Woolwich and Gravesend, Joule questions the “wisdom of sacrificing the purity of the air inhaled by (their) inhabitants…and the immense floating population, in the doubtful attempt to make the

\(^{116}\) The others show Joule’s skepticism about Bazalgette’s actual skill in achieving his hydrodynamic ends.
air of the metropolis more wholesome” (390, emphasis mine). This point bears considerable importance because of its concern for “the immense floating population” of the Thames, which can only be taken to mean the inmates of prison hulks there.

Woolwich and Gravesend have now been approached as threshold locales in Bazalgette’s planning against unwanted, tidal circulation of waste, in Joule’s critique thereof, and in the judicial deployment of prison hulks. He identifies how eagerly English society seeks to flush its social and bodily waste without regard to its effects on the places where it is released—desiring only to have it flow “away” to the far side of a perceived threshold. Joule’s concern for the environment in those communities seems to make him a lonely public voice, though his desire to consider the humanity the inhabitants who live hear Bazalgette’s proposed outfall sewers, including convicts, demonstrates a view similar to Bentham’s—that they are people, not merely matter to be held indefinitely at a threshold of waste.117

Revealing how fully the Thames connotes a cultural contest between flow and circulation at the time of Great Expectations, Joule sees the Main Drainage and Embankment work as an oversimplified, incompletely-informed flow-obsessed mistake. It constitutes, therefore, a geographical extension of a gut-level, ignorant rejection of one’s own abject waste. Joule’s concern for the “floating populations,” the communities living near these locations, the

117 Joule adds to this critique of Victorian England’s fixation on establishing thresholds for its waste, that “the system is a filthy one” because it delivers the combined human waste of London to one spot within the river’s waters, where he expects it to accumulate their on the river bed “at a distance of only a few miles from the city” (391). This accumulation—which might have occurred given that Bazalgette expressly designed his outfall sewers to dump their contents as near to the river bed as possible despite having measured surface movements—means for Joule that “the liquid portion will remain for months near the spot where it was introduced,” again citing studies that show the tide’s limiting of the river’s actual flowing movement (another Forster experiment). Thus, the threshold beyond which Bazalgette believes he will be flushing this waste will become, to Joule’s thinking, a “depôt” of the accumulated human waste of London, wreaking havoc on the riverbed and the water, presumably doing damage along the river in ways that neither he nor Bazalgette can anticipate or predict.
environment, and the faulty goals, methods, and execution of Bazalgette’s plans also amounts to a criticism of the positions of privilege from which flow dynamics’ applications are approved and carried out. Though he has worked his own way from a brewing family background into the academies, he sees Bazalgette and his compatriots taking for granted their right to create and manage flows for an immediate effect they desire, disregarding the humanity flushed in flow dynamics’ social applications, the humanity affected downstream in its literal applications, and the “Laws of Nature” he sees flowing from God in the observable phenomena of energy science.

Working toward his own solution for London’s drainage, Joule draws on growing fields of research in molecular physics and chemistry, deploying an understanding of chemical potential energy to show how irredeemably wasteful Bazalgette’s plan will be in expelling London’s human waste.\textsuperscript{118} As physics recognized forms of potential energy, the findings of what we now call organic chemistry offered new (albeit, sometimes faulty) information about how energy transformed within elements’ and compounds’ movement through biological processes. This, in turn, influenced advancing medical science as physiologists began including chemistry’s findings in their already-established concerns for human wellness in urban areas.\textsuperscript{119} From the

\textsuperscript{118} Physics’ recognition of chemical potential energy starts with Thomson’s dynamical theory as it changed from 1851 to 1852. By the time of his 1852 draft of that theory, he had accepted Rankine’s “vortex” theory of molecular energy for helping to explain troublesome corollaries of the law of conversion (Smith and Wise 345). The details of this theory are irrelevant, but it spurred physicists to begin conceiving of what had previously been called \textit{vis viva} and thought of as somehow imparted to matter when it was in motion or put in motion by another force, as inherent in the matter itself. By 1862 Thomson had settled on the concepts of two distinct forms of energy, “kinetic” and “potential” (Smith and Wise 347).

\textsuperscript{119} One such example is William Benjamin Carpenter’s 1856 \textit{Manual of Physiology}, which shows some interesting applications of energy concepts within physiological functions (as \textit{heat}, primarily).
1830’s to 1860’s, chemists’ and physiologists’ view of the *vis viva*, *living force*, or *labouring force* of organic matter even became, to a limited extent, topics of public interest.\textsuperscript{120} “On the Utilization of the Sewage” takes this newly developed awareness of chemical potential energy and submits it to the same sense of duty to “economy” that physicists advocated in relation to the management of kinetic energy. This inspires Joule’s argument for the retention of London’s sewage, a project he urges in an emphatic tone that traces from the extent of the damage to natural, biological and chemical cycles he sees as already having been wrought by the handling of London’s sewage since the eradication of cesspools. Joule notes that as early as 1828, painter of apocalypse scenes and illustrator and engraver of engineering schematics, John Martin, had already called for Parliament to address “the waste which was even then going on” with the London’s sewage (392). Though some of Martin’s detailed planning was later adopted (or stolen) by Bazalgette, the steps designed to obtain the “solid” waste prior to effecting the final drainage were left out by the latter. Chadwick’s proposed “arterio-venous” drainage system also would have utilized sewage-bound waste, but the Board of Works denied it in the 1840’s.

Joule rages that so much time has passed since alarms were raised about this energetic waste, which had only accelerated under flow dynamics’ influence through the middle of the century. “In fact, to illustrate how steadily, and…determinedly, the opposition to economy has been carried on,” Joule says, he only needs to quote Bazalgette himself (392). The latter writes

\textsuperscript{120} The notoriety which Germany’s Justus Liebig had won himself across Europe via his *Familiar Letters on Chemistry* (*Chemische Briefe*) suggests this interest, as does its appearance English by 1851, just after the first German edition. In this work, he described how organic and inorganic materials circulated through biological processes of consumption, excretion, and fertilization. Girdlestone, a successor, and Bakewell, a predecessor, both employed the same kind of methods and interests as Liebig, if not also his specific findings in the case of Girdlestone, to address contemporary social, health, and even religious issues. Liebig’s assent to higher prominence, however, lent weight to their approaches and appeals.
that he and his colleagues “consider it inexpedient” to attempt to get any use from the waste content of the river (392). Where inexpediency or expediency are concerned, the goal and background motivations determine the view. Joule sees the entire world as a kind of closed system with a limited total of energy for man to wisely utilize as it tends toward an eventual equilibrium. For Bazalgette, the flowing of the river outweighs all else, and the “copious dilution of the sewage (that) is necessary to the health of the inhabitants of the metropolis” through which it flows then becomes a secondary, necessary condition, despite that this dilution renders it unusable to the private business sector to which he recommends any proposals for utilization (392). Joule parrots this reasoning: “We will take care to dilute and remove the sewage, and then when, as we have shown, private enterprize will be unremunerative, we will invite it” (392). We must only recall the sense of moral-religious obligation to efficient energy use to understand how disrespectful (to faith) and distasteful (to science) such a dismissal would have been to Joule.

A growing chorus of public voices have begun arguing for its utilization by the 1850’s, so that Joule can claim, “I might bring the evidence of nearly every scientific chemist” to demonstrate consensus in favor of his argument (392). He specifically cites the German chemist, Justus von Liebig, because Liebig has specifically produced “artificial manures” commercially and would not, therefore, be predisposed to favor natural sources. When invoking Liebig, Joule effectively includes an entire dialogue among European chemists concerned with chemical energy and, most importantly, material circulations.

One such English commentator, Edward Deacon Girdlestone’s, *Our Debt and Duty to the Soil; or, The Poetry and Philosophy of Sewage Utilization* (1878), provides an example of how the utilization side of the debate seizes on physiological and ecological circulations. Girdlestone
recognizes that flow dynamics has carried the argument to the time of his writing but calls,
nonetheless, for recognition of the “debt and duty” of his title to change how England handles its
drainage. “It is not…the object of” his essay “to demonstrate either of these propositions
(utilization’s practicality and profitability); but simply to shew…that the Non-utilization” of
sewage “is, apart from all its sanitary and economical consequences, a defiance of one of the
plainest, widest, and deepest Laws of Nature” (3-4). His “Laws of Nature” indicate those
arranged “by the beneficent ordinance of our Creator,” so that the opening claim of his complete
argument invokes a spiritual, Christian connotation to his “duty” (44). In this light, economic—
meaning financial—profit should not be considered in the same register as the “economical”—
meaning efficient—use of natural sources of energy. And in the same way that this point
combines the latest proven, scientific facts with the apparent confirmation of a general Christian
theology, Girdlestone asserts that Bazalgette’s flow dynamics-based plans directly contradict
those, which renders moot the excuse that any recuperation of chemical potential energy from the
sewage would not be economically viable for any man of faith.

Following Liebig, Girdlestone uses depictions of circulations of matter to illustrate his
essay’s religious and scientific appeals. He begins with his primary rhetorical and argumentative
pattern, the interrelating of all living matter, even soil. “The Body of a Man, like that of a plant,”
he says, “is made partly out of the air he breathes, and partly out of the food he eats” (35). In
turn, “the food he eats is made up (always excepting the contents of the salt cellar) of the plants
he eats,” even if “we often call the food we are eating beef and mutton, and…the names of
various animals” (35). These animals, too, have bodies made “out of plants only, and plants
entirely” (35). Therefore, “[b]eef and mutton are only grass and turnips and hay, &c., in an
altered state” (35). He concludes from this cycle that “the bodies of men are made out of soil
(‘the dust of the ground’),” taking the phrase “the dust of the ground” directly from the Judeo-Christian creation story (Genesis 2:7 in the Christian Old Testament) (35). Hence comes the the weight of humankind’s “debt” to the soil in Girdlestone’s view of sewage utilization; it is the literal material from which God created, and continues to create, humankind.

Circulation captures the way in which the “interchange of matter” occurs. At the end of a long chain of specific organic chemical conversions, Girdlestone declares that human waste is “all but ready, in fact, to be used as the Food of Plants,” as long as “[t]he action of the soil—if the soil is allowed to act—completes the preparation” (40). “Pass food through the body of a man,” he writes, “and it becomes sewage; pass sewage through the soil and plants, and it may become food” (44). God/Nature has created a perpetually, mutually beneficial set of circulations of matter and energy in the natural “economies” of biological consumption and excretion that humankind can enjoy. That is, until humankind intervenes against it.

Liebig’s own image of such circulation shows that the chemical potential energy organic materials contain is not destroyed but rather “converted” in a cyclical system that does not feature loss or waste. In “Chemistry of Agriculture and Physiology,” Liebig writes that the “mineral ingredients of food” come directly “from our fields” and that in the “vital processes of animals the elements of the food are converted into compounds of oxygen, while the urine and faeces contain the constituents of the soil” of those same fields, “so that by incorporating these excrements with our land we restore it to its original state of fertility” (qtd in Joule 392). Based on Liebig’s chemical findings, circulation constitutes an ideal pattern of movement for meeting the moral-religious demands outlined by Joule and Thomson for the efficient, humble use of energy toward human purposes.
Liebig particularly stresses applying a circulatory model to agricultural practices—just the kind Bazalgette’s plans preclude. According to Liebig, a farmer who only takes from the soil while putting “nothing back” practices a system, not of “farming, but of spoliation” (qtd in Girdlestone 23). A simple harvest without subsequent returning of the “food” necessary for the next crop to eat (which, in Girdlestone is best “prepared” by “The Body of Man” or other animals that eat the particular crop) unjustly interrupts and ruins a natural cycle. As Joule puts it, “[if] the excrements of an animal are not returned to the soil, the food of that animal cannot be reproduced” and the agricultural work actually “communicate[s]…barrenness” to the soil (393-4). “Returning” signifies circulation, which in this case would mean merely allowing this somewhat altered material’s presence at the place of its origin (recalling that “returners” are NSW transportation’s worst offenders).

However, “man,” in Girdlestone’s words, takes “the Waste products…he owes to the soil from which they came” and “pays not this debt, but casts it into the sea or river,” an act he calls both “unnatural” and “dishonest” (41). Even if the sewage “really gets safe into the sea, none of it forcing its way up through the traps into our houses, and none of it polluting the atmosphere or the river near the outfall,” he asks, “[w]ill the sea utilize it?” or “[c]an it do so?” (45). In Liebig’s theorizing, sewage is just “food that we have eaten in another form…suited…to become the food of plants…to nourish us again,” so that the London drainage system “wastes what is as valuable, if not to us, yet to our posterity, as anything the earth contains” (45).

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121 The figure of the sea functioned for physicists “as a sink of lost work, both for water running to the sea in rivers and for heat diffusing itself to the temperature of the sea” since Thomson’s early research into heat and energy (Smith and Wise 290). Thomson even used the generic “sea” to help explain his formulation of the Second Law by describing that the sea cannot accomplish “work” by having a colder material placed into it. Therefore, the expending of energy into the Thames, and thereby into the literal sea, could not have more directly opposed Joule’s or Girdlestone’s sense of duty or energetic “economy.”
For Joule, the chemical potential energy in sewage ties natural or divine creation and energy efficiency to circulation—a model of recuperation that contradicts the forceful, one-way flow of Bazalgette’s London drainage. He takes Liebig’s principle that “[f]rom the known composition of the excrements of man, we are also able to calculate how much of them it is necessary to supply to a field to compensate for the loss that it has sustained” and uses it to quantify the magnitude of “loss” inherent in Bazalgette’s system (qtd in Joule 393). Researching the masses of food and drink consumed in London, he claims the city flushes 2,723 tons of “solid” and 860,000 gallons of “liquid food” down the river daily (394). In recasting feces and urine as solid and liquid “food,” Joule (like his colleagues) seeks to overturn the predominant view that excrement constitutes “waste.”

Joule’s desire for what we might now call sustainability contradicts the “fallacious, narrow-minded, and selfish view” that dismisses sewage utilization because its economics cannot compete with imported guano on the market (395). Knowing that the guano England imports from the Chincha Islands to fertilize its fields “will not last forever” and that the sewage flushed downstream in the Thames and other English rivers could “almost exactly make up for” the 288,362 tons of guano imported in 1857 alone, Joule sees that flushing of sewage as leading toward England’s eventual inability to produce its own food (395). A fixation on short-term profitability via flow dynamics involves an incredibly large-scale disregard for “Nature’s Laws” and the duty they ought to call up, for the future of England’s agricultural lands as a result of that, and for the state of the country’s waterways into and through which sewage currently flows.

Despite the rate of waste per hour, per day, or per year in the highest defiance of the “Laws of Nature” that he can specifically calculate, Joule laments, “there are many who treat the subject entirely as a commercial one” in which “if the cost of transit…prevent[s] sewage
competing with guano in the market, they argue that it out to be thrown away as
refuse” (394-5). Joule finds himself—the son of a successful brewer and lifelong Tory—
arguing against the outcome, if not the principles, of free market economics as they contradict
the principles of science’s latest findings. In his thinking, the magnitude of this waste of
chemical potential runs into the hundreds of thousands of tons—a tangible, weighable loss
wrought by the conscious departure from chemical potential energy’s natural circulation. And
if England’s political bodies would allow their committees to be steered by science, such a
“regaining” of energy that is “lost to man,” in Thomson’s words, would be relatively simple. It
only need be collected and returned to fields where agricultural work occurs.

122 Joule projects that “guano” from the Chincha Islands of Peru will be exhausted soon and, logically, can
only grow more expensive as that point nears. He claims that Great Britain alone consumed 288,362 tons
of guano in 1857, of the 18,200,000 tons produced. At those rates, England alone would deplete Chincha
guano in 36 years (395). The guano actually ran out much more quickly than he predicts—by the 1870’s.
Further, the islands were captured by Spain and subject of war between Chile, Peru, and Spain from
1864-66. This conflict drew attention among English readers—as in F. E. Cerruti’s Narrative of the
Events Preceding and Following the Seizure of the Chincha Islands, published in English in 1864.

123 William Benjamin Carpenter’s A Manual of Physiology (1856) describes the cycles of transformation
between organic and inorganic matter from his own scientific perspective, in which “force” and “heat”
concern physiological functioning in plants and animals. This too, illustrates how powerfully wasteful are
Bazalgette’s plans to create a more ideal flow in the Thames. First explaining his view of heat, force, and
living beings, he writes: “The heat which Plants receive, acting through their organized structures as Vital
force, serves...to supply new instruments for the agency of light and for the production of organic
compounds. The whole nius of Vegetable life may be considered as manifested in this production; and, in
effecting it, each organism is not only drawing material, but force, from the universe around it. Supposing
that no Animals existed to consume these organic compounds, they would be all at last restored to the
inorganic condition by spontaneous decay, which would reproduce the carbonic acid, water, and
ammonia, from which they were generated” (38). Carpenter sees a balance of ecological and
physiological processes via circulation of energy in organic materials that power biological life. In this
living version of the first law of thermodynamics, there is no waste. There is only chemical conversion.
The problem of humankind-induced waste emerges when one applies Carpenter’s description of burning
coal to something like Bazalgette’s plans: “…in making use of the stores of Coal which have been
prepared for his wants by the luxuriant Flora of past ages, Man is not only restoring to the atmosphere the
carbonic acid, the water, and the ammonia, of the Carboniferous period; but is actually reproducing, and
applying to his own purposes, the Light and Heat which were operating to produce the growth of
vegetation at that remote period in the Earth's history” (38). Carpenter imagines the release of heat, light,
and pollution as a natural circulation of materials and force via chemical change in nature—until or unless
humankind intervenes into this circulation in such an unbalanced, uncalibrated interruption as
Bazalgette’s, which endangers this natural, even global, set of material circulations.
At the outset of his critique, Joule declares that “the careful collection of these substances” which are available in sewage as beginnings of sustaining life (Joule 393). When Londoners remove what they sense to be repulsive of their own waste from their drains and rivers—despite that poor management put it there to begin with—Joule intends to make them see that they are effectively interrupting the cycle of production, consumption, fertilization, and repeated production. “Nature having completed a circle all but one link,” as Girdlestone puts it, “it would be a strange thing if she had made it impossible for man to fill up that little gap!” (46). “Nay,” he continues, “the very disorganisation of plant-products which is effected in the bodies of men seems to imitate a positive intention on the part of Nature that man should complete the circle” (46).124 “Completing the circle” of chemical potential directly contradicts with the flow dynamics-based principles that led to Bazalgette’s infrastructural designs.

Draining away sewage material, alternatively, delivers it out of its natural circulation.125 To make matters worse, Joule’s attention to thermodynamics also shows how wasteful of kinetic energy (and the chemical potential energy of burning coal) the entire project is, when and if it accomplishes this interruption of natural circulation. Contrasted with the circulating, energy-recuperating system of God’s or Nature’s laws, flow dynamics in the form of Bazalgette’s

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124 Girdlestone makes a direct analogy between city-level waste management and physiological conversion and circulation of matter: “Well, to trace the food of man through the process of digestion in his frame, to follow it into his blood, and watch the transformation of blood into bone and muscle and fat…and all the different tissues which make up the solids of his body; then to note how this same blood, which brought supplies to every nook and corner, also carries off the ashes and the rubbish which it finds in any place—acting through the arteries, as the Purveyor, and through the veins as the Scavenger of the frame (just as the same cart which brings coals to our houses, is often employed to take away afterwards the contents of our ashpits) like the nightsoil men and their honey pots…” (39-40, emphasis in bold mine).

125 Girdlestone provides one brief case that exemplifies his advocacy of circulation over flow dynamics’ favored drainage flows, The West of England Sanatorium (sic), which uses inhabitants’ waste for garden fertilizer. In his words, it “pays its Debt, and does its Duty to the Soil—everything solid and liquid being put into the garden there. Not a single drain pipe leaves the premises; nor is there a water-closet upon them” (Girdlestone 51). The absent “drain pipe” here embodies flow dynamics’ absent deployment here.
engineering powers one liquid flow from within a dynamic, collecting watershed to a point of release beyond a threshold of tidal circulation.

Where Girdlestone leaves his readers to question “whether we will follow out the clue He has given us and utilize” sewage, Joule proposes how it will be used if reason determines public policy (44). His communal cesspool system considers all London’s “inhabitants,” not just those who can afford private drainage and its attendant disregard for where it subsequently flows. He claims his system will provide the highest possible recuperation of energy from waste, producing more fertile fields and increased production (which, though he likely avoids specifying this thanks to concerns of rent-collecting landowners, means more and cheaper food on the market).

Nonetheless, though his plan could save “the dead loss of three millions sterling which must be incurred if (Bazalgette’s) plan is carried out,” while actually guaranteeing the “total prevention of infiltration of sewage” from “an unpolluted river,” Parliament disregards him (398-399).126

Joule acknowledges the uphill battle he faced in attacking the tenets of flow dynamics, and his admission that, “[i]n justice to the eminent engineers…named, it is needful to premise that…they were called on to…carry out a system predetermined by the hasty voice of public opinion,” without consulting “the advice and assistance of scientific men” (389, 386). Kragh notes, too, that not all educated members of the public were familiar with the second, or even the first system.

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126 Girdlestone also provides scientific backing and examples meant to illustrate what is to be gained from circulating sewage back to agricultural lands rather than flushing it down the Thames and other rivers. He says: “Some people believe and teach that no method of Utilization will ever pay, that is, that the net produce will never fetch in the market a price equal to the cost of production. This may possibly prove to be the truth in the money sense of ‘pay.’ But the question is primarily one of wealth and not of money, and of a species of wealth too which, while it is absolutely essential to human existence, is at the same time not unlimited in quantity.” He gives the example of the “dykes of Holland” from which no one proprietor profits, and which certainly cost a lot of money to construct but are nonetheless “invaluable to the nation” (48). In other words, echoing Joule’s sense of communal good (the “prosperity of the nation”), circulation and utilization of sewage would inherently honor the communal sharing of costs and benefits, as it honors God-given circulations of energy in the world.
first, law of thermodynamics by the early 1870’s so that appeals to energetic science would have struggled to convince a public so desperate to finally send its sewage flowing away beyond any possible circulation that could bring it back under their eyes and noses (32).

While this entire debate about the use of Victorian England’s most prized, if infamous, river previews 20th and 21st-century debates about environmental engineering and sustainability — with its confluence of public opinion, scientific expertise, politics, and bureaucracy — its most important outcome for *Great Expectations* is the heightening of awareness that Thames constitutes the site for the playing out of a moral and political contest between flow dynamics and circulation as either a culture-threatening or a dutiful, recuperative pattern of movement.

In *Great Expectations*, Dickens focuses on the Thames, emphasizing its tidal movements and the material it washes upriver in direct relation to Magwitch’s illegal returning and failed escape beyond Gravesend — all while its fictional events correspond with the height of NSW transportation’s deployment. In this way, the criticisms of Joule and, as I will show immediately, Jeremy Bentham unite to form a multi-pronged criticism of flow dynamics’ deployment, specifically on the Thames and other English rivers. Much as Joule sees unthinkable amounts of “unproductive labour” being poured into the Main Drainage and Embankment projects, which simultaneously dismiss hundreds of thousands of tons of potential chemical energy, Bentham criticizes NSW transportation — and in a way that reveals *Great Expectations* as a questioning of the flushing downriver (literally) of the permanent and durable products of Magwitch’s labor in New South Wales, if not Magwitch’s life and Pip’s potential social advancement, in the form of the documents swept away with Compeyson in the Thames.

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127 Dickens’s “Chemistry of a Candle,” from *Household Words* (30 March 1850) shows his desire to educate the public about energetic science.
B. Wasteful Expulsion of “animæ viles”: Bentham’s “Panopticon versus New South Wales.”

Criticism of NSW transportation grew from that which had dogged the prison hulk system, despite that that earlier criticism helped spur NSW transportation to begin with. Jeremy Bentham spearheaded this latter criticism of NSW transportation in a way that bears a telling resemblance to Joule’s attack on Bazalgette’s plans to extend, and hide, London’s waste flows. Vitally, that infrastructural planning and the social application of flow dynamics in NSW transportation revolve around the thresholds beyond which they eject their respective waste materials for fear of its dangerous recirculation. After examining Bentham’s critique, I will explore how such maneuvering around social thresholds informs Pip and company’s attempt to re-eject Magwitch from England after his illegal return.

In the same way that Bazalgette’s work constituted a response to the abject condition of the Thames after the sanitary movement channeled the city’s waste into it; just so did calls to remove hulks and their convicts from the Thames and other English waters lead to NSW transportation. First moored at Woolwich, then Gravesend, and then further towards the Thames Estuary, these depôts produced the scenario in which NSW transportation took shape as a drainage flow to “anywhere but here,” as the historical record shows. This ejection of convicts, according to Bentham and other likeminded critics, not only treated them and their families cruelly but was as wasteful as Bazalgette’s engineering. From within a similarly hydrologically, energetically-oriented discourse as that which Joule aims at Bazalgette’s work,

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128 John Hollingshead identified the connection between the two problems and the two systems developed to address them in 1862’s *Underground London*: “Sewage, whether fluid or solid, mixed or unmixed, is very much like our convicts, everybody wants to get rid of it, and no one consents to have it” (11). The book appeared in *All the Year Round* prior to its volume publication in 1862, suggesting Dickens’s familiarity. Hollingshead also credits his friend Joseph Bazalgette with assistance in his research.
Bentham condemns this perceived wastefulness. Even the structure of Bentham’s criticism (in “Panopticon versus New South Wales: Or, the Panopticon Penitentiary System, and the Penal Colonization System, Compared,”) matches that of Joule’s future attack on Bazalgette’s plans. First he addresses what he considers to be its faulty goals, and then he attempts to show that the system as currently designed will not achieve them anyway. Third, and most important, Bentham argues that NSW transportation wastes its subject material’s (in this case, convicts’) energetic, productive potential by disregarding any method for its remediation or recuperation in its ejecting them beyond perceived thresholds of possible recirculation. In all, Bentham critiques the social application of the same wasteful, dismissive, principles of ejection in NSW transportation that would take infrastructural form in the London Thames projects. And as Brooke and Brandon show, these criticisms became the basis of argument for the system’s detractors over the 60 after Bentham’s writing (34).

Transportation to NSW aimed to purify England’s waters by voiding them of their unwanted human deposits, and that goal alone justified the endeavor to move them to the other side of the world (to the “antipodes” as both its advocates and detractors reiterated), despite the “dead charge on the government” incurred in sending convicts “to a place expected to produce no surplus” (Hughes 57). Bentham recognized that NSW had been chosen as the outlet point for the drainage of England’s prison ships and jails and derided it as such. Along with his perception that it resembled the hydrological approaches that were garnering the attention of men like Kay and Taylor, Bentham saw NSW as a “cloaca,” wastefully, pointlessly holding convicts out of sight, across the globe (Hughes 1). He described the convict drainage to the “thief-colony” as:

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129 Originally from 1802, printed on a small scale in 1803, was published in 1812, as the 1811 changes to the legal code accelerated the rate and volume of convicts being shipped to NSW.
indeed a measure of experiment…but the subject-matter…was, in this case, a peculiarly commodious one; a set of animae viles, a sort of excrementitious mass, that could be projected, and accordingly was projected—projected, and as it should seem purposely—as far out of sight as possible. (Bentham 176, emphasis in bold mine)

Bentham’s impression aptly describes the social application of flow dynamics that convict transportation constituted. As an “experiment,” it takes human subjects as matter, just as social hydrology described earlier did with working poor populations in mill towns—as liquid matter to be channeled and then drained away to avoid redundancy and potentially infectious stagnation. As if feces itself, convicts are understood as a mass to be removed from society’s sight and mind.

Most problematically for Bentham, the “projection” of this “excrementitious mass” to New South Wales lacks any kind of reasoned motivation. Simply because “could be projected,” it “was projected,” which, for him, is a childlike urge. In this case, it appears on the massive scale of English culture as a whole. And though the prison hulks were intended to remove convict populations from sight and others senses’ perception to begin with, their fouling of English rivers and waters turned them into the thresholds I have described, bearing associations with the human waste collecting there, and spurring the drive for new, clearer perceived borders between the social body and that which has been excreted.

Parliament ultimately paid to eject this dirty mass from its waters, rather than face the fact of its poor management in draining it into them. Not long after becoming governor of NSW, Arthur Phillip decried the apparent enthusiasm with which “the authorities in England” sent a Second Fleet full of sick, dead, and dying convicts and intended to follow it with more (qtd in Hughes 105). The “dispatching…into oblivion…of ‘the disordered and helpless clears the gaols and may ease the parishes from which they are sent,’” Phillip wrote, “‘but it is obvious that the settlement, instead of being a colony which will support itself, will, if this practice is continued,
remain for years a burthen to the mother-country’” (qtd in Hughes 105, emphasis mine). Eventually, after receiving waves of what Hollingshead’s formulated as England’s human sewage, Phillip begins promoting future colonial riches from NSW as if to change its nature.

As Bentham applied his understanding of criminal justice, however, the convict colony only more strongly resembled such a dump. He begins with the four “ends of penal justice” accepted “from Blackstone and from everybody” concerned with criminal justice (174). They are: “1st, Example,” treating a convicted criminal so as to discourage witnesses to that treatment from imitating his or her crimes; “2dly, Reformation,” or the prevention of that same individual from committing the same crime in the future by “curing him of the will to do” it again; “3dly, Incapacitation,” removing the ability of the criminal to repeat said offense; and “4thly, Compensation or satisfaction,” to repay victim(s) (174). Vitally, the first three principles treat both witnesses and subjects of punishment as human beings, with powers of observation, empathy, will, and mental and physical capabilities to do either right or wrong. The fourth shows a desire that criminal punishment repay, or recuperate, social or individual losses accrued via crime. With this basis, Bentham attacks NSW transportation for its dismissal of the humanity of those whom its punishment concerns—both its positive and negative sides—and of its abandonment of any systematic recuperation (via “reformation”) in criminal punishment.

Bentham explains his position by profiling the diametrically opposed goals of his own “penitentiary system”—in a way familiar to Foucauldian readings of Victorian penal and social practices. “[V]icinity was the object with me, not distance,” he states, “[v]icinity to the public eye” (177). The public eye then becomes synonymous with “the metropolis,” a stark difference from transportation as it relates to Bazalgette’s flow-based intervention onto the Thames, English cities’ water-related concerns generally, and the role of the “threshold” (174). In Bentham’s
penitentiary system, the “Scene of punishment” must bear “vicinity to the metropolis—the very spot which contains the greatest number of spectators of all descriptions” (174).

Bentham has two problems with transportation’s removal of criminals and their punishment from the “vicinity of the metropolis” that bring together Joule’s critique of Bazalgette, the threshold of tidal circulation, and Great Expectations. The simple-minded aim of ejection beyond an apparent threshold of distance precludes convicts’ recuperation and falsely promises to prevent their circulation through the English social body. Bentham mocks “the rule of logic” of England’s “statesmen,” which says: “Things not apparent, and things not existing, belong to the same account,” and that “depredation and all other kinds of mischief and vice not making their appearance—that is, not here in Britain—it is the same thing as if there were none” (183). The “indisputable attribute of this favourite spot (New South Wales)—distance,” he mocks, is “the supposed mother of security” (186). “Of this attribute,” he continues, “it was seen to be possessed in a degree altogether beyond dispute. The moon was then, as it continues to be, inaccessible: upon earth there was no accessible sport more distant than New South Wales” (186). If it could have, England would have launched its convicts to the moon with as much rationale as Bentham saw it using in sending them to New South Wales.

Childish suspension of common sense about what would happen to convicts once gone from sight in England’s river-bound thresholds makes transportation’s ends appear similarly silly to Bazalgette’s dumping of London sewage further downriver. Simply creating a longer segment of drainage could never truly solve a systematic problem of waste’s collection, stagnation, and circulation through the topography and social body. Similarly, the thinking that Bentham exposes almost joyfully dismisses any possible valuing of the material being ejected—let alone any worthwhile recuperation of its productive potential. Instead, NSW claims to offer “the best
possible” security, for “the distance was the greatest possible” and “means of communication already established” were “none” (Bentham 186).\footnote{The term “communication” foretells the coming contagion-based understanding of disease incidence, as the previous chapter showed. Following Bentham’s work by several years, John Snow points toward the modern understanding of “network contagion” that occurs in mismanaged water systems, in which a more distant point of dissipation for drainage flows does not ensure freedom from contagion (Spar and Bebenek 678). Bentham’s critique of the NSW transportation rejects its child-like desire to flush “away” and no longer contemplate what is deemed to be abject “waste,” assuming distance ensures safety.}

Beyond this naive concept that embraces “distance” as the equivalent to separation and security, Bentham sees a misguided approach in that transported convicts are made invisible. Not only does it feature a “radical incapacity of…any efficient system of inspection,” which founds the penitentiary system, transportation directly refutes this inspection principle, as “convicts and their punishment are removed…to the antipodes, as far as possible out of the view of the aggregate mass of individuals,” on whose minds an “impression” of punishment should be made” (Bentham 175, 174).\footnote{His use of the phrase, “aggregate mass of individuals,” matches the discourse of social hydrology established in Kay, Taylor, Greenwood, and others discussed earlier.} In place of punishment that incorporates reformation and an educational function within the social body, NSW transportation flush those elements out of sight, like sewage flowing to sea in Victoria Embankment.

Nonetheless, like Joule, Bentham underestimates the cultural force of flow dynamics and emerging social hydrology in this moment, in which aggregates are only to be drained, certainly not collected and inspected, and where human and social waste will be flushed, not recuperated and recirculated. And though Foucault’s description of the carceral’s spread in nineteenth-century England as led by Bentham has offered helpful readings of its literature and culture, Bentham’s arguments against NSW transportation loses its battle for visibility and penitentiary reformation. As he showed (and as Pitt acknowledged from the outset), there was no intended
usefulness to convicts’ dismissal that costs the government while paying back nothing, provides no economic or moral recuperation, and creates a massive net loss in productive human potential.

Parliament’s continued embrace of NSW transportation, nonetheless, seems to prove the power of this faulty logic—“Let a man once get there, we shall never be troubled with him any more”—the appeal of permanent dismissal beyond possible “communication” with England (Bentham 186). This appeal beats out the complicated challenge of attempting to recuperate latent potential within criminals in order to break cycles of recidivism and clear the country’s waterways of their waste “depôts.” As such, Bentham and other critics like the Reverend Sydney Smith correctly identified NSW transportation as motivated by, and existing as, waste disposal. The lack of any promising supervision, inspection, or even visibility to any authoritative overseers promised a criminal colony and nothing like a “society” (Hughes 364).

Working from his premise that NSW transportation does not intend to rehabilitate convicts and thereby has little value to begin with, Bentham asserts the weaknesses he sees in the system’s ability to achieve those aims. First he decries the ineffective, and almost secondarily, inhumane way that New South Wales transportation sets its “excrementitious mass” in motion. Censuring both the unclean, crowded hulks and the contracted transportation fleets, Bentham decries how much of its “material” the system loses along its delivery routes. The deadly “Second Fleet” (1789-1790) for example, killed 25 percent of the just over 1,000 convicts it was to deliver, while hundreds more were sick on arrival, with some 124 dead shortly thereafter (Hughes 105-6). Having been paid a flat rate per convict loaded on board in London after undercutting the offer of the First Fleet’s contractors, the Second Fleet’s overseers had no financial motivation to care for convicts during the trip. Though they had marine guards, they manacled their charges, fed them little, and treated them, to some accounts, worse than the slaves
which they had previously been in the business of transporting. Bentham disgustedly jokes that, in light of the “object” of “Incapacitation” in criminal punishment—or the “prevention of similar offences on the part of the same individual, by depriving him of the power to do the like,”—death under the heading, “Stone dead has no fellow,” certainly serves the object (174, 195).

Bentham then lays out his statistical findings that, “[i]n the course of about eight years and a half, from the 13th of May 1787 to the 31st of December 1795,” 5,196 convicts were recorded as having been shipped, and 522 had been recorded as dying during the voyage—although that number leaves “all not told” about the extent to which the government’s contracted companies “decimated” their subjects (195). The two primary causes of such heinous death rates, he says, are the length of the voyage and the “want of interest” of those contractors, whom the Crown and Parliament entrusted and who Bentham rightfully blames as being motivated “the profit the transporter had it in his power to make by putting people to death—whether by starving them or crowding them” (given the up-front, flat-rate payment particular to NSW transportation as compared to older models, in which laborers could be sold if they arrived healthy) (195).

This decimation of convict populations during their delivery out of England’s waterways again emphasizes the extent to which the system cared only for social and topographical evacuation. That so much of the evacuated material was lost along the way—even when this material is human beings—pales in comparison to appeasing the public’s desire to have it ejected beyond the problematic, prison hulks thresholds. To Bentham, the tragedy of the Second Fleet embodied not just the failed goals of NSW transportation but its ineptitude at accomplishing this goal. According to his research, by the end of 1792 more than a quarter of all transported convicts had died, either on the journey or shortly upon arrival, making 1,291 deaths of 4,792
convicts sent in the first three fleets (198). This delivery mechanism clearly “leaked” much of its waste cargo before reaching its point of release beyond visibility. Nonetheless, with modest reforms enacted, Parliament had barely begun in 1792 to tap the jails and hulks compared with the rate at which would do so in the following decades.

Most importantly, Bentham questions whether NSW transportation achieves its most central goal: the lasting dismissal of convicts—the permanent prevention of, or strictly control over, their returning to England. Much as Joule would argue that delivering London’s raw sewage from the proposed outfall sewers at Gravesend would not actually keep it from returning to London’s reaches on the flood tides, Bentham gives evidence of the incomplete dismissal of convicts that NSW transportation actually accomplishes.

Not only did evidence exist that some transported convicts had already successfully fled NSW, even reaching England, the primary reasoning for expecting the number of “returners” to increase in the future was the principle of “communication.” The unwanted recirculation of transported convicts into England “may naturally be expected to be greater and greater, the longer the establishment continues,” Bentham writes, largely because “the longer it continues, the greater the population of it may be expected to be,” and, practically speaking, due to “the greater the number of vessels that touch there in a year, whether for the purpose of bringing in more convicts, or for any other purposes” as the practice continues (192). As convict-delivering traffic increases, more points of contact and avenues will be created for illicit returning.132

The numbers of “returners” to England constitute for Bentham a “fruitlessly expelled mass of corruption,” which “instead of putting on incorruption, as it was expected to have done by miracle, without any human means provided for the production of the effect,” has “put on a

132 As usual, Bentham provides statistical support for this assertion by examining lists of ejected convicts.
worse corruption…than before” (191). To that—again, I would argue, echoing the discourse of his opponents in regard to convicts—“still the obnoxious vermin remain unextirpated” from the English social body (191). The “waste” that does return against its intended dismissal also does so in more “obnoxious,” “verminous,” less useful form than that which had been ejected, like the waste so diluted in Bazalgette’s drainage flows that it cannot be utilized. Like Joule critiquing that energetically and monetarily costly dismissal of chemical potential energy with questionable permanence, Bentham writes that transportation’s “whole…price, in the way of injustice…is thus paid for the expected benefit” that is “but in an imperfect degree…reaped” (191). A “price” paid in literal terms, in terms of the principles of English criminal justice that Bentham sees being violated, and in the actual expenditure of work put produces an uneconomical, inefficient system.

For Bentham, the “Laws of Nature” that reveal God’s creative role in the universe do not determine the terms of economy. Instead, the terms of rational punishment that will most optimally and sustainably serve English society do. Simple discharge of people from the country’s prisons and river-bound hulks violates these terms, particularly when—like the latest scientific findings do for Joule—his new concepts of penitentiary-based rehabilitation suggest that these people can be treated so that their potential for social and economic production is recuperated into society. Thus, he depicts NSW transportation as a failed social application of flow dynamics whose economic and moral measures show unacceptable, yet intentional, loss.

Bentham, like Joule, sees social hydrology not merely as embracing fallacious goals but as so short-sighted that he must add a new criterium to Blackstone’s accepted four principles of criminal punishment—“Economy,” which he claims must be an “indirect or collateral” end to criminal justice (174). In any given punishment, economy, or efficiency, “ought not to departed from to any great distance” except in so far as it is “unavoidable” in “pursuit of the other direct
ends” (174). Just as Joule draws on Liebig and others to show that Bazalgette’s system lacks economy and knowingly embraces unacceptable loss, Bentham’s critique of transportation’s uneconomical, intentional loss, focuses on the ejected material itself, its animæ viles.

Bentham rejects the reduction of humans to something like “waste,” akin to the raw sewage whose productive potential Joule, Liebig, and others intended to recuperate through circulation in place of ejection. The term animæ viles itself conveys the attitude against which he argues—Latin for a life or soul “of low value or price,” or one that is “cheap, common, mean, base” (OED “vile”). While Bentham sees the NSW transportation venture as demanding “all sorts of faculties” and energy from those who would carry it out, it simply takes the “commodious” or conveniently available prisoners as its matter and “projects” them without hope of any recuperation for the energy expended to do so (176). Like Thomson envisioning the sea as an energetic “sink” when describing energy as a falling river, Bentham sees the discharge of England’s social waste to the “antipodes” as a complete loss of all work put into discharging convicts as well as a loss of their inherent value.

After Bentham, an increasingly prominent notion of the New South Wales colony as a “sink” mixes moral and energetic-economic discourse, in addition to invoking a hydrological, waste management context. Bentham asserts the moral level of this colony’s wastefulness as

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133 Note the overarching crossover between moral and thermodynamic terms here, as with “dissipation” as explored earlier. Writing as the numbers of transported convicts exploded, the Reverend Smith attacked the colony in Edinburgh Review, questioning how its function could be anything other than the moral, social equivalent of what happens when human waste is dumped into a reservoir. “New South Wales is a sink of wickedness in which the great majority of convicts…become infinitely more depraved than at the period of their arrival. It is impossible that vice should not become more intense in such [a] society” (Hughes 355). At the time the primary meaning of “sink” was “a pool or pit formed in the ground for the receipt of waste water, sewage, etc.…a cesspool,…a receptacle for filth or ordure,” or “a conduit, drain, or pipe for carrying away dirty water or sewage” (OED, “sink”). Smith’s diatribe also invokes now-outdated figurative meanings of “sink” as “a receptacle or gathering-place of vice or corruption” or “the scum or dregs of a place or set of persons” (OED “sink”). Additionally, the term “sink” melds the thermodynamic with the moral in the physics since of a “sink” of heat/work/energy.
well, due to its utter lack of structure for reforming convicts, and secondly because—as a waste “depôt”—NSW also lacks moral leaders and guidance for its masses (181). He fills his second 1802 “letter” to Lord Pelham, “in Continuation of the Comparative View,” of penal colonization and the home penitentiary system with evidence of the “general depravity,” “drunkenness,” “sloth,” “corruption,” “prodigality,” and lacking “remedies” at hand to correct them in New South Wales (i). Convicts in such surroundings stand little chance of “reformation.”

Nonetheless, this system will cost money, and Bentham crafts a compelling argument about its monetary costs, ranging from the fact that no capital investment had flowed, or likely would flow, to a convict colony that produced nothing of value for export to a closing salvo that combines moral, energetic, and monetary discourses of efficiency. Historically, NSW presented no real prospects of natural resources at its outset (not just because of lacking surveys of the land but also due to the distances and concordant costs of any exporting), and, therefore, did not draw any substantial capital investments for decades after its creation—one aspect of the system’s lack of “compensation” to England (183). As of his first version of “Panopticon versus New South Wales” (from 1802), he also calculates from government records that “the annual value of a man’s labour” in NSW is “minus £46 : 5s,” meaning the food and care necessary to keep him alive costs the country that amount above anything he would produce (let alone that the colony

134 Bentham’s table of contents in the second letter demonstrates his view of the colony’s moral state:
“IV.—: General Depravity—Prevalence of it in New South Wales, as attested in general expressions.
2. General Depravity continued—Females.
V. General Depravity—Particular Exemplifications.
VI. Depravity—Particular Exemplifications—Incendiariism.
VII. Remedies unavailing—Spiritual.
3. Per Contra—Penitentiary System
VIII. Remedies unavailing—Temporal.
1. Punishments and Rewards—Evidence unobtainable.
2. Police.
3. Functionaries corrupt—Servants worthless.
IX. Main Cause of Non-Reformation, Drunkenness.—Universality and Incurableness of it in New South Wales.” (i)
could produce even its food and other needs for survival) (200). With characteristic irony he concludes that this leaves little room for “positive surplus...for the purpose of being converted into...positive compensation, payable to the individual in Great Britain who had been a sufferer by the offence for which the convict...had been consigned to New South Wales” (200).

Moreover, Parliament exacerbates this loss by throwing bad money after good, and that on a grand scale. Citing the same Treasury “Finance Report” from which he drew the negative production value of a NSW convict, Bentham asserts that “the average annual expense of convicts, per head...is from £33 : 9 : 5½ to £46 : 7 : 9¼” (200). Contrasting that with his own estimates for the penitentiary system—£14 10s to £18 10s per head—Bentham’s outrage gains (albeit biased) merit, in so far as his literal economic costs range far lower (202). 135

Nonetheless, this money did pour into the flushing of convicts out of sight, collective consciousness, and the useful waters of England. With characteristic irony, Bentham writes that, despite all apparent logic, the “particularly commodious” human subjects of experiment were shipped “year after year by hundreds to the antipodes, to be kept without employment to corrupt one another...in a makeshift jail, at an expense...from twice to four times as great as that of the

135 He also easily beats the optimistic £37 per convict estimate put forth by transportation’s advocates. The difference of somewhere between £15 to £32 meant an annual difference of £11,625 to £24,800 to support the 775 original transports, compared to their being housed in one of Bentham’s penitentiaries.
system sacrificed to it” (176, 195). “Happily,” he satirizes, “on those terms, and at that distance, the necessary jail, such as it was, was built” (195).136

Finally, extending the kind of criticism levied by Joule against the ignorance embraced, and possibly feigned, by Bazalgette about the potential value of the material he had been asked to flush, Bentham closes his critique of transportation’s lacking “economy” by reiterating the disregard for human life it also demonstrates. “Those who were to be sent out of (England) belonged neither to the list of souls to be saved, nor to the list of moral beings” in the realm, he writes (183). Only by assuming this principle about transportation’s animæ viles could one explain that no thought was given to “how the people thus sent thither behaved while there,…so long as they did but stay there, or at any rate, did not come back here” (183). “Such was the religion, such the morality,” he rails, that “presided over the design and execution of the picture of industry and reformation in New South Wales” (183).

Thus, like Joule does against Bazalgette’s flow dynamics-based engineering, Bentham combines logic, statistical analysis, and a more systematic view of production, recuperation, and “moral” health to the responsibility of waste-convict handling. “And here, in conclusion,” he writes, “your Lordship sees a sample of that logic which has led to such economy, and proved such morality to be conducive to true interest, and compatible with lasting fame” (Bentham 203).

136 As Branch-Johnson documents, the “permanent” system that Bentham and Howard advocated had been accepted in Parliamentary Committees, and a site in London had been chosen for Treasury to create the first “penitentiary” (26). Though the unprofitability of the hulks was clearly understood, with the labor of its individual convicts, according to Branch-Johnson, “estimated to produce no more than two-fifths the cost of their maintenance,” they still remained “cheaper than the erection of new prisons ashore” as the way-stations for convicts destined for NSW (27). Bentham’s own illustration of NSW as an aggregating “sink” points out the irony of further investment in NSW: “The consequence is, that the greater the use made of the colony in this or in any other way—the greater the increase of it in wealth as well as population—the greater…the degree of “improvement” it receives…the more incapable it becomes of answering the expectations formed of it, in regard to its primary object—the more unfit, with reference to this the only real and substantial use that anybody has ever seen or professed to see in it” (193).
Nonetheless—and this is the operative fact—Bentham’s denunciation of NSW transportation found exactly as much success as Joule’s critique of Bazalgette did, none. The river-bound, tide-locked, prison hulks thresholds would be transcended.

For *Great Expectations*, two keys emerge. First, the novel’s fictional River Thames bears all the historical connotations of the context I have explored. It has become the site of consternation and contestation for both hydrological-infrastructural and social-hydrological interventions. It signifies public angst about political mismanagement of drinking water and sewage—about political bodies’ inability to manage the biological level of life in the capital city. At the same time, the Thames raises heated debates about the wisest ways to fix those problems, with excavations for the intercepting sewers and embankments going on during the novel’s publication. Also at the same time, the fight over NSW transportation rages—mostly through criticism against it (including by longer-tenured Australians by the time of *GE*)—though the system still used prison hulks “depôts” in the Thames as “outfall sewers” for the permanent ejection of convicts until the system’s end in 1868.

Secondly, this complicated and culturally dominant set of contests around the Thames in particular make it site where a set of experiments with, and criticisms of, flow dynamics intersect—each figured as a conflict between unidirectional flow and tidal circulation. This fraught intersection of conflicts denotes an as-yet unexamined layer of tension and complication in the novel. The continuity of Magwitch’s story with the actual, historical nature of NSW

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137 Another similarity between Joule and Bentham’s respective failures is their disinclination toward dominant assumptions. As Joule found profit motive irrelevant to his waste circulation system, Bentham dismisses English colonialism. After concluding his other arguments against NSW transportation, Bentham writes: “My Lord—to confess the truth, I never could bring myself to see any real advantage derived by the mother country, from anything that ever bore the name of a Colony. It does not appear to me, that any instance ever did exist, in which any expense bestowed by government in the planting or conquering of a colony was really repaid” (206).
transportation, paired with the novel’s consistent reminders readers about the contemporary, historical reengineering of the river, its banks, and the bridges over it, evidence its engagement with flow dynamics’ literal and social applications there. Dickens’s placement of Great Expectations into the context of early NSW transportation provokes arguments for and against the energetic and moral economies of the drainage, or flushing, of convicted English subjects to an intended point of “annihilation,” in Bentham’s terms. Its fixation on the river within this context shows the novel to be a narrative exploration of how social hydrology might play out over generations of life and how, what kind, and with what effects “waste” or “loss” are suffered by both the individual and the society through its application across infrastructure and society. In this vein, I suggest that the loss, the “tumbling on the tide,” of Magwitch’s identity, Compeyson’s body, and the papers meant to grant Pip the properties and accumulated wealth of Magwich from New South Wales into the Thames stand for a lost opportunity for systematic, just recuperation of people, of damages suffered, and even of narrative, sympathetic energy.

4. Great Expectations: Tide, Circulation and a Critique of Flow Dynamics

Given the context I have just described and Magwitch’s thwarted benevolence, even amid ambivalence about his past violence, we can read Dickens’s work as questioning the system of transportation that was nearing its end under increasing criticism as GE ran (the last transports left England in 1868). Magwitch’s failed expurgation, return, and the execution for which he must be nursed through illness matches Bentham’s final questions about the effectiveness of the system. To that, an understanding of the tide’s role in the paradigmatic incarnations of flow dynamics on the River Thames in and through London opens up the ways in which GE interacts with and critiques its literal and social applications. The novel does this first by fixating on the
tide in the Thames from the moment of Magwitch’s appearance to the moment of his sentencing to death. This attention constitutes not coincidence but Dickens’s understanding of how the river can function symbolically and literally, both in relation to flow dynamics in his fictional world. These functions become subjects of examination first and most literally with the plan for Magwitch’s escape, then with that plan’s failure and Pip’s accompanying failure to achieve class mobility within England and to secure Estella’s partnership in life (in the original ending), all of which point toward a critique of flow dynamics’s tendency to eject matter beyond certain perceived thresholds, regardless of loss, wastefulness, or a lack of “economy.”

A. Magwitch and Pip: Tidal Circulation and Failure

In the reader’s interaction with the fictional world of *Great Expectations*, Magwitch and Pip both originate in the Medway marshes. Pip’s “first fancies” of his parents, which emanate from their tombstones in the churchyard (like the Woolwich marshes where deceased hulks prisoners were buried), quickly lead to his remembered images of the immediate landscape, to the sea on the edge of the horizon, and then to Magwitch. He calls this orientation his “first most vivid and broad impression of the identity of things,” which come like a series of sensory shocks (3). His descriptions focus on attributes, which then earn names. He “learn[s]…that this bleak place overgrown with nettles was the churchyard…that the dark flat wilderness beyond the churchyard, intersected with dykes and mounds and grates, with scattered cattle feeding on it, was the marshes,” that his immediate family are all “dead and buried…that the low leaden line beyond, was the river; and the distant savage lair from which the wind was rushing, was the sea; and that the small bundle of shivers growing afraid of it all and beginning to cry, was
Pip” (3-4). Just after naming himself, a voice which belongs to the later-named Magwitch yells, “Hold your noise!” Magwitch’s angry voice assails Pip just as he perceives the sea as the “savage lair from which the wind was rushing,” (4, emphasis mine). A strong, if not violent, onshore, upriver wind stages Magwitch’s arrival, presaging his post-transportation return.

While his entrance accompanies Pip’s “identification” with the “things” around him, all of which seem cold, harsh, and death-tinged, his leaving initiates a thematic pattern in the novel —often reflected syntactically—that emphasizes Magwitch’s problematic circulation. As he leaves, Pip sees Magwitch walking near a gibbet as the formerly-gibbeted “pirate come to life, and come down, and going back to hook himself up again” (6). Pip’s imagination provides both a ghastly image of a man about to hang himself “again” and a model of the dangerous pattern of circulation that Magwitch enacts throughout GE. This re-animated pirate has returned against the Crown’s punishment by death, their attempt to be rid of him permanently, to the very spot of his previous punishment. Not only because the reader and the narrating, adult Pip recognize the man with leg irons as an escaped hulks prisoner, but because the gibbet symbolizes political authority’s power to take life, the novel’s opening pages introduce its interest in individual experiences with criminal authority. Specifically, the elements of thematic and linguistic circulation suggest an exploration of how individuals’ movements escape, refute, confound, and/or ultimately succumb to political authority. Also, as Pip’s and Magwitch’s location of narrative origin, Dickens’s descriptions of the Medway marshes introduces the novel’s interest in the literal-topographical and metaphorical-social ways in which flow dynamics was applied to them. Like the infirm, deteriorating “foreshore” and riverbed that the very first hulks prisoners were set

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138 The River Medway empties into the Thames Estuary, so that the two rivers’ meet as the estuary nears the “offing” which Schmitt describes in relation to Conrad’s Heart of Darkness —where the rivers’ waters meet those of the North Sea in the English Channel.
to work on at Woolwich Warren, the shore of the Medway “meshes” near Pip’s home feature traditional forms of water-management infrastructure—dykes, sluices, dams, and mounds.

Furthermore, Pip’s narration of the end of this encounter shows how the characters’ relationship bears a connection to tidal dynamics. As Magwitch heads for better hiding ground, Pip recalls, “I saw him going on again towards the river, still hugging himself in both arms, and picking his way with his sore feet among the great stones dropped into the marshes here and there, for stepping-places when the rains were heavy, or the tide was in” (7, emphasis mine). Likewise, after his sister threatens Pip that “[p]eople are put in the Hulks because they murder, and because they rob, and forge, and do all sorts of bad; and they always begin by asking questions,” Pip goes to bed “sensible of the great convenience that the Hulks were handy for [him],” because “[he] had begun by asking questions, and [he] was going to rob Mrs. Joe” (14). “If I slept at all that night,” he continues, “it was only to imagine myself drifting down the river on a strong spring tide, to the hulks” (14, emphasis mine). By first naming the tide generally and then specifying a particularly strong flood, Dickens bonds tidal dynamism to Magwitch’s narrative appearance in GE, his interference with Pip’s life, and the marshy Medway hulks “depôt” as a symbolic threshold for holding and ejecting society’s rejects. This connection of tidal dynamics to the point from and to which Pip will circulate over the novel’s course and to the hulks as a symbol of social hydrology introduces the novel’s examination of how cultural insistence on unidirectional drainage flows against unwanted circulation actually comes to life.

Adding to this thematic confluence, the movements of Pip over the narrative’s arc, and the illicit circulation of Magwitch against NSW transportation and through the fictional watersheds of southeast England (the Medway, which abuts the Thames Estuary, and the Thames itself), Dickens has his supporting characters reinforce the publicly scrutinized nature of such
littoral, liminal zones along English rivers. Wopsle typifies negative public sentiment about places like the Medway’s riverine “depôts” by asking, “Do you find any gipsies, now, or tramps, or vagrants of any sort, out there?” in the “solitary” land near the river, though he admits to being “not acquainted with this country” (69). “No,…none but a runaway convict now and then,” responds Joe, revealing the kind of leakage of the “depôt’s” supposedly contained population of into the riverine community nearby as documented in the historical record earlier.

Finally, Dickens initiates attention to circulation as an important model of movement in the novel via circular syntactic constructions that depict them. In Volume II, after his “expectations” have taken him to London and his clothing and demeanor are intended to make him appear middle class, Pip rides back “down” to his home, again in the company of the man who sneaked him Magwitch’s reward for his assistance as a child in the public house. This man cannot recognize Pip, but in describing the shape of life at the hulks “depôt” there, he calls it “[a] most beastly place. Mudbank, mist, swamp, and work; work, swamp, and mudbank” (210). As Pip imagines these convicts heading for “the slime-washed” stairs and “wicked Noah’s Ark lying out on the black water,” the convict’s own description of life as syntactically circular, alongside Pip’s image of “black water”—which often was associated with human waste in the Thames—reiterate the threshold nature of that place. It collects waste, which the tide recirculates, while the convicts there stagnate, collect, and, occasionally, escape to circulate through society.

B. The Magwitch Escape Plan: Escaping the Tidal Threshold

Once Pip and Herbert recognize the need to get Magwitch out of London, the tide becomes a primary concern. It bears on how they will conceal Magwitch’s identity, where they will hide him, how boat traffic patterns and time schedules affect both of those, and where,
when, and how they might get him aboard a ship bound for anywhere outside of England. The raw number of Dickens’s uses of the word “tide” betrays how important it becomes, particularly in Volume III, which includes 32 uses of the word “tide,” two uses of “ebb” and three of “high,” as in “high tide” or “high water.” Finally, Dickens uses the related word “tidings” four times as well, with the final two coming in Volume III. This language reflects the narrative’s adamant characterization of both Magwitch’s prohibited returning and the attempts to re-eject him from London as river- and tide-bound events. Pip’s attempt to flout the criminal authority that punishes returners is informed by the ways in which the historical River Thames’ tidal movements actually bounded its use as a dynamic waste depository.

Pip and, frankly, the reader require close familiarity with the tide’s effects on the Thames in order to clearly understand the navigational challenge of getting Magwitch onto a ship leaving the tidal reaches of London. Contemporary readers, even those unfamiliar with navigating tide-affected rivers amongst steamers and “packet boats,” may follow the overall action and tension of the scenes that lead to Magwitch’s arrest. However, a more nuanced understanding like that provided by Bazalgette’s engineering “Report” shows how nearly the tide’s limits to Magwitch’s movements and those placed on Bazalgette’s “suspended materials” match one another.

To begin, the transported convict returns to England by way of the Thames into London, doing so as if on the winds of the upriver-blowing storm that occurs at the end of Vol. II, Ch. 20. Recalling both the cyclical syntactical constructions applied to the marshes above, particularly that of the muddy marsh-shore, Dickens sets the stage with the combination of the “wretched weather”—“stormy and wet, stormy and wet; and mud, mud, mud, deep in all the streets”—and the particular location of Pip’s apartment in the Temple (286). This is not Temple Bar, as Dickens specifies by mentioning the “[a]lterations” that “have been made in that part of the
Temple since that time,” where it is no longer “so exposed to the river” (286). This earlier Temple fell in the way of the “Victoria Embankment.” Here again, Dickens unites the returned convict and the connotations of his NSW transportation to the interventions caused and then addressed by, flow dynamics’ influence on the handling of English rivers. Further, this storm features a “wind rushing up the river” violently enough to shake Pip and Herbert’s house and push “the coal fires in barges on the river...before the wind like red-hot splashes” (286). As with Pip’s identification of “things” in the novel’s opening, where “the distant savage lair from which the wind was rushing, was the sea,” Magwitch appears with the wind pushing ships up the river against the direction of flow—from the ocean into the heart of England and English authority (4).

Through this wind, a cacophony of clocks strike and Magwitch steps up to Pip and Herbert’s rooms. Shortly thereafter, and after revealing his identity, he declares, “I was sent for life. It’s death to come back. There’s been overmuch coming back of late years, and I should of a certainty be hanged if took” (294). Tellingly, “life” here equates to being “sent” or drained away, while “death” equates to circulating, “coming back.” Thus, his re-entry into England commences under threat of his own death, and, as Herbert points out, threatens to ruin Pip’s public character through the criminal connection Magwitch’s identification by authorities would reveal. As Pip decides never to take more money from a transported convict who has been living at the “antipodes,” the two young men begin planning how to get him back out to sea.

At this point, the tide functions as the same kind of obstacle for Pip, Herbert, and Wemmick as it had posed to Bazalgette in draining London. It limits what constitutes dangerously within or safely without the metropolitan area for Magwitch, as a piece of returned material from the criminal “depôt” of New South Wales. It determines how Pip, Herbert, and the boatmen they engage for assistance can travel up and downriver. The tide also creates the
schedule on which the larger ships can navigate the Thames, thereby determining the schedule on which Pip and company can secure Magwitch’s passage out to sea. Just as Bazalgette calibrated his system of drains, pumps, and reservoirs to deliver waste into, or in front of, favorable tides rather than be returned, unwanted, on unfavorable floods, the group trying to sneak Magwitch out of London calibrates their plan to the tide—and with an eye to the Gravesend threshold.

From the outset, Wemmick suggests to Pip a way of thinking about Magwitch’s escape that mirrors flow-based approaches to the mid-century Thames—that they simply discharge him downstream. “It seemed to me,” Wemmick writes, “almost indifferent what port we made for… the place signified little” (381). To achieve Magwitch’s ejection, they will have to “get him well down the river…certainly well beyond Gravesend, which was a critical place for search or inquiry if suspicion were afoot,” naming that location as the practical threshold of policing authorities, just as it is a practical, navigational threshold thanks to the tide—and just as Bazalgette denoted it his threshold for successful ejection of London’s waste beyond circulation (381). If they can discharge Magwitch beyond Gravesend as cargo on a “packet-boat,” they may succeed in preventing his returning into London (in chains). By mentioning the threat of police authority at this threshold, Dickens reinforces the danger posed to Magwitch of having violated the NSW transportation system’s anti-circulation aims.

The escape plan’s tidal-temporal planning approaches the level of detail seen in Bazalgette’s Report. “As foreign steamers would leave London at about the same time of high-water,” he writes, “our plan would be to get down the river by a previous ebb-tide, and lie by in some quiet spot until we could pull off to one” (381). Thanks to precise tide tables, he continues,

139 Hamburg, Rotterdam, and Antwerp are given as possibilities. Hamburg, perhaps not coincidentally, had been traced by John Snow as the point of origin for the first cholera epidemic that struck London in 1832. A sailor had carried the disease from Hamburg to London along a standard shipping route.
“[t]he time when one would be due where we lay…could be calculated pretty nearly” just as Bazalgette’s infrastructure, even including the planned sizes and materials for the main drains within neighborhoods of the city, had been conceived of in relation to the predictable nature of the tides (381). Pip later describes how precise such planning could be. At “half-past eight,” the time of “high-water,” they would begin. “The tide, beginning to run down at nine, and being with us until three, we intended…to creep on after it had turned, and row against it until dark” (397). They “should then be…below Gravesend, between Kent and Essex, where the river is broad and solitary, where the water-side inhabitants are very few,” and where a “lone public-house” would serve for their night accommodations (397). Finally, from this threshold to the Thames Estuary, they would plan to catch a steamer either to Hamburg or Rotterdam, which “would start from London at about nine on Thursday morning” (397).

While they wait for that day, Wemmick posits that Magwitch be kept in the “Pool,” between London Bridge and Greenwich, where he will be unattached to Pip, and from whence he will be ready to “slip…on board a foreign packet-boat” like some cargo (340). Beginning a little over a mile downriver from Pip’s Temple apartment, the “Pool of London” was the river’s primary and densely crowded wharf and dock area (its overcrowding led to the 1799 West India Dock Act, the first of a series of such authorizations in the historical era of GE). In this chaotic, overcrowded port area, which Pip only visits once at the beginning of this plan’s hatching, Magwitch can easily be missed among “stranded ships repairing in dry docks…old hulls of ships in course of being knocked to pieces…ooze and slime and other dregs of tide” that

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140 The Pool remained a vital hub of river traffic, nonetheless (Museum of London). London Bridge served as the upriver limit to the Pool, because high-masted ships could not pass under it (in its pre-1831 version) and the Pool stretched roughly from there to Rotherhithe, about 2.5 miles. Wemmick describes it loosely as running from London Bridge and Greenwich, suggesting his inclusion of Millwall and the reference to a “stump of a ruined windmill” near Magwitch’s hiding place (324).
Pip navigates in order to reach his hiding place (342). Dickens affiliates what the tide has washed up on the Pool’s shores with the “returned” Magwitch—just as the ooze, slime, and dregs of tide at Gravesend reinforce this connection (with a twist) during the later escape attempt.

The plan also demands Pip’s ability to navigate the ebb and flood as they affect the features and currents within the river throughout London. Until the day of the escape attempt, Pip is to act like a leisure-time boatman, never visiting Magwitch on foot but occasionally boating past to check for the signal that all is well. He builds confidence in his ability to harness the tide, eventually claiming that he can pilot through Old London Bridge “after seeing it done,” so that he no longer has to keep “above Blackfriars Bridge,” but can “‘shoot’…the bridge…as the hours of the tide change” and create “a race and a fall of water which gave it a bad reputation” (348). He becomes an unsuspicious regular between the Temple and the Pool.

The confidence in his ability to use the tide, though, proves to be overconfidence on the day of the escape, reiterating the phenomenon’s ultimately insuperable nature, to which Bazalgette’s plans had also acceded. At first Pip enjoys the “relief of being at last engaged in the execution of the purpose,” not the least because the elements seem to be in their favor (397).

“The crisp air, the sunlight, the movement on the river, and the moving river itself—the road that ran with us, seeming to sympathise with us, animate us, and encourage us on—freshen[s]” his hope (397, emphasis mine). The most basic impetus of flow dynamics exists in Pip’s phrase “the

141 This imitation of a leisure boater and the ultimate failure of this plan ties together the metaphorical and literal levels of Pip’s failed attempt to ascend the class structure, and returning instead to the exact place and state from which he came. It also recalls the role of rowing the Thames in David Copperfield and Daniel Deronda and those title characters’ cultural or developmental aspirations.

142 During this time, Herbert contemplates the tide hopefully, while Pip does so with foreboding: “Herbert…found it pleasant to stand at one of four windows…when the tide was running down, and to think that it was flowing…towards Clara. But I thought with dread that it was flowing towards Magwitch, and that any black mark on its surface might be his pursuers, going swiftly, silently…to take him” (348).
road that ran with us,” in that it invokes the enticing promise of purposefully harnessing the watercourse’s movement, in this case as amplified by the concurrence of the ebb-tide (as traffic around them is said to be “dropping down with the tide” [397]).

Magwitch has a different experience in these moments though. He feels the “freedom” of cruising with the river, a feeling he hasn’t enjoyed since having been ejected from England, but the “flowing so soft and pleasant through the water” does not keep him from wondering whether the plan will work (399, 400). The boat’s occupants “can no more see to the bottom of the next few hours, than we can see to the bottom of this river what I catches hold of,” he says, with his hand in the water (400). “Nor yet we can’t no more hold their tide than I can hold this,” he continues, “[a]nd it’s run through my fingers and gone, you see!” (400). While the less experienced Pip feels strength in riding the combined current and tide and perhaps overestimates their chances, Magwitch physically demonstrates and metaphorically ruminates over the fact that, no matter how they plan, the tide holds ultimate sway over everything in the river, as a practical limiter of movement, a reminder against hopefulness and ostensible freedom.143

Dickens seems to hope for readers’ knowledge of the Thames’ movement and locales, boating practices, and forms of work on the river and, in part, teaches a basic understanding of these, so that readers fully grasp how the escape plan fails. By making the tide central in the plan, Dickens lends both a specific timetable to the escape, chase, and eventual crash and a constant sense of tension that not all options are open to the men trying to get Magwitch out of London. Rather, they require an outbound steamer riding the ebb out to the ocean at precisely the threshold of Gravesend. Having moved with the ebb during the afternoon—“[taking] care to

143 Magwitch combines or conflates the temporal with the topographical here, in addressing the river’s substance and movement. To “hold” its tide would be to possess full knowledge and control of the “hours,” or to connect with the possessive thinking about the river that Bazalgette and his fellows show.
lose none of it”—they row all the way to that threshold in one movement (400). Believing that Magwitch’s cloak adequately disguises him, Pip also steers directly under the “floating Custom House, and so out to catch the stream” at its most energetic, though passing under symbolically threatening “emigrant ships, and…a large transport with troops on the forecastle” (400).

The subsequent change in tide demarcates the changing fortunes of Magwitch’s escape—as “the craft lying at anchor began to swing, and presently had all swung round” (400). These larger ships requires a deeper draw and the help of the tide to reach the Pool, and they turn around their anchor lines while the phases change, “crowd[ing] upon” Pip’s boat at the center of the river “in a fleet” (400). Pip then steers them “under the shore, as much out of the strength of the tide” as possible, reminding them that they are in contention with its incontestable force and with the entire pattern of traffic which is adapted to it.

This rising tide also makes it impossible to check for footprints outside the pub where they wait for the next morning’s ebb, so that they remain ignorant of whether Customs officers are actually tracking them. Though Pip notes “slimy stones stuck out of the mud, and red landmarks and tidemarks out of the mud, and an old landing stage…and all about…stagnation and mud,” that resemble the Medway marshes and the “ooze and slime and dregs of tide” in the Pool, he cannot verify any footprints (405). “To be sure the tide was high,” he laments, “and there might have been some footprints under the water,” though nothing can be seen (405). Again, the tide tangibly complicates their mission, not only causing them to move downriver in spurts that coincide with the ebb, then fighting not to be washed back toward London on the flood, but by concealing this practical evidence that proves deadly to have missed in the end.

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144 Intriguingly, this sentence’s adverb, “presently,” coincides with the boats’ movement on the tide, as if they are in motion between the sentence’s comma-separated phrases.
Nonetheless, they are committed to the attempt and must try to board one of the two previously chosen steamers. They plan to wait “until within an hour or so of the steamer’s time, and then to get out in her track, and drift easily with the tide” (404). This means that the tide will change again overnight, or early in the morning, as they wait and attempt to rest. As it sets to ebb and increase the river’s strength of flow out to sea, they will deliver themselves in front of it and let it push them into a favorable position and comparable speed before the steamer (like “the road that ran with them”). However, as the smoke from the steamer becomes visible—a little later than they expected, half-past one—its speed catches them off guard. At the same time, a four-oared galley emerges from hiding along the shore and joins the same current which Pip’s boat rides. Pip begs the crew of his boat “to keep before the tide, that she (the steamer) might see them” (405). Nonetheless, the galley remains near while the steamer approaches at full speed. As the steersman announces the illegal circulation—“You have a returned Transport there…His name is Abel Magwitch, otherwise Provis”—his crew runs the galley “athwart” of Pip’s boat to make their arrest (406). However, driven on the tide-strengthened flow, the steamer’s speed hardly diminishes, while Pip sees “that both boats were swinging round with the force of the tide” and into the track of the steamer before they collide (406). By focusing so precisely on the tide’s role in the boats’ collision, Dickens reiterates how Magwitch’s circulation and potential re-ejection are bound up with problematic, tidal dynamics in the Thames.

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145 The *OED* defines “galley” as a “large open row-boat…formerly used on the Thames by custom-house officers, and by the press-gang,” giving its use in *GE* as an example. A variant indicates that “the rowers were mostly slaves or condemned criminals…[h]ence phr. *to condemn, or send, to the galleys.*”

146 Pip’s description of falling into the water in the center of this collision invokes traditional flow-harnessing structures: “I seemed to struggle,” he says, “with a thousand mill-weirs and a thousand flashes of light” (406). This evocation of the river’s power, symbolized by the traditional methods for harnessing it, emphasizes Pip’s helplessness in this moment, in context of their failure to outmaneuver the tidal movements within that flow and the political authorities managing their confluence.
Having been ejected from English society after cycles of criminal recidivism, then having “escaped from (the) scene of intended annihilation” in New South Wales, the “transport” has been apprehended for returning (Bentham 191). Dickens emphasizes the tidal nature of this punishable circulation in four ways that pay off in this final failure to eject Magwitch. The first three of these I have already shown: the consistent associations of Magwitch to the tidal-washed mud, “slime,” and “dregs” of the riverine locations through which he circulates; the orchestration of the escape plan with the tide in resemblance of Bazalgette’s plan to drain London; and the fateful crash resulting in part from tidal movement. Finally, Dickens emphasizes the tide’s active operation in the novel, which renders it a subject of inquiry, in Pip’s eulogy on the failed escape, which he gives as they move and face west, upriver, toward the city where judgment waits.

Pip captures their failure to discharge Magwitch from London in the image of the flood tide returning against the direction of the river’s flow. “We remained at the public-house until the tide turned,” he says, when he and Magwitch are taken onboard the galley (408). Once in motion, Pip recalls, “[a]s we returned towards the setting sun we had yesterday left behind us, and as the stream of our hopes seemed all running back, I told him how grieved I was to think that he had come home for my sake” (408, emphasis mine). They are washed back up like tidal flotsam, bridging the gap between the river’s management against tidal waste circulation and the social drainage against criminal circulation that NSW transportation constitutes.

147 There is striking similarity between this description focalized through Pip and the final image of Heart of Darkness as Schmitt reads it: because the Nelly has missed the tide during his tale, the boat has turned, meaning that Marlow faces London as he ends his narrative, with the sun setting behind the city as well.
C. *Great Expectations* Illustrates the Wasteful, Needless Loss and Lack of Recuperation in NSW Transportation

The attention Dickens pays to tide and tidal thresholds in the unfolding of Magwitch’s capture, death, and the failure of his wealth to flow to Pip invokes the same kinds of criticisms against loss, waste, and lacking “economy” that Joule and Bentham made against flow-based plans for dealing with circulation. Beginning with Compeyson, the materials that are lost in the river during the crash and arrest are only found after their operative moment and in an unusable fashion (recalling the transformation of useable sewage into unusable from through its dilution). This circumstance begins Dickens’s questions about the wisdom and efficacy of NSW transportation. Compeyson clearly cuts an utterly negative figure throughout the novel, so that his death is not regrettable. Nonetheless, the insensitive description of his drowned body becomes almost indulgently callous and, thereby, emphasizes all that is lost in his drowning.

The first description of Compeyson’s body transforms him into a missing procedural step in Magwitch’s trial. Because he is “tumbling on the tides, dead,” he cannot depose (409). Further, [w]hen his body was found, many miles from the scene of his death,” he was “so horribly disfigured that he was only recognisable by the contents of his pockets” (410). The defaced object “tumbling” for miles like one of Bazalgette’s floats inconveniences the proceedings against Magwitch by preventing an affirmation of his identity. As decomposing organic matter subject to tidal dynamics, Compeyson epitomizes the failure of NSW transportation to completely eject its fallen members of society from its hallmark drainage flow, the Thames.

The loss of Compeyson to the river’s tidal movements necessitates a final reconnection between Magwitch and the Medway hulks “depôt” where he, Pip, and the narrative began, because only one old officer of the prison ship there can identify him. The reattachment of
Magwitch to his real identity from that origin point pertains to whether or not he will be accepted back into England’s social body, having moved up through its channels of social drainage, or whether he will be eliminated for having done so. Jaggers rightly expects the latter, telling Pip “that the case must be over in five minutes when the witness was there, and that no power on earth could prevent it going against” them (409).

This loss exposes the novel’s version of NSW transportation to Bentham’s critique about its historical counterpart’s lack of recuperative action. Beyond his own financial wastefulness, Pip’s potential to obtain the property and wealth Magwitch labored for in NSW is lost when Compeyson dies prior to divulging Magwitch’s desire to transfer that property to Pip. The potential redeeming of Magwitch as a productive member of society is, therefore, as is all the material wealth that redemption had produced. Pip recognizes this immediately after the arrest and keeps Magwitch “in ignorance of the fate of his wealth,” for fear that the shock will kill him (409). In wording similar to Magwitch’s contemplation of the river water earlier, Jaggers becomes “querulous and angry,” in Pip’s words, “for having ‘let it slip through [his] fingers,’” saying they “must memorialise by-and-by, and try...for some of it” (409). Nonetheless, Jaggers explains to the chagrin of Pip and sympathetic readers alike that “there were no circumstances in this case to make it one of” the “many cases in which the forfeiture would not be exacted” (409).

NSW transportation’s mechanisms of enforcement have drained away all possible recuperation of fairly-earned wealth and social standing into Pip’s life or into the productive potential it might then have. Pip is not related to Magwitch “or connected to him by any recognisable tie,” and Magwitch “had put his hand to no writing or settlement in [his] favour before his apprehension,” while doing so after he arrest would be “idle” (409). “I had no claim,” Pip admits, “and I finally resolved, and ever afterwards abided by the resolution, that my heart
should never be sickened with the hopeless task of attempting to establish one” (409). Though he claims not to be “sickened” with the loss of property and wealth that Magwitch intended for him, Dickens clearly leads his readers to question whether such punishment has any productive point for the individuals involved or for English society.148

Along with Compeyson’s body, the materials that could have identified Magwitch’s wealth and desire for its transfer to Pip circulate in the river to no redemptive purpose. Combined with his own poor management of the money which had been flowing back to him from NSW, this loss or “waste” inherent in the enforcement of NSW transportation ends Pip’s social ascendance. Just after his benefactor’s death, Pip puts his apartment up for rent, he says, “for, I was in debt, and had scarcely any money, and began to be seriously alarmed by the state of my affairs” (421). Ultimately, Pip’s chance at establishing himself and, perhaps subsequently, a middle-class family are purged by the literal and social applications of flow dynamics.149

The final way in which the failure to get Magwitch out of London shows Great Expectations to be a criticism of social hydrology is through an unredeemable loss in the sympathetic economy of the novel. NSW transportation in GE squanders not only the economic benefits of Magwitch’s labor in New South Wales, but the potential redemption of a man who

148 I posit that Dickens’s next novel, Our Mutual Friend, begins from this point, with a family surviving through recovering value from the bodies of those drowned in the Thames, reiterated by the gaining of wealth from what otherwise is “waste” in the novel’s prominent dustheaps. The tide also plays a similarly important role in the navigation of the Thames in order to recover living and drowned bodies. Our Mutual Friend also concerns itself with the river’s infrastructural management through scenes involving traditional management modes like locks and references to the then-ongoing embankments project.

149 Once again, Dickens highlights the tidal, circulatory nature of this failure, as Pip begins Vol. 3, Ch. 19: “The tidings of my fortunes having had a heavy fall, had got down to my native place and its neighborhood, before I got there” (432, emphasis mine). According to the OED, “tidings” means either “something that happens; an event, incident, occurrence,” and “the flowing or rising of the tide.” Thus, Pip’s humiliating failure, solidified and symbolized in his return to his Medway marsh “native place” and from the way that the news of his return precedes him like the rising tide moving upriver.
could fill the unoccupied role of father to Pip and work productively in society. This loss emerges in their interactions between the time of Magwitch’s sentencing and his death.

First, Pip’s closeness with Magwitch reveals the wasted opportunity of his benefactor’s potential redemption. Pip observes “on two or three occasions” that when Magwitch’s “desperate reputation was alluded to by one or the other of the people in attendance on him,” that “a smile crossed his face then, he turned his eyes on me with a trustful look, as if he were confident that I had seen some small redeeming touch in him, even so long ago as when I was a little child” (416). To “all the rest,” Pip says, “he was humble and contrite, and I never knew him to complain” (416). During the times when he is not allowed to visit Magwitch, Pip writes letters to the Home Secretary and the Crown, “setting forth [his] knowledge of him, and how it was that he had come back for [Pip’s] sake” (418). The acknowledgment that the illicit returning was intended to have a recuperative, contributory effect on Pip and his role in English society might excuse his law-breaking, to Pip’s mind. But even the kind of adoptive, fatherly love that motivates the return to see his “son’s” expected progress is disregarded. Pip receives no replies.

Secondly, through an almost melodramatic set of interactions between the two men, in which they repeatedly make and maintain contact with each other’s hands, Dickens leads his readers into acknowledgment of the wasting of redeeming affection, if not love, that Magwitch’s punishment wreaks. Beginning in the “Sessions” where he is sentenced, Pip is permitted to approach the “dock” where Magwitch sits and holds “the hand that he stretched forth” (417). Clearly Dickens invokes the reader’s appreciation of the irony (and very “biopolitical” it sounds) of Magwitch’s being kept alive in order to be judicially killed to begin earning sympathy. On top of this, he adds that Magwitch “went last of all” from the courtroom, “because of having to be helped from his chair and to go very slowly”—all while “the audience got up (putting their
dresses right, as they might at church or elsewhere) and pointed down…most of all at him and me” (418). This crowd gathered for some combination of entertainment, fashion, and/or a sense of righteousness, all drive readers’ sympathy for Magwitch and Pip as their objects.

Dickens builds the development of sympathy, compassion, and perhaps familial love between the two men toward an apparent redemptive, emotional climax, only to have that climax refuted (in the novel’s original ending). During Pip’s last visit to the dying Magwitch, the two hold hands again. After Magwitch smiles, Pip says, “I understood his touch to mean that he wished to lift my hand, to lay it on his breast,” as in a final, closest, most sympathetic form of contact (420). The ensuing, arguably overdone symphony of hand contacts, smiles, sympathies, and understandings flowing back and forth serves a dramatic purpose that ties back into the novel as a criticism of NSW transportation’s social hydrology, because it leads to Pip’s revelations about Estella to Magwitch. First asking the dying man whether he understands what Pip says, Magwitch responds with “gentle pressure on [his] hand” (420). Pip begins, “You had a child once, whom you loved and lost,” bringing “stronger pressure on [his] hand” (420). “She lived and found powerful friends,” Pip continues (420). “She is living now. She is a lady and very beautiful,” he adds, then capping off this apparent love-based union of father, daughter, and functionally-adoptive son by stating, “And I love her!” (420). Magwitch then raises Pip’s hand “[w]ith a last faint effort,” kisses it, lets it fall to his breast again, and dies (420).

For the invested, empathetic reader, this apparent final, emotional release that Magwitch receives in place of execution actually becomes a false promise that heightens the sense of needless, senseless waste and loss, because no (re-)union between Estella and Pip actually occurs. Because of his debts, his resumed lower-class status, and now his association with a convicted “returner,” Pip leaves England and spends eleven years paying off his debts. He
foregoes any potential union with either Biddy, whom the reader might see as his natural partner, or Estella, whom the reader has been led to believe would provide some recuperation in the novel’s sympathetic economy. Even given the forgiveness which Pip receives from Biddy and Joe, his being lost from England and from a potential middle-class family life that Victorian culture so embraced, along with the pointless sentencing to death and eradicating of Magwitch’s wealth, all show Dickens excoriating the role of social hydrology in the form of NSW transportation. The narrative’s placement within the literal and metaphorical cultural contests between circulation as typified by the tidal Thames and the uni-directional flow that authorities so treasured allows readers to see the unfeeling and culturally unproductive loss that occurs in flow dynamics’ actual, historical deployments. The intensity with which Dickens presents this loss or waste in the novel’s original ending strikes readers so intensely that he is eventually persuaded to lessen the blow in a rewrite for the novel’s volume edition.
SECTION THREE: FLOOD

I move now to two novels set in rural, agricultural England by George Eliot and Thomas Hardy. In *The Mill on the Floss* and *The Return of the Native*, respectively, each author writes at a temporal remove of approximately thirty years from the time of their narratives, situating their works within eras of dramatic cultural shifts there. For Eliot, the late 1850’s granted perspective on changing life in rural Lincolnshire (the model geography for *The Mill on the Floss*) in the early 1830’s, while Hardy set *The Return of the Native*’s version of Dorset, “Wessex,” in the 1840’s as he wrote from the perspective of the 1870’s. These decades bookend a drastic era of changes in agricultural practices and, in turn, rural life, especially featuring new ways of handling water that moved from urban-based flow dynamics paradigms, in the direction traced by this work, into the the agricultural countryside surrounding England’s growing metropolises.

Perspectives on English agriculture, either looking forward from the 1830’s and or backward from 1880, would have included the drainage mania that typified the urbanizing cities’ sanitary movements as it spread to agricultural lands. As Turner, Beckett, and Afton show in *Farm Production in England, 1700-1914*, the “most obvious” change to farming in the early nineteenth century was enclosure. That change contributed to a more or less established system by 1835 of “arable production” that included the second most significant change to farming, which, they say, “took the form of land drainage” (Turner et al 88, 89). They also write that “it was in the 1840s that land drainage became a major concern of agricultural experts,” and though they hesitate to attribute effective rural drainage solely to the “introduction of a substantial scale of manufactured cylindrical pipes” then, I would add that mass production of drainage piping bore a relationship to that flow dynamics-influenced movement whose apex was the 40’s (90-91). By then, Robison’s *Theory of Rivers* had been published for twenty or more years, he
had been nominated to the Royal Guelphic Order of Hanover and knighted by Victoria, and the sanitary movement had adopted his notion of enlivening, surplus-draining flows into its drainage fixation. British historian E. L. Jones also locates this drainage movement in English agriculture generally within the 1840’s and provides evidence for a “metamorphosis amounting to ‘revolution’” in the claylands (like Hardy’s “Wessex”) after the 1850’s, which “resulted from the widespread adoption of improved drainage and expanded use” of newer fertilizers (22-23).

Evidence for the 1840’s to the 1850’s as the main period flow dynamics’ spread into the countryside in the form of systematic, pipe and tile-based drainage and irrigation also comes from Parliament’s actions at the time. The same Robert Peel who famously pushed metropolitan police reform advocated a “general scheme” for improving the competitiveness of English farming in the face of potential Corn Law repeal by reducing production costs (Jones 27). Central in this scheme were “cuts in duties on imported…buckweat (sic), maize, clover seed and oilcake, and” most vitally, “offers of loans for drainage” (Jones 27). This proposal included an initial £2,000,000 for drainage improvements, and after the full establishment of the Lands Improvement Company in 1848, an eventual total of £4,000,000 was lent to enable systematic drainage expansion by 1880. Finally, as a sign of how vital drainage was considered to be then, Jones notes that it was “the only innovation on which tenants customarily paid direct interest to their landlords…only when the drainage actually did bring about” increased productivity as promised—which would have encouraged farmer tenants to take up the venture (30). Further, P. J. Perry’s British Agriculture: 1875-1914 confirms that nineteenth-century “tenant right,” meaning “the right of the tenant farmer to compensation for certain classes of improvement of a lasting…kind,” applied to the creation of “drains,” though legal protection of the custom was only fully guaranteed under Parliamentary Acts in 1883 (177-178).
This apparent period of progress for drainage-dominated, agricultural, rural life ended poorly, however, as wheat prices in England plummeted in 1873 and lead to a legitimate agricultural depression. Though drainage projects made significant impacts on refiguring the English countryside and did arguably add to production, the agricultural collapse of the late-1870’s “showed up the system’s heavy costs for labour, feed, artificials (fertilizers) and drainage,” in Jones’s words (21). By becoming so heavily invested in the costs of what was then seen as indispensable drainage and elaborate systems of irrigation—not to mention international free trade that helped to depress grain prices—the economics of farming had changed for the much more difficult, despite what the view from the 1830’s or 40’s might have imagined. Like the mid to late-century Thames that suffered the effects of the 1830’s and 40’s sanitary movement, a supposed “golden age” of farming, bound up with its own version of flow dynamics-based interventions, had come and gone in rural England by 1873.

Within this context, Eliot and Hardy both create novels in which the spread of flow dynamics-based topographical thinking has fully permeated systems of cultural management as well. In each case, hydrologically-oriented infrastructure within the fictional topography has a relationship to the applications of flow management principles to individuals’ mental and emotional activities and interpersonal relations. For Eliot, the catastrophic flood that ends The Mill on the Floss makes up part of the novel’s exploration of systematized manipulation of individuals’ intellectual activity in light of the socioeconomic ramifications of contests over the authority to manage watersheds. Hardy’s own, subsequent, deadly flood in The Return of the Native stages the cataclysm that ends that work’s critique of a homologous system for managing topography and desire, alike, in Egdon Heath.
CHAPTER FOUR: “water’s water”: Hydrological Management and the Insurgent Mind in Eliot’s The Mill on the Floss

Introduction

Of the many recent interpretations of George Eliot’s The Mill on the Floss, only Jordan Brower’s article, “The Mill on the Floss, Riparian Law, and the Difficulty of Judgment,” addresses Mr. Tulliver’s central, repeated claim that “water’s water,” which would seem necessary for any reading involving the titular river or the novel’s climactic flood. As I will show, the thinking conveyed in this phrase and the ways Eliot’s narrative refutes that thinking lie at the heart of a simultaneous investigation of social and topographical systems of management that share common, hydrologically-conceived criteria, in a way that Brower begins to contextualize but which my focus on the era’s flow dynamics will more fully explicate (18). While water may be water, the “water-power” Tulliver covets both is and is not simply water. His mill’s structural intervention into the flowing Ripple makes “water-power,” and it does so within a historical moment of tension between long-established and as-yet unconsolidated fields of law regarding water-related practices, alongside conflicts surrounding traditional agricultural and economic land and water management that appear outdated—lacking “method” in Wakem’s words—to newer landowners like Pivart (even without regard to the specter of steam power in the novel). Adding to this already complex set of relations, Eliot consistently places the novel’s simultaneous investigation of social methods for blocking and/or productively diverting individuals’ intellectual and emotional activity within a hydrological linguistic register. This

150 Brower’s premise: “However, if I may expand the aegis of the term ‘object,’ there is such a thing in The Mill on the Floss that is mentioned both frequently and, as will become clear, at the most crucial moment in the novel. The text grants this thing several symbolic meanings, none of which predominate, but, because of this thing’s simplicity and ubiquity, the text only obliquely acknowledges this thing’s “objectness”—its existence as a discrete physical thing in the world. This thing is water” (214).
combination forces an interpretation of the economic and legal problematics surrounding the harnessing of the Floss and the Ripple for milling and irrigation also to account for hydrological management’s role in the social shaping of intellectual and emotional activity that Eliot depicts as physiological flows.

1. Mr. Tulliver’s Case: The Ownership and Management of Water-as-Power

In point of fact, “water” is not even what Tulliver actually wants, and neither is “a river.” What he desires control over and what he depends upon economically is their combination in the form of an ideally imagined, dynamic and well-managed flow as object-cum-motion. Despite repeating his simple maxim, Tulliver himself allows that its simplicity can become strikingly abstract and complicated in practice, while acknowledging also that his true interest is not actually water but “water-power.” Contained inside the difference between “water” and “water-power”—or the structures and methods of obtaining the latter from the former—are systemic complications. As seen in the centuries of political fighting over the local versus systemic uses of a flowing river in this work’s introduction, no “local” use of a watercourse ever can be truly isolated from the whole. Each diversion, blockage, or other minor “diminishment” of a river affects its navigability, volume, and flow rate in time and space across its entire course. The flowing of pertinent streams and rivers is the material that must be managed, just as and despite that that material almost never naturally exists in a static, non-flowing, non-dissipating state that can be addressed or handled as if quantifiable in units (the material is the motion that must be managed, or, equally, the motion is the material). The ability to use such material-cum-motion as power depends on the partial and controlled prevention of this movement—on the damming of flow that creates potential and subsequently directed, kinetic energy from otherwise naturally
dissipating, gravity and topography-directed movement. The “power” and the “water” cannot be addressed as mutually exclusive, but the energy that “power” denotes does depend on quantity and motion for its existence, so that without the material, any discussion of power or energy would be moot. This last point instigates Tulliver’s successive fears about the “lowering” of the water on which his economic life depends and tendency to litigate based on them.\footnote{In her chapter, “Psychic Forces: Steam, Water, and Mechanical Perception in \textit{The Mill on the Floss},” Ketabgian calls Tulliver’s “claim to own waterpower…a convenient fiction,” even from the perspective of emerging thermodynamic science in the time of Eliot’s writing (she documents Eliot’s study of such emerging science via reading and attending lectures) (118). As Ketabgian says, Helmholtz was already suggesting at the time that, “once we grasp the full extent of energy conservation, claiming possession of this force is akin to claiming that of all other natural forces,” a claim that certainly would be fallacious in general, and which Eliot’s use of the flood utterly obliterates (qtd in Ketabgian 118). Even in the Robison-esque roots of \textit{flow dynamics}, the power that Tulliver utilizes never belongs to him; he might simply attempt to render it as forceful, contained, and efficiently utilized as possible.}

The difficulty that Tulliver’s suit faces in challenging the “dykes and erigations” Pivart wishes to build above Dorlcote Mill inhere in these complications. It also exists within the context of the ways that hydrological advances in managing watercourses which Robison had called for, while they did spur widespread construction of irrigation systems, did not provide clear methods for quantifying energy in standard terms, let alone for describing its equitable use by various parties.\footnote{Brower shows the historical movement in English court that establishes precedent for this setting down water as a legally, economically divisible kind of object.} (And all of this disregards the complicating factor of the Floss’s tidal movements, which Eliot largely ignores outside of the opening scenes and closing chapters.) Without a standardized means for describing such power, then, the traditional riparian codes—legal precedents governing riverbanks and water access and rights that far predated any thermodynamically or hydrodynamically-informed understandings of fluid motion—could hardly be expected adequately allocate rights to river access for diversionary irrigation features like those Pivart proposes upstream of Tulliver’s traditional dam and mill-race. The fact that
Dorlcote Mill’s mill-race is still “rushing” and its dam “roaring” when Tom retakes control of it, well after Pivart’s legal victory and Jetsome’s tenure as its drunken overseer, ironically suggest that the legal fight had never been necessary and that Tulliver’s personal hydraulics had utterly misjudged what Pivart’s “dykes and erigations” would produce (502, 503).

What takes precedence in The Mill on the Floss, then, is not just flowing water as a power source applied to by various parties with incompatible, incomplete understandings of its nature and ability to be owned and used for their purposes. Precedence instead lies in the contested basis of what political, economic, or traditionally-empowered parties could make determinations about rights to direct flowing water’s systemic management. This contest then also bears directly on Eliot’s figurative linguistic conceptions of intellectual activity, perception,

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153 Archer, Marggraf Turley, and Thomas and Brower provide helpful evidence of the historical moment of legal contestation into which Eliot placed The Mill on the Floss—from the writing perspective of the late 1850’s looking back on the 1820’s and 30’s. The two sides of this legal contest were traditional riparian law (under which Tulliver’s mill would have traditionally been protected) and some necessary but still-unsettled set of legal precedents for arbitrating over water in ways that new hydrological science and industrial technology had made accessible. Archer, Marggraf Turley, and Thomas outline the history of riparian law arbitration at sites that Eliot visited, like Arbury Mill in Chilvers Coton (711). What awareness of this traditional set of legal precedents would have shown Eliot, they argue, was that “Riparian doctrine could only adjudicate conflicts of interest created by the known quantities and effects of established technologies, such as dams, watermills, and canals. Tulliver vs. Wakem concerns the long-term impact on land of recent technological advances in irrigation. There were no legal precedents for such a dispute, and the science of hydrography was in its infancy” (711).

Brower also outlines multiple water-rights cases which Eliot may have had awareness of, including one intriguing suit from an individual against a local Board of Health that was heard in the House of Lords during the writing of The Mill on the Floss in 1859. The individual, Chasemore, sued the Croydon Board of Health, which had been tasked with providing safe water supply to the town of Croydon. That Board had been extracting subterranean water via a well operated by steam power about a quarter of a mile from the river Wandle, which Chasemore’s mill sat upon and utilized (Brower 223–4). The well extracted “some 500,000 to 600,000 gallons daily” and noticeably reduced the river’s strength, prompting Chasemore to sue. Eventually, after six years, the Honorable Judge Chelmsford delivered a unanimous judgment in favor of the Croydon Board of Health, on the grounds that riparian doctrine did not apply to such subterranean waters and, most specifically, because the bounds of “water percolating through underground strata, which has no certain course, no defined limits, but which oozes through the soil in every direction” (qtd in Brower 224) constituted an entirely different object than a “clearly defined flowing stream” (Brower 224).
and even emotion as physiologically-initiated flows whose social management converge with the contested rights to manage literal watersheds in the novel’s climactic flood.

The novel begins in earnest with Mr. Tulliver’s pronunciations about his wishes for Tom’s education. This “eddication” should on one hand “be a bread to him,” an image in which schooling transforms into the same product into which Dorlcote Mill’s product—flour—can be made. On the other hand, Tulliver’s motivations involve a simultaneous selfishness and self-consciousness, because this hypothetical “eddication” will not only feed Tom into the foreseeable future. It will also place him at an impossible, though ideal, socioeconomic nexus from which he will be ready to gainsay unjust attempts to use the Ripple’s water in ways that Mr. Tulliver believes he can recognize but cannot effectively contradict in court (11). Tom will do this by becoming “a bit of a scholard” who can recognize falsity in smooth rhetoric and return it in kind, without becoming fully a “raskill” lawyer by learning the practical expertise of “a sort o’ engineer, or a surveyor,” or “vallyer” (11). In other words, Tom will be educated to become not someone who might take over the mill from his father, as Jules Law and others have pointed out, but someone who can speak with authority on the legal and practical aspects of managing the Floss and its surrounding watershed and skillfully defend the family’s rights to “water-power” access when need be.

Key in Mr. Tulliver’s unrealistic expectations for this education are his assertions about the skill Tom will gain in practical land and water management expertise. In Mr. Tulliver’s

154 Also early in the novel, in Chapter 4, the narrator describes how the young Maggie enjoys observing the mill at work, in which the product “pours” as if in unlimited quantity in a way that interacts with the economics of millwork during the historical, as I will show later: “Maggie loved to linger in the great spaces of the mill, and often came out with her black hair powdered to a soft whiteness that made her dark eyes flash out with new fire. The resolute din, the unresting motion of the great stones giving her a dim delicious awe as at the presence of an uncontrollable force, the meal for ever pouring, pouring” (32). This making of the mill’s meal into a metaphorical, uncontrollable, forcefully flowing liquid
vision, Tom will understand all, or some mix of, the fields of (presumably civil) engineering, surveying, and “vallying.” The OED lists the verb, “to valley,” a now almost obsolete term, as bearing both intransitive and transitive meanings in the middle of the nineteenth century. In an intransitive sense, to “valley” meant to “form a hollow or hollows resembling a valley,” and the transitive form, which would entail the work of a “vallyer,” meant to “make valleys in,” or “to furrow” some piece of land (OED “valley”). Thus, a “vallyer” would have been someone who directed, in a traditional sense, the digging and reinforcement of surface features for directing surface water for drainage or, particularly, irrigation purposes. Such tradesman, in Tulliver’s thinking, could define, delimit, and manage the topography like surveyors and civil engineers do. On the other hand, Eliot uses the verb “vallying” in *Adam Bede* to indicate an active negotiating of the value of some property, which would cohere with the word “vallyer” here if it constitutes an accented pronunciation of “valuer,” or appraiser.155

The kinds of work that Tom might do in his father’s inchoate dreams constitute, on one hand, practical, experience-based forms of work (the “surveying,” and potentially “vallying,” he envisions resembles what was called “hydraulics” in traditional mill-weir, dam, and mill-race management). But if he is to be something like a civil engineer, that pursuit would entail education in technical fields that were advancing into fuller, academically-informed sets of mathematic and energetic sciences at the time (like what was mostly called “hydrodynamics” and would increasingly be seen as necessary for designing and building irrigation systems or building a new mill with advanced technology like possible steam-power assistance).156 In any case, Tulliver wants Tom to be qualified to make concrete structural interventions, proprietary

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155 This image also directly resembles the kind of man *Adam Bede*’s eponymous protagonist looks up to, who knows how to build canals, mills, and engines.

156 See Olivier Darrigol’s *Worlds of Flow* for a fuller explanation of the distinction between these fields.
delineations, and economic valuations into the Dorlcote landscape and on the water (and “water-
power”) that flows through it, as well as being capable of defending such definitions and actions in courts of law. His education will prepare him to seize and/or defend their right to manage the Ripple well beyond the site of Dorlcote Mill, in any way perceived to affect it by Mr. Tulliver.

2. Intellectual Activity as Physiological Flow, and Management by Metaphor

Eliot immediately flouts this educational dream of Mr. Tulliver’s, which involves Tom at the exclusion of Maggie and initiates the relationship between figurative and literal visions of flow management in *The Mill on the Floss*. In the first instance, Eliot draws attention to the making of metaphors which subsequently steer educational as well as social behavior by attempting to give standard form to the “mind” and its activity. She treats this topic like an experiment for observing what might result from the embracing of a metaphorical concept in practices that transform the abstraction of metaphor into concrete, cause-and-effect phenomena. This metaphorical approach to education bears onto the physiological as well in this case, thanks to Eliot’s materialist view that thought and emotion emerge as flows, currents, or streams from and within all the component parts of the body, as in her partner, G. H. Lewes’ *The Physiology of Common Life*.

Lewes wrote *Physiology* concurrently to Eliot’s writing of *The Mill on the Floss*, and the two works appeared in the same year (1859). In *Physiology*, Lewes explicates literal, material “streams” of lymph or blood, along with “flows” of materials like “gastric juice” and saliva through vessels, organs, and systems. To that, though, he deploys the same imagery—especially “streams”—in ways more abstract or figurative, to illustrate phenomena that do occur but less obviously, as in his description of the prioritizing action of the nervous system. The nervous
system, he writes, is a “centre or fountain of influence” in which “we may detect three streams in which the influence flows:” a “nutritive stream, a locomotive stream, and a sensitive stream” (22, emphasis mine). The nervous system in Lewes’ thinking (as a complex of physiological structures) functions like a set of weir-sluices or races which respond to the demands put on the body by its conscious direction toward activity. Like the limited, given quantity of water which hydrodynamicists, hydraulicists, or water-driven mill owners must utilize through the direction in a zero-sum system, the human nervous system according to Lewes can only direct a given quantity of the liquid-like substance over which it has “influence.” This means that, “[i]f the demand from the nutritive stream be large, the supply to the sensitive and locomotive streams will be proportionately reduced,” for example (in the way that Tulliver assumes Pivart’s irrigation diversions will “lower” his water supply) (Lewes 22). In this conception, then, something like the “violent and protracted exercise” of “the habitually trained athlete” makes him into “nearly an idiot” through its diversion of nervous system “streams” into the “locomotive” and away from the “sensitive”—just as it does for the “over-eater” whose other streams’ material must be diverted into the “nutritive” (22-23).157 The nervous system works, then, not to create or expend the material flows of its action, but to manage them systemically through its diversion into one, two, or three channels in proportion to what is demanded.

Finally, and most importantly for The Mill on the Floss and its interest in the systemic training and management of minds and their flows of intellectual activity, Lewes considers conscious attention also as a kind of nervous system material that resembles liquid and moves in

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157 The Physiology of Common Life features 49 uses of the word “stream” and 47 of the word “flow” across its several hundred pages, for some sense of how fully hydrological language permeates the work. Interestingly, Lewes is quoted in the OED’s current definition of the word “insurgent,” under its primary meaning as an adjective (“Rising in active revolt. Also fig.”). The example comes from Lewes’ The History of Philosophy from Thales to Comte (1867) which describes the “insurgent mind” of one thinker.
“flows” or “streams.” For Lewes, conscious thought or attention, as opposed to distraction or “unperceived sensations” that do not garner conscious attention, is created via the mutual communication of individual parts of the entire body that may contribute to a conscious direction of attention (64). In this complete view, attention emerges as the direction of “a massive and diffusive sensation arising from the organic processes” that people mostly do not consciously notice until their attention to it reveals it as “a vast and powerful stream of sensation, belonging to none of the special Senses, but to the System as a whole” (68, emphasis mine). Thus, this mental material’s “diffusive” state—dispersed, at equilibrium, and lacking momentum, in hydrodynamic terms—corresponds to the unnoticed, inattentive state of mind, differing from the “powerful stream” that signifies well-channelled, physically forceful flow, and in the intellectual connotations of this discussion, consciously managed by someone and directed toward a particular purpose.

This concept of thought, attention, and perception as emerging diffusely, through the body’s “system as a whole,” comes under strain in the context of the education Mr. Tulliver submits his son to under the tutelage of Mr. Selling, whose penchant for “harrowing” and “ploughing” his students’ minds into engraved, channelled shapes of thought does not fit well with a Lewes-influenced, materialist version of the mind. In her chapter, “Psychic Forces: Steam, Water, and Mechanical Perception in The Mill on the Floss,” Tamara Ketabgian argues that the novel “views the psyche both as a mechanical site under pressure and as located in a coordinated network of abstract, interdependent forces and relations” (108). Ketabgian thus also

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158 Lewes writes: “…we have as many different forms of consciousness as we have different kinds of sensation. While some of these confluent streams are so slight that they are no more appreciable than are the stars at noonday, others are so equable and constant, that they attract no attention unless their currents are disturbed” (69, emphasis mine). In Adam Bede, Eliot’s narrator interjects in one instance: “Yes! thank God; human feeling is like the mighty rivers that bless the earth,” apparently extending Lewes’ image of the nervous system’s activity to include emotion as well (162, emphasis mine).
reads an interaction between the literal and the metaphorical within the novel’s exploration of how to identify and handle the mind and its activity (while mapping her own metaphor of the machine onto the psyche). She rightly gives attention to the relationship between a “pressure” on the shaping and/or steering of the mind’s action and the more abstract, wide-ranging “forces and relations” of cultural shaping of gender and socioeconomic relations. I would add that the complexity that betrays the mantra, “water’s water,” lies at the heart of this mechanical concreteness that pairs with “coordinated,” “abstract,” and “interdependent forces” because of the way Eliot sets systems for controlling, directing, and making use of natural hydrological movement alongside those cultural systems that attempt to do the same with hydrologically-depicted intellectual activity or movement.

The meeting of hydrological management on a topographical level and the attempt to manage intellectual activity comes into relief once Stelling finds Tom’s mind unamenable to his standard method of “instruction” and deploys the metaphor of inadequately arable land to treat it. Because education takes the leading role in this experimentation with the management of the mind in the opening chapters of *The Mill on the Floss*, the narrator’s lampooning of Mr. Stelling’s methods constitutes a telling criticism in the novel’s central concern about social systems for managing intellectual activity along accepted channels. Stelling’s self-awareness and intellectual flexibility are introduced as analogous to that of “Binny the beaver” from William Roderip’s 1852 *Leaves from the Note Book of a Naturalist* who built a dam out of household materials in an upstairs London apartment, because it was his “function to build” regardless of context (*Mill* 145). “With the same unerring instinct,” Eliot’s narrator says, Stelling hammers away with his standard teaching approach—without attention to the tendencies, talents, or desired future vocation of a given pupil (145). Hence comes “his natural method” of drilling
pupils in the Eton Grammar and Euclid before allowing them to move on to any other subjects, a standard course of education the he denotes the “only right way” to educate young men to be more than “smatterers,” as “all other means of education” do, in Stelling’s opinion (145-146).

As quickly as Tom begins, though, Stelling dismisses him “as a thoroughly stupid lad” (146). Because Latin grammar cannot find “lodgment” in his “brain,” Stelling concludes that it is, therefore, “peculiarly in need of being ploughed and harrowed” by the “patent implements” of etymology and “demonstrations” (146, emphasis mine). Conceptually, Tom’s mind has become a difficult piece of land in need of unceasing plowing and tilling—though, perhaps tellingly, given the historical trends I have shown and the coming conflict over Pivart’s irrigation plans in the novel, not to be irrigated or drained metaphorically. Nonetheless, if successful, these preparations would allow Tom’s mind to accept “any subsequent crop” of educational content (146).159

Eliot highlights this pedagogical metaphor for the mind as such (as Stelling’s “favourite metaphor”), interjecting overtly into a consideration of its deployment (146). Moreover, she asks her readers to consider what it means for a linguistic metaphor to be placed upon a human mind, and to be deployed in the conscious development of human intellectual functioning—with the frightening context in this case that this single metaphor controls the only possible course of such development. “I say nothing against Mr Stelling’s theory,” she ironically asserts, because, “if we are to have one regimen for all minds his seems to me as good as any other” (146, emphasis mine). Eliot clearly connects the teacher’s “favourite metaphor” to the nature of his education as

159 Later, in conversation with Maggie, Philip describes his own “mind” and/or its “nature” in similar terms: “I think of too many things—sow all sorts of seeds, and get no great harvest from any one of them. I’m cursed with susceptibility in every direction, and effective faculty in none” (339).
controlling, channelling action, in opposition to any expansive, exploratory, let alone liberating, action that might result from a different approach to education.

The metaphor becomes concrete in this way, despite its utterly arbitrary origin. Eliot emphasizes this, too, in her narrator’s exaggerated wonder over the “astonishing” difference of models for educational practices “one gets by changing the metaphor” for the mind (146). If, instead of referring to it as a parcel of arable land, calling “the brain an intellectual stomach” renders the image of “classics and geometry as ploughs and harrows” useless as a model for pedagogical praxis (146). Eliot clearly enjoys pointing out this arbitrariness, as she includes another pair of images that one could just as easily (or, perhaps, more easily) attach to the handing of intellectual development: the “mind” as “a sheet of white paper or a mirror,” both of which make “one’s knowledge of the digestive process…quite irrelevant” (146).¹⁶⁰

Considering Eliot’s panning of Stelling’s educational approach, the fact that her partner’s contemporary work in physiology conceptualizes the work of the nervous system—especially conscious mental attention—as “streams” which may flow spontaneously, with power when focused from confluent sources all over the individual body, encourages us to read The Mill on the Floss as engaged in a critique of such sweeping, systemic schemes for managing intellectual activity. Furthermore, as Jules Law notes and I will more fully explore directly, this critique exists within a pervasive fabric of imagery which sets down intense thoughts and sometimes “feeling,” along with behaviors they suggest, as forces constrained by and within certain

¹⁶⁰ Archer, Marggraf Turley, and Thomas note this same metaphor as well, noting that the words “‘plough,’ ‘harrow,’ ‘culture,’ and ‘crop’ have meaning only in so far as they are metaphors for the process of learning,” in this case, despite that, “[a]s Mr. Glegg points out, this education will not include knowledge of the worked land” (707). In other words, the metaphorical action here completely fails to match the concrete results of the education that Mr. Tulliver desires. They further, and quite importantly, point out that this scheme for Tom’s education began with the “sliding signification” of “bread” as economic usefulness resulting from education—rather than indicating “the material substance produced by the combined work of a farmer, miller, and baker” (Archer et al 708).
“channels” of social expectation or structures of enforcing them.\textsuperscript{161} Moving from Tom’s education to this larger contestation, then, we must bear in mind Eliot’s investment in the function of linguistic metaphors in establishing and steering concrete aspects of relations between characters, particularly in the context of education as training of the “mind.”\textsuperscript{162} At the same time, we must also bear in mind the establishment of Eliot’s own metaphorical register for depicting intellectual activity as a hydrodynamic phenomenon, because this metaphorical register creates the complex relationship between the novel’s questions about the standardizing, systemic management of both intellectual activity and of water’s movement through its fictional topography. The obvious mismatches of the individual student’s actual intellectual strengths, as well as to the desired outcomes of that education in terms of what trades or professions he will be able to take up afterwards, to the materials and methods of his teacher cap off this critique. Moreover, given the origins of Tom’s education in Mr. Tulliver’s desire to consolidate his rights to oversee the Ripple broadly out of interest in his own mill, the failure of Tom’s education through an overly systematized, stifling management of intellectual development constitutes another loss of ownership for Tulliver over water-as-power.

3. The Harrowing of Mental Character and Blockage of Mental Flows Charge a Head

I will not recount the nature of Tom’s failures within this period of education, which others have discussed at length.\textsuperscript{163} However, Eliot’s description this failed education does


\textsuperscript{162} Lewes also notes “an unfortunate equivocation in language” that makes the discussion of his concepts of inattention, as “unperceived sensations,” as he searches for language to describe the alternation of mental state between attention and inattention to sensations that exist within the body regardless of either state (64). He posits the phrase “unperceived sensations” for this case (64).

\textsuperscript{163} See, for example, Linda K. Robertson’s \textit{The Power of Knowledge: George Eliot and Education}. 
warrant attention, because it consistently involves two disparate registers of description whose combination I will show to be vital to understanding *The Mill on the Floss*. The first of these is the sustained investigation “mind’s” work as both relating to a character’s “nature.” The second is the liquid register that becomes central in the novel as the intelligence and curiosity of Maggie draw increasing social condemnation and make her more distinctly different from her brother.

To begin, this liquid register features both the natural action of Tom’s mind and that which it displays under Stelling’s tutelage. As an adherent of the concept that a non-material “mind” comes as a function of the material “brain,” Eliot’s use of both terms in the passage describing Stelling’s arbitrary, metaphorical images of them as external, manmade objects which all would evoke different treatments for their best cultivation imply Ketabgian’s reading that the human psyche in *The Mill* constitutes “a mechanical site under pressure…as located in a coordinated network of abstract, interdependent forces and relations” (108). Nonetheless, the method and direction of education which cannot benefit Tom nonetheless “[goes] on with mill-like monotonility” despite “his mind continuing to move with a slow, half-stifled pulse in a medium of uninteresting or unintelligible ideas (*Mill* 196). Where the action of his mind “pulses” as blood through the body—though slowly and without productive force in this case—the pedagogical practices (modeled on a mill that would use the flowing of a stream or river as its own driving force) simply grinds on as ever. That his thoughts’ motion is described via a metaphor of liquid that includes an evaluation of that liquid’s movement immediately calls up the kind of watercourse supervision that I have shown influencing social practices from the first deployments of flow dynamics throughout the nineteenth century.

Also, when Ketabgian sees the novel’s early focus on Dorlcote Mill and its central, driving wheel as establishing a relationship between the “deploy[ment] of abstract force as a
central structuring feature of human feeling and experience,” meaning that the mill “does not
treat water as a substance so much as an impenetrable abstraction—‘water power’” (116), the
“mill-like monotony” of Tom’s so-called education likewise addresses itself not to his
physiological, intellectual development but to the same “difficulty of imagining abstract force”
and “presence of greater ‘uncontrollable’ forces in both individuals and the world around them”
in the novel (116). Stelling’s education, as part of a system for managing the direction and
output of mental, intellectual activity, would render all of this abstract, potentially uncontrollable
force visible, standardized, predictable, and controllable. Capturing this nexus of interdependent
forces and relations that address themselves to the mind (or “brain”) is Tulliver’s premise that—
if Tom’s mind can be adequately, fruitfully “ploughed” and “harrowed” (or “vallyed” in the
agricultural sense of that word), Tulliver wishes it will be so that Tom can apply the non-
metaphorical denotations of those verbs to manage and protect the value and productivity of the
the family’s land and moving water.

The question that emerges within this context is how, and why, Eliot also simultaneously
explores the inverse problem—that of imagining apparently non-corporal human intellectual and
emotional activity as material, liquid substance? We might then ask how the disparity between
outdated mill operation and flow dynamics-aligned, systemic, enclosed, drainage and irrigation
interventions at this particular moment colors the answers to the above questions. As a
ramification of understanding the novel as functioning like a steam engine, Ketabgian posits that
“The Mill reveals the industrial origins not only of Victorian objectivity but also of our most
recent notions of abstract, postsubjective affect—affect envisioned as a dynamic flow of human
intensity” (111, emphasis mine). She goes on to argue, “[w]hether in the depths of the boiler or
the currents of the millstream,” The Mill on the Floss “explores a modern intensification of
perception and sensation that suffused Britain’s greater industrial project—a project fueled by powerful constraint, release, and “collision” (The Mill 394)” (111). Ketabgian has an investment in showing that the steam engine metaphorically serves as a model for the thermodynamics (my term) of the novel’s narrative functioning. This seems an unnecessary complication of an otherwise fruitful reading, and it is one that, just as with Stelling inside the narrative, seeks for a controlling metaphor as organizing principle. Nonetheless, Ketabgian makes a convincing case for part of what I also would posit, that Eliot writes her characters’ intellectual and sometimes their emotional activity as most naturally occurring in the form of liquid flows which are then subjected to forms of cultural manipulation and control.

These flows, however, as in Lewes’s Physiology, are inherent to human physiology. They exist within the corporeal components, the very tissues, of the body’s mutually communicating, total system. The “nonhuman” element of the contestation between such flows and the “constraint,” “release,” and “collision” of them that Ketabgian says occur in the novel, then, are the forces and/or structures which are implemented to constrain and channel them in an effort to manage economic production and benefit and maintain the socioeconomic status quo (especially the established gender hierarchy). That is to say, the structures which enforce the social expectations regarding the flow—which are human creations—take the role of the “nonhuman” if we are to accept Ketabgian’s reading. I submit that, regardless of their existence as “nonhuman,” such features—like the channelling of Tom’s mismatched intellectual qualities in Stelling’s education and Maggie’s considerable intellectual potential being channelled away from any education at all, which contributes to her increasingly rebellious behavior—exist within the culturally pervasive tenets of flow dynamics. Its hydrological criteria establish the mutually-functioning systems for managing intellectual and emotional flows as much as those that inform
Pivart’s new irrigation system. Within such a system of cultural, structural management, the individual’s “mind” as the center of her intellectual and emotional flows becomes hard to pin down in isolation, and remains difficult to control across a complicated, human ecosystem in which variation is the norm and the not exception, all of which produces a new, if not skewed, version of that physiology-bound mind over time.

This dynamic relationship between the individual mind and the system to created to address its manageability actually was already introduced in Tulliver’s initial invocation of “water was water,” which he tacks to the codicil, “if everybody was what they should be” (17). The statement and its codicil both hide immense complexities and biases, while uniting claims of authority to oversee the management of either, or their combination. In this way, Eliot establishes from the beginning a connection between contested claims over rights to the systemic watershed management and its counterpart in the management of people via the shaping, steering, blockage, and/or diversion of their intellectual activity and emotional expression. Both of these aspects of attempted, systematic blockage and channelling toward particular socioeconomic ends result in destructive floods. Both also simultaneously confirm that Mr. Tulliver no longer understands how to navigate an historical era when his home and livelihood are soon to be erased by capital investment-based, systematic improvements like those made by the newly arrived Pivart (recalling Peel’s loans-for-pipes scheme) with his lack of farming experience, and Wakem, a lawyer who scorns Tulliver’s lack of modern agricultural “method.”

Thus, in *The Mill on the Floss*, the action of the mind (which is an extension of the physical body and “brain”) constitutes a flowing phenomenon, which exists within a socioeconomic system that seeks to manage *all* flows that might contribute to economic production or social formation. Such managerial practices do, in fact, produce concrete results in
the subsequent actions of Tom’s and Maggie’s respective “minds” that lead to the novel’s final crisis. Without recapitulating extant readings of Maggie’s exclusion from formal educational opportunities that match her intellectual potential, I posit that Eliot’s imagery in describing that stifling—as with that of Tom’s failed education—reveals its hydrological nature, showing the novel to be an exploration of possible outcomes of hydrology-based topographical and cultural management.

As far back as Bernard Paris’s *Experiments in Life: George Eliot’s Quest for Values*, critics have noted that Eliot deliberately considered her early writing “a set of experiments” designed as “an endeavor to see what our thought and emotion may be capable of” (qtd in Paris 117).164 Paris links these stated aims to “the cosmology of positivism” that sees all phenomena as subject to “the law of causation” and views society as an organism, along the lines of John Stuart Mill’s thinking, in which “[t]he state of every part of the social whole at any time, is intimately connected with the contemporaneous state of all the others” (Mill qtd in Paris 27).165 Such a reading establishes an important understanding that Eliot’s “experiments” involved highly complicated relations between fields of scientific knowledge, fine arts, “the industrial arts,” economics, and humanistic fields of knowledge in a way that resembles Lewes’s conception of the mutual function of all parts of the body systems—both of which emphasize the real-time causative influence of related but distinct entities and actions (Mill qtd in Paris 17). However, this and subsequent readings neglect in an telling way that Eliot’s consideration of “what our thought and motion may be capable of” comes with the appositive phrase, “what stores of motive”—a phrase that invokes an energetic context, and one that takes the form of hydrological

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164 Eliot wrote this in an 1876 letter to Dr. Joseph Frank Payne (Paris 116).

165 From Mill’s *Auguste Comte and Positivism*. 
management in *The Mill on the Floss*. Eliot gives such an experiment in human thought and emotion, therefore, the form of the struggle to manage water’s flowing, damming, and use as an energy source, as emphasized by the legal battles over ownership of such use.⁶⁶⁶

In the collisions between the Tulliver siblings’ physiologically-predisposed “minds” or “natures” and the deliberate treatment of them from their youth onward, along with the environmental happenstances of their lives, Eliot presents the natural, physiologically-based variations in kinds of intelligence and its expression. Then she demonstrates the effects of a socially based, systemic attempt at the management of intellectual activity, as flows, on those natures. Eliot’s novel does not imagine the interactions between these two simply as Mill’s organic model of society, but she fully immerses them in the language of physiological and hydrological flows, in which—like an upstream mill-weir’s effect on the Ripple—the nature of the individual cannot be separated from the structures and practices of management that intervene upon the system within which it exists.

Prior readings of Tom’s and Maggie’s differing intellectual natures have not appreciated the linkage Eliot builds between attempts to “channel” them. On one hand, Tom’s thinking, motivation, and courses of action become increasingly “narrow,” “channelled” ever more clearly, as the novel moves forward—in part in imitation of that of his father, as Law notes. In contrast, Maggie displays increasing resistance to the “submission” Tom wants from her, the expansiveness of her ever more culturally threatening interests, both intellectual and romantic, and the deviance from cultural courses that they produce. Her intellectual activity, which flows naturally, spontaneously, and along with bursts of imagination and memory, is dammed up consistently throughout the novel to the point that it eventually ruptures beyond accepted

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⁶⁶⁶ This distinctly does not resemble the process of producing and utilizing steam power, which relies in first part on combustion and chemical conversion, rather than on the direction of kinetic energy.
channels (the “elopement” down the river constituting such an “outburst” in a social sense, prior to flood in the Floss watershed that kills her and Tom and destroys the mill). The clear differences between their initial interests and intellectual talents do nothing to counteract their fast bond in childhood, when their days mostly revolve around activities done together. Only by late adolescence and young adulthood, as the misguided attempts to develop or stifle those interests and talents have begun to take effect, do we see the tension and eventual breaking off of contact between the two siblings.

This pattern of divergence emerges first when Maggie appears at the Stellings’ to announce their father’s legal loss and resulting health problems. In this moment, as is typical throughout the novel, the nature of Maggie’s speech reflects the nature of her mental activity. As she explains the situation, Maggie feels “urged to fuller speech by Tom’s freedom from apprehension,” which increases the intensity of the disastrous consequences she (accurately) imagines for the family (198). She speaks “loudly and rapidly, as if the words would burst from her” (198, emphasis in bold mine). Eliot connects the differing natures of their minds—Maggie’s ability to accurately imagine the complex consequences to come in the future from this momentary occurrence, paired with the rigid, uncreative mental activity encouraged by Stelling’s

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167 Maggie, even as a young child, is the only character adept at identifying such tautological thinking, a sign of the way her intellectual activity will not submit (readily, easily, or without trouble) to such management. As early as Mr. Riley’s first visit to the Tullivers in the novel, Maggie recognizes the tautology within one of the stories she recounts to Riley. There a woman is tested for being a witch by being thrown in the river—with the stakes being that, if she swims, then she is a witch and will be killed; whereas, if she drowns, then she is not a witch but is dead all the same. Just after this, Riley discourages her from reading the “History of the Devil” because of the presence of the devil throughout the work, but applauds her for reading Pilgrim’s Progress. To this she responds, “Well, but there’s a great deal about the devil in that,” clearly understanding that Riley’s logic fails and sensing that the real problem is a fear of certain depictions of the devil not condoned or designed by a specific religious or moral authority (20). Riley’s response to her intelligence, tellingly, is that “the child ‘ull learn more mischief nor (meaning, ‘than’) good wi’ the books”—giving Maggie a “sense of disgrace” (22).
fruitless plowing of his mind—to how they do or do not speak in this moment. While Maggie has been indulging readings and discussions with Phillip that encourage her expansive intelligence and interest, Tom, despite having moved through puberty and toward adulthood (as the “down” on his lip makes clear), has only “thoughts and expectations” that exist as “the reproduction in changed forms of the boyish dreams which he had lived three years ago” (198). Maggie’s assumption that their father will lose the mill, the land, and their home disrupts this lifeless, undeveloped set of expectations and “awaken[s]” him “with a violent shock” (199). Because he does not possess the clarity of imaginative insight that she does, “[a]nxiety about the future had never entered Tom’s mind” regarding the case or Dorlcote Mill (198). Eliot emphasizes their minds’ recent treatment in this scene’s closing, which foreshadows their impending death. Her narrator states, “[t]he two poor things clung closer to each other—both trembling—the one at an unshapen fear, the other at the image of a terrible certainty” (200, emphasis mine). In the way their minds can or cannot lend particular objective shape to expectations, fears, and the complicated set of socioeconomic realities that result from Tulliver’s

168 Speech functions throughout the novel to exemplify characters’ intellectual strengths and weaknesses, particularly during Tom’s and Maggie’s youth, and even more persistently as an expression of mental activity in particular moments. Within the latter, Maggie most often “bursts out” with speech, reflecting her mental (including emotional) activity’s difficulty remaining within the bounds of conscious control.

169 Eliot’s narrator also repeatedly depicts Tom’s changing nature as a result of Stelling’s failed plowing and tilling of his mind as a kind of failure to age into manhood. He has explicitly become more “girl-like” through this education: “Tom, as I said, had never been so much like a girl in his life before, and at the epoch of irregular verbs his spirit was further depressed by a new means of mental development,” which is occasionally babysitting the Stellings’ daughter, over which he also cries (150). In addition, Tom’s initial bad impression on Deane also involves Deane’s suspicion that Tom will not be ready to handle “manly business” like he was as a young man—notably, when, “with only looking into what went on in the mill, (he) found out how there was a waste of five hundred a year” (241, emphasis mine). This mill then becomes Deane’s metaphor for the development of Tom and his mind, in contrast with Stelling’s. Deane tells Tom that his success or failure will depend both “on what sort of article” he is to start out, and “whether (he’s) been put into the right mill” subsequently (242, emphasis mine). This encounter helps push Tom toward a focus on recovering Dorlcote Mill, which therefore exists as the endpoint of his subsequent course of rigidly, undeviating motivation and action.
loss, we see the first stage of results of the combination of their initial mental nature and its
treatment through a period of three years of adolescence.

In the immediate aftermath of Pivart’s legal victory over Tulliver that allows him to divert
water from the Ripple and secondarily costs Tulliver his family’s livelihood, the changes in
Tom’s mental character concretize. “His natural inclination to blame, hitherto kept entirely in
abeyance towards his father by the predisposition to think him always right,” the narrator says,
“was turned into a new channel by his mother’s plaints” about the removal of their property
under the bailiff’s eye, along with the blame she places on her husband (215, emphasis mine).
The narrator adds that “the double stimulus of resentment against his aunts, and the sense that he
must behave like a man and take care of his mother” induces the “natural strength and firmness
of his nature…to assert itself,” showing the chain of physiological causation behind the “new
channel” of mental activity just mentioned (in *stimulus, nature, and natural strength*) (215).

This statement invokes an early evolutionary concept—the expression of “natural” or genetic
tendencies according to environmental stimuli—and it results from the legal fight between Pivart
and Tulliver, who respectively represent the advancing influence of flow dynamics-influenced,
 системic watershed management and traditional, locally-regulated and executed “hydraulics.”

As Tom’s mind becomes “channelled” during this scene, Maggie’s mental, emotional
flows break the bounds coherent, controllable speech, as she “burst[s] out, at last, in an agitated,
almost violent tone” against her mother and in defense of her father (215). The violent “bursting
out” which subsequently marks key moments of her speech throughout *The Mill on the Floss*,
contrasts diametrically with the shrinking channels in which Tom’s thoughts can flow, both

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170 Tulliver’s first, apparently thoughtful, response after learning that the case has been decided in Pivart’s
favor constitutes a “a vent for…the obstinacy and defiance of his *nature,*” as they are “driven out of their
old *channel*” by circumstances (205, emphasis mine). This “vent” is “a *rush* of projects in his *brain*” that
focus on his retention of his place in the mill regardless of its ownership (205, emphasis mine).
resulting from the meeting of their respective “natures” or “minds” and the social treatment of them. The narrator names it “a significant indication of Tom’s character, that though he thought his aunts ought to do something more for his mother, he felt nothing like Maggie’s violent resentment,” adding, that there are “no impulses in Tom” like those within Maggie (236). Where the natural talent of Tom’s mind for mechanical and naturalistic subjects has been mercilessly “ploughed” with Euclid and Latin into a kind of unfeeling, unimaginative stupor that is predisposed to follow the courses of external expectations and standards of those like his aunts and uncles, Maggie’s creative, humanistic, and linguistic mental gifts have been obstructed, then indulged, always surreptitiously and as if dangerously, leading to increasingly frequent and violent floods of speech and action that set her in opposition to Tom’s and the wider community’s patriarchal and socioeconomic standards.

Later, after Tom has left Stelling for work at Guest & Co. under his uncle Deane, his mind begins reifying into a construct which turns most any activity into one of a select few, consciously chosen “channels,” in a way that resembles the three streams into which Lewes’ nervous system may channel its finite resources. Because Deane judged his education to have been all but pointless, Tom determines to take his uncle’s model of working his way up from the bottom through self-determination (on the metaphor of being “put through the mill”). At the same time, his father’s omnipresent bitterness at owing debts, possessing no land or property, and being publicly recognized as having “fallen” socially also begin determining setting up the endpoints for Tom’s courses of thought and action. This bitterness encourages Tom’s natural mind for perceived justices and injustices, which the narrator describes as “subjects…on which Tom was much quicker than on the niceties of classical construction, or the relations of a mathematical demonstration” (236). In this instance, the education that is life experience meets
Tom’s natural intellectual tendencies productively, steering his intellectual action toward the same “narrow notions” of his father (291).

The frequently repeated image of Tulliver’s “narrow” and “channelled” thinking in the wake of his legal loss, which influences Tom during his employment at Deane at Guest & Co., bears a particularly economic imprint. This imprint vitally colors the novel’s failed water management practices and the lacking legal precedents for addressing the newest advances of hydrological technology and science into rural areas like Lincolnshire—along similar lines as the community-wide economic ramifications that Archer, Marggraf Turley, and Thomas remind us to consider in regard to the final flood. In a new era in which capital investment in the management of drainage and irrigation flows on the scale of regional watersheds came paired with culturally pervasive criteria for evaluating whole subsets of population and attending to their character and behavior, Tulliver’s narrowly channelled, utterly localized thinking becomes obsolete (though it becomes fast in Tom’s mind at the same time). Mr. Tulliver’s “narrow notions about debt” mark them as “old-fashioned,” and as the narrator interjects, “may perhaps excite a smile on the faces of many readers in these days of wide commercial views and wide philosophy” (291). Though weighty in his sense of failure and subsequent bitterness, his debts appear insignificant in an era in which capitalist economics reshape the scale of what would be understood as sizable flows of capital, lending, and debt (like criticism of Peel’s initial offer to lend £2,000,000 to fund the construction of irrigation and drainage across rural England as miserly). On the scale of an entire tidal watershed modeled on the historical Tyne, one water-powered grain mill, and one family’s economic losses in relation to it, do not move any kind of larger, even regional, economic needle. Thus, the consistent “narrow notions” and “grim melancholy and narrowing concentration of desire” that Tulliver constantly steers his thoughts toward and which
simultaneously help shape Tom’s thought and action show evidence of, in the narrator’s words, “uncultured minds, confined to a narrow range of personal experience” that suffer “under the pressure of continued misfortune” (291-2).

The combination of a narrowness of mental “nature” and narrowness of “experience,” then, lead to narrowly-channelled thought, which restricts the adaptability of Tom and his father as they pursue a new future—or, rather, attempt to re-secure the past. A lack of flexibility introduced into Tom’s thinking via the succession of Stelling’s rigid education, the rejection of that education by his uncle Deane who suggests modeling his life on the monotonous function of a mill, and the influence of his father’s own “narrow channells” of thinking that corresponds with his inability to allow for and adapt to life in the flow dynamics-steered irrigation era, changes Tom’s nature into one that diametrically opposes Maggie’s own.\footnote{Wakem’s mind also flows down rigidly formed channels in a way that resembles Tulliver’s, though the nature of those channels and their endpoints differ. In one pertinent image, his mental activity is machine-like in the most explicitly violent context of the novel: “It is still possible to believe that the attorney was not more guilty towards him, than a ingenious machine which performs its work with much regularity is guilty towards the rash man who, venturing too near it, is caught up by some fly-wheel or other, and suddenly converted into unexpected sausages” (260). At the end of the scene in which Mrs. Tulliver unintentionally inspires Wakem to take the family’s mill, the narrator states that “his mental glance was very rapid: he was one of those men who can be prompt without being rash, because \textit{their motives run in fixed tracks},” which frees them from any “need to reconcile conflicting aims” (264).}

The “impulses” of emotional expression, bursting speech, and wide-ranging intellectual curiosity that constitute Maggie’s natural mental proclivities and talents combine with her familial and social exclusion from education to produce a cyclical pattern of intellectual selfprivation followed by binges of intellectual and emotional exploration that threaten familial, gender, and socioeconomic channels. In opposition to the metaphors that illustrate Tom’s “concentration of desire” as “a channel of unified force that nearly merges with the borders that define it,” in Ketabgian’s words, Maggie’s “energies are more disorganized, expansive, and
threateningly changeable” in a way that “resist[s] containment,” though she sometimes attempts to “channel” her own “emotional energy” in response to others’ criticisms (110). Maggie’s “mind” (as intellectual and emotional “energy”) works in a way that leaves her “unable to define its confines,” according to Ketabgian, and therefore “explores how we might understand psychic forces without a stable shape” (131). Rather than engaged in a deliberate exploration, I posit, Maggie’s mind simply must and will intermittently flood beyond any structures that restrict its natural flowing, just as the Floss intermittently must flood, as the novel’s opening pages declare. I would argue that she even recognizes this facet of her own nature’s contrast to the culturally “narrow” Dorlcote-St. Oggs community, given the way that she pictures her alienation within that community (in what appears an early example of free indirect discourse). While working at the bazaar, she questions whether her life will always feature so much “inward strife,” and then, listening to “the busy indifferent voices around her,” she “wishe[s] her mind could flow into that easy, babbling current” of quotidian discussions, purchases, and gossip occurring around her (453, emphasis mine). Compared to the “stream of customers” and their ways of getting on in the world, Maggie sees herself as an interruption, an ill-fitting, dynamic feature (435).

Beginning with her parents’ early judgment that Maggie’s unusually high intelligence threatens future danger rather than offering promise, followed by being denied formal education, the flowing intelligence and sensitive emotion that naturally occurs within Maggie is constantly obstructed throughout The Mill on the Floss. This external obstruction of her intellectual and emotional activity from childhood through adolescence induces conscious, internal attempts on her behalf to channel and dam up her mind’s natural motion from that adolescence into adulthood. Serving as Maggie’s inlet to stores of humanistic texts and ideas throughout the novel, Philip criticizes these phases of her life, saying they both distort her nature and lead to
some certain, future disaster. “[Y]ou are shutting yourself up in a narrow self-delusive fanaticism,” he charges her at the beginning of their second phase of interaction, attempting to avoid pain “by starving into dulness all the highest powers of [her] nature” (340). “Stupefaction is not resignation,” he adds, “and it is stupefaction to remain in ignorance—to shut up all the avenues by which the life of your fellow-men might become known to you” (340). Philip understands the vivacity of Maggie’s mind, its ability to quickly and powerfully move through a range of complex knowledge and ideas, and he rues her attempt to avoid familial and social judgment by “stupefying” it by eliminating the “avenues” through which those ideas can flow.

Moreover, Philip wishes for Maggie that, rather than “benumbing and cramping [her] nature in this way,” she might instead encourage her “wit and bright imagination” (342) and allow the “world” that he declares her mind to be to interact with the world outside (349). He suggests, for example, that she “avenge the dark women,” who so often suffer in the novels she reads, “in [her] own person”—meaning, she ought to live her actual life in direct relation to the expansive imaginary worlds in which she naturally enjoys immersing herself (345). To this, Eliot’s narrator adds her own hydrological image—one of a flood which could not be managed or avoided—to express the “feeling” that moves between the two characters as Philip encourages Maggie’s intellectual pursuits. After he declares that he cannot tire of being with her, the narrator describes the moment as “one of those dangerous moments when speech is at once sincere and deceptive—when feeling, rising high above its average depth, leaves flood-marks which are never reached again” (349, emphasis mine). The “dangerous” magnitude and power of the intellectual and emotional flows that occur when Philip and Maggie are together and mutually encouraging their intellectual and emotional expansion resemble something like an era-
defining flood whose high-water mark is never reached again in the experience of several
generations of local inhabitants—like St. Oggs and the Floss in the novel’s opening pages.

Because she understands that danger, its threat to her relationship with her brother and
father, particularly, and in the eyes of the community’s socioeconomic standards, Maggie
nonetheless determines to cut off this relationship again. As she leaves, however, she senses that
the “tissue of vague dreams must now get narrower and narrower,” and that their elements of
“thought and emotion” must be “gradually absorbed into the woof of her actual daily life” (350).
The attempt to reabsorb into a mundane, culturally safe fabric of life of her mind’s otherwise
rapid, powerful, dangerous flows cannot last, however, as the pattern of “outbursts” of speech
and behavior leading up to her break with Tom show. Over time, Maggie consciously
understands herself as rebellious, and the blockage of her mind’s natural movements by her
father, and then especially by her brother, as the objects against which she rebels. In deliberately
considering what would be her natural way of life in contrast to her family members’ own
courses of thought and action, she experiences “fits even of anger and hatred towards her father
and mother who were so unlike what she would have them to be,” while she “rebel[s] against her
lot” (299). She directs most of her ire towards Tom, “who check[s] her and m[eets] her thought
or feeling always by some thwarting difference” (299). As Law reminds us, the first image of the
Floss’s flowing motion includes the important note that the tide “checks” that flow, so that the
anger and rebelliousness described her as “flow[ing] out over her affectations and conscience”
becomes a kind of flooding over and against that same kind of “checking” of Tom’s that thwarts
what would otherwise be the natural flows of her thought, emotion, or “feeling” in general (299).

These solidifying differences in the ways that Maggie’s and Tom’s mental activity flows
cause increasingly important separation between them, particularly as Tom tries to foist stridently
patriarchal expectations onto her as a subject to his familial authority. As Philip convinces Maggie to engage in a second period of intellectual and emotional converse between them, Maggie feels a “mental conflict” on one hand and “an opening in the rocky wall which shut in the narrow Valley of Humiliation” on the other hand—a figurative breach of the walls blockaded her intellectual activity (337). Her “mind” here is described as able to “sense” the end of its own exile, adding to the sense that her life revolves around the mental pursuits that are naturally housed within her physiology. Ketabgian also connects this period of Maggie’s divergent behavior to a hydrological, though not necessarily physiological for her reading, register—in which Maggie’s “attraction to Stephen Guest consistently unfolds through figures of gaseous expansion and uneven flow” (131). “Gaseous expansion” excluded (Ketabgian’s argument depends on the novel functioning like a steam engine), this “uneven flow” of intellectual and emotional current on the part of Maggie runs up against the now permanently and singly channelled thinking of Tom (symbolized also in the “Valley”), with both patriarchal motivations and those resulting from his own humiliating education that so mismatched his “nature.”

Stephen successfully exploits the tendency of Maggie’s mind to flow with such great force at the inducement of intellectual interest in order to coax her, with a group the first time, into rowing the Floss in a prelude to their later trip as a duo—after “the stream of his recollections” start “running rather shallow” as he attempts to interest or impress Maggie with his studies, he suggests the rowing (396). That she becomes so fully “absorbed” by his “plunging” her into the knowledge he has gained from his own books helps him to induce her toward his eventual marriage proposal (396). During that later, fateful trip downriver, the narrator describes “delicious visions” that move in her mind as “flow[ing] over her like a soft stream” that renders her passive, to the point that she gets “lulled to sleep with that soft stream
still flowing over her” (490, emphasis mine). His capitalizing on Maggie’s mind’s ability to seize her whole being in flows of reverie has brought her close to Stephen’s possession in marriage.

The turn from inner intellectual “absorption” to emotionally (though mentally pictured) pleasing experience as a “flowing stream,” however, precedes Maggie’s comprehension that Stephen has effectively abducted her. At this point, she confronts him, though without any concrete recourse to alter the situation, but Stephen specifically cites the cultural restrictions on their emotional expression as unfair, unreasonable, and in direct contradiction to their physiological, mental natures. His speech “burst[s] out” as he claims, “[w]e have proved that the feeling which draws us towards each other is too strong to be overcome,” as a “natural law that surmounts every other” (495). He would have them both disregard “what (this ‘law’) clashes with”—various forms of social judgment and punishment (495)—though Maggie attempts to argue that their duty involves not simply following every natural “impulse” (498). Stephen stages the dynamic contest between restrictive, socially condoned courses of action with their mental, physical impulses of desire for each other as a conflict between what is “the divine voice within” them which, if they should hearken to, would “sanctify” their lives, adding that others will recognize “a force which declared against their claims” for different familial and social relations (498-9). Nonetheless, Maggie maintains that this “is not the force that ought to rule us—this that we feel for each other” (499). The smallest amount of indulgence of her “flowing streams” of “delicious images” that she allowed herself, Maggie knows, in concert with Stephen’s dishonesty and their community’s expectations, dams her.

Though we must remember that their father largely shaped the “stimuli” to which Tom’s and Maggie’s minds were subjected throughout their youth and into adulthood, based on his ideas about education, gender, and economics, by the time that Maggie mostly-unintentionally
disappears with Stephen Guest, both of the siblings’ minds have seemingly taken permanent, incompatible forms. Around this time, Lucy voices concern for Tom’s future. Given his “rapid fulfillment of his wish about the Mill,” she thinks, he finally “must become pliant and flexible,” though she bears little hope that he will (475). The narrator immediately contradicts her hope as well: “But to minds strongly marked by the positive and negative qualities that create severity,” which include “narrowness of imagination and intellect, great power of self-control and a disposition to exert control over others,” there is a drive toward “prejudices” in place of hunger for “that complex, fragmentary, doubt-provoking knowledge which we call truth” (475). Like his father’s, Tom’s narrowing of mind leads him not only to a strictness with his own thoughts and courses of action, but to the inflict such rigidity of thought and action onto others—exactly as he does, ever more patriarchally, with Maggie.

Paired with the obvious critique of Stelling’s mode of education, this statement that the “truth” lies outside the purview of narrowed minds like Tom’s suggests that Eliot sees a need for a form of socialization that enables wide-ranging, flexible, uncertainty-embracing thinking in order for society to move forward. Tom’s mind, in contrast, has become “a technique of narrowness and negation that risks deforming the self,” in Ketabgian’s words, just as Philip warned Maggie her own attempts at mental privation would render hers (136). At the same time, however, Ketabgian grants that this technique gives Tom the “ability to unify and direct ‘one force’” through his mental activity and subsequent behavior (136). That is, Tom has deliberately managed his mental life via a kind of hydrologically model into a “vallyed” topography that allows for far fewer, far more forceful, mental flows than that which his “natural” mind had originally allowed—just as a Robison-inspired hydrodynamicist would look to obtain from a watercourse on which he intervened.
The consistent pattern of damming up and then bursting out of Maggie’s intellectual and emotional activity, on the other hand, induces the behavior Tom finds reprehensibly erratic. Without his position as ersatz patriarch in the Tulliver family, such a judgment would hardly matter, but the rest of his family does in fact rely on Tom’s economic activity, a realm from which he has always reminded her of being excluded for her gender (if we recall the childhood scene in which he brags of having “half-sovereigns and sovereigns for [his] Christmas boxes, because [he] shall be a man,” while she will “only have five-shilling pieces, because [she’s] only a girl” [30]). After her scandalous trip down and back up the Floss with Stephen, Maggie undergoes the social enforcement of sexual mores first via the communal, public humiliation that Eliot poignantly orchestrates via her walk through St. Oggs under various judgmental gazes.

The criticism Tom lobs toward Maggie prior to declaring that he will no longer maintain a relationship with her centers on her rejection of the same kind of channelling of mind that he has adopted—and which he seems to expect from her all the more thoroughly because she is both a woman and his younger sibling. “You’re always in extremes,” he tells her, reflecting the alternating damming and subsequent bursting out of her divergent thinking and behavior (408). Not only does she “have no judgment and self-command,” in Tom’s words, she dares to think she knows “best, and will not submit to be guided” (408, emphasis mine). In response to her judgment of him as unkind, he states, “my kindness can only be directed by what I believe to be good for you” (409, emphasis mine). The “direction” that steers all of Tom’s thinking is the harrowing that resulted from his mismanaged education, his initial disappointment at its failure to launch his career, and adoption of his father’s own “narrow,” bitter constructs in the wake of his legal loss. Reflecting her greater comfort with the difficult, “doubt-provoking” truth of the situation, Maggie rejects that he can “judge for [her]” because their “natures are very
different” (409). They have become drastically more different, in fact, through their dissimilar life experiences, since the childhood in which their minds already showed natural variation.

Throughout this scene of final conflict between the siblings, Eliot affiliates Tom with the literal structures for blocking and diverting the Ripple’s flow at Dorlcote Mill. First, as Maggie approaches, he walks “with his back towards the entrance gate, and his face towards the rushing mill-stream,” which reminds us both of his fixation on owning and using that source of “water-power” his father so coveted and of his role as the firmly-channelled and channelling one within this pair. As Maggie approaches, her “fast-beating heart” recalls the flow of emotion within bodies that serves as the problematic basis of this conflict, which stands in contrast to his “inexorable, unbending, unmodifiable” mental character (502, 503). Further, Eliot juxtaposes him with the figure of blockage in this structural system in the moment of their confrontation: “he [i]s just then close upon the roaring dam; but he presently turn[s], and...s[ees] the figure whose worn look and loneliness seemed to him a confirmation of his worst conjectures” (503).

As he stands near, and is identified with, the dam and mill-race that symbolize the nature of his own mind’s blockage and direction down select few, socioeconomically productive channels, she again experiences the flow of emotion, this time near to a flood. “She fe[els] the hatred in his face—fe[els] it rushing through her fibres,” like the sensation made from myriad streams and currents in Lewes’ *Physiology* (502). Where Maggie hopes for “one draught of simple human pity,” she receives his condemnation (505, emphasis mine). He claims, “I have had feelings to struggle with—but I conquered them,” while he “loathes” both her character and conduct because nothing “keeps” her checked (like the tidal Floss) (504). Feeling, emotion, and the intellectual flows that underly them take the form of flows again in this vital moment. While
Maggie feels and gives credence to them, while Tom blocks them and judges her for her failure to similarly obstruct them in her “character” and “conduct.”

Maggie’s fluctuation between the renunciation of her natural mental talents and emotional responses to intellectual and romantic experiences—which her family’s and her community’s social expectations demand—and the alternative, intermittent embrace of the natural directions which her “feeling” takes collide with the “unimaginative, unsympathetic” mind of Tom, whose words of condemnation contain “a terrible truth” about her behavior (409). This “truth” exists through the real-world, real-time, and lifelong interactions between the siblings, though its pronouncement causes her to “writh[e]” as always “under this judgment of Tom’s” (409). The result of such judgment, though, is rebellion that comes paired with humiliation (409). Through the equally mismanaged approaches that Jeremy Tulliver takes toward developing his children’s natural intellectual talents, then through Tom’s and Maggie’s varying experiences with and responses to the family’s financial problems that result from the failed case against Pivart’s “erigations,” Tom and Maggie come to constitute a fundamentally opposed set of hydrological phenomena—an erratically, socially-divergent, free-flowing “mind” and a “ploughed and furrowed,” but not irrigated, mind which can only follow certain channels of activity. The collision of the freely flowing impulses which burst forth from Maggie’s mind with the forced channelling of Tom’s “vallyed” mind and can only result in a food.

4. The Overcharged Watershed Floods

I will close by attempting to situate an interpretation of the already frequently-interpreted flood that kills Tom and Maggie at the end of *The Mill on the Floss* within the wider, decades-long growth of hydrological science’s cultural importance from the end of the nineteenth century
that this whole work has traced. I argue that this context reveals the ways in which Eliot’s novel invokes its cultural predominance in physical, topographical and structural forms, as well as its influence on systematizations of moral and social order based upon models of idealized, naturally occurring flows. Rather than attempting to determine a hierarchy of import between the levels of the literal and the representative, which has generally characterized waves of criticism of *The Mill on the Floss* and its final flood, an understanding of flow dynamics’ influence across levels of socioeconomic meaning demonstrates their coincidence, mutual dependence, and, most importantly, Eliot’s skepticism (much like Dickens’s in *Great Expectations*) about the effects of such a sweepingly systemic, emphatically enforced construct for evaluating and influencing flowing bodies of water, the watersheds through which they flow, groups of populations living in part from those bodies of water, and individuals within those communities—particularly their natural flows of intellectual and emotional activity. This reading reveals the literal and the figurative levels of the flood to be homologous within the development of flow dynamics, which may help to shed light on the frequently noted, somewhat inscrutable relationship between the metaphorical and literal in *The Mill on the Floss* generally.

The “energy” that Ketabgian reads as “imagined throughout *The Mill’s* psychic and physical landscapes” as a “stored-up force” can only exist as “stored-up” force via the blockage or partial blockage of natural flows (like a “charged” mill-weir), and in both “psychic” and “physical” landscapes a flood becomes the only possible outcome of the mismanagement of the systems of management that orchestrate such blockages, diversions, and utilizations (110). Ketabgian’s concept of an “engine” here loses something of the literal concreteness of doubly

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172 Brower similarly imagines “Maggie’s essential stultification,” which precedes the flood, as impetus for the narrative “mak[ing] two turns, one psychologically deleterious, one environmentally destructive, the former foreseeable, the latter literally incredible” (228).
“psychic and physical” landscapes of *The Mill on the Floss*, however, because the principles of damming up a naturally occurring flow for the creation and utilization of potential and kinetic energy far predates anything like an engine involving chemical conversions of coal or other fuel and liquid water into gaseous water. Rather, the historical perspective afforded to Eliot as she looked back on the time period in which the narrative occurs, would have revealed layers of complicated interaction between ancient principles for harnessing the natural movement of rivers and streams on a local, individual, and experience-informed basis and the widespread influence of new Victorian hydrological sciences and interventions that increasingly treated entire watersheds as topographies to be addressed under systemic political and scientific supervision and emphasized the power and productivity of well-channeled, powerful, individual flows (like Pivart’s intended irrigation flows). That historically inherited system of mill-weir and mill-race construction for the grinding of grain or other purposes involved the the partial blockage of what naturally occurs, increasing its potential energy and directing it toward use and subsequent release back into the natural flow. The newer system sought to imitate such flows for the creation of more powerful systems of drainage, irrigation, production, and economic gain, extending their usefulness to a further-distant point of their dissipation. *The Mill on the Floss*, and Dorlcote Mill specifically, finds itself in a transition point between these two eras.

It has been widely demonstrated how Eliot personally studied recent and historical floods, along with the rivers, streams, mill, and mill-related structures in order to grant her novel
some (highly debatable, when it comes to the flood) realism. However, Ketabgian specifically shows that Eliot’s research into floods that might serve as models for the novel contains a vital judgment of water-management practices that bears particularly significant meaning here.

Ketabgian documents that Eliot had consulted and made notes on Sir Thomas Dick Lauder’s *Great Floods of August, 1829, in the Province of Moray and Adjoining Districts* as part of the same research into floods also noted by Brower, Archer, Marggraf Turley, and Thomson, and others before them. The significance of Lauder’s work within the literal level of the novel’s flood—whether his ideas withstand scrutiny or not—is that it provides an idea that poor management (in Lauder’s eyes, over-management) of watersheds actually functions to greatly increase the volume and destructiveness of the unprecedented floods that he has studied, if not helping to create them in the first place. Ketabgian notes that the passage in which Lauder

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173 Others have established the texts and sites at which Eliot researched the history major floods in England and learned about mills and other structures for the management and use of flowing water throughout the country. It also bears mentioning that she used such traditional agricultural uses of water to play vital roles in plot structures in novels set in England. In *Silas Marner* (1861), the next of Eliot’s novels after *The Mill on the Floss*, a literal level of interest in and function of water management and irrigation plays a central role. While not an uncontrolled, destructive flood, the draining of the holding pond near Marner’s home for the purposes of irrigating arable land nearby leads to the novel’s final revelation that inheres in the resolved set of familial relations that move forward into the narrative world’s future at the novel’s end. Furthermore, *Adam Bede* not only features the drowning of Thias Bede in a river in its opening phase, Eliot also connects this literal level of plot events to a figurative exploration of intellectual and emotional activity. In the opening chapter of Book II of *Adam Bede*, titled “In Which the Story Pauses a Little,” Eliot’s narrator exclaims, “Yes! thank God; human feeling is like the mighty rivers that bless the earth: it does not wait for beauty—it flows with resistless force and brings beauty with it” (162, emphasis mine). Here, then, the river figures both as literally deadly and as representationally valid for naturally occurring human “feeling” in a way that Hardy will build upon in *The Return of the Native*, as the following chapter will show.

Moreover, as Hughes and Lund note in *The Victorian Serial*, Eliot *Romola* also utilizes a river in a simultaneously literal and metaphorical level. “Tito is unaware here that he is controlled by events,” they write, “just as he will be in his final drifting down the “dark river” toward Baldassarre: ‘The current was having its way with him: he hardly knew where he was: exhaustion was bringing on the dreamy state that precedes unconsciousness’” (July 1863: 32)” (78). They posit that the use of the river as a hydrological model for the movement of both plot events and time even leads its readers to “feel themselves and the characters being pulled along in the current of history,” as one contemporary critic of the time, R. H. Hutton, exemplifies in an 18 July 1863 *Spectator* review, writing, “the reader is drawn into that rushing tide of Savonarola’s revolution”” (qtd Hughes and Lund 79).
makes this claim has been marked up in Eliot’s hand. Thus, the non-symbolic level of the flood
Eliot constructs in the novel, according to Ketabgian, “shows how acts of control and
confinement themselves account for much of the violence in floods” (139).

Though Ketabgian again tries to connect this statement to her reading of the novel as a
metaphorical steam-engine and thus categorizes the flood alongside “other forms of cataclysmic
expansion” rather than seeing it more simply (and literally) as the kind of collection-in-motion
that John Robison described in his *Theory of Rivers and Hydrodynamics*. Nonetheless, the
argument that Eliot considered Lauder’s ascribing of danger to an over-eager, too widely-applied
set of practices for managing drainage and irrigation flows, rivers and streams, I believe to be
born out both by Ketabgian and in the current reading. Lauder’s take on the rise of such
practices is that “modern watershed management has both efficiently channeled water and
heightened its destructive intensity,” because, in his words, “[n]ature can seldom be regulated or
controlled in one way, without running riot in some other’” (qtd in Ketabgian 140).

In the passage that Eliot has annotated, Lauder first tries to establish that his subject
floods were “considerably greater, and more destructive, than any flood that ever affected the
same rivers” as recorded in any account or “legend,” as well being “fearfully enduring” and not
the normal “comparatively short…reign of terror” of previous floods (8). Lauder, as a source-
text informing the novel’s fictional flood, lays the blame without hesitation onto the ironically-
named, “highly improved” state of the districts’ lands (8). I have already introduced the advent
of irrigation and drainage piping and tiling that spread from the industrial centers where they
could be produced, and the practices for utilizing them as they spread into rural areas of England
(and in this case, Scotland), and Lauder clearly sees these systematic, modern “improvements” as
highly dangerous *because* they are effective. “Any given quantity of rain,” he writes, “must now
produce a much greater flood than it could have done before” (8). Lauder writes that precipitation “either evaporated on the hill side, or [was] sucked up by an arid or a spongy soil” previously (the latter of which seems a questionable assertion on its face), before it could “coalesce as to form a rill” (8). The “open cuts” made to “dry hill pastures,” along with the “numerous bogs reclaimed by drainage,” “the ditches of enclosure recently constructed— and the long lines of roads formed with side drains, hack drains, and cross conduits” have “covered” the affected districts “with a perfect new-work of courses to catch and to concentrate the rain-drops as they fall, and to hurry them off in accumulated tribute to the next stream” (9). One could not ask for a clearer picture of the outcomes of hydrological influence, of the obsessive desire for the creation of clearly defined, supposedly manageable, flows throughout rural districts, than what Lauder describes here. These forms of drainage and irrigation that Lauder credits with building a kind of floodwater-leviathan constitute instantiations of flow dynamics’ movement through agricultural land and water management practices, as was Peel’s desire and part of his program for reducing the costs of grain production that would allow for Corn Law repeal. In this light, also, we cannot fail to recognize that Lauder includes “enclosure” and the ditches and drains that were part of its establishment as bearing some of the blame for this flood’s magnitude.

This particular historical reading of the dangers brought about by an overly-emphasized, flow-based water management system too clearly interacts with the insistent hydrological register used throughout The Mill on the Floss to depict both topographical features and characters’ mental and emotional activity not to lend Eliot’s interest in Lauder credence. Ketabgian sees Lauder’s negative explication of irrigation and drainage systems as “[l]ike the narrow limits of Tom’s millstream” and, quoting from the novel, as “find[ing] their counterimage in a rushing flood—a flood that itself mimics ‘a gigantic mill-dam, the sluice of which ha[s] been
newly opened’’ (140). In other words, Lauder’s image of a disastrous flood as partially resulting from an either ill-conceived or overused system of management as bearing a resemblance to Tom (and I would argue Tom’s mental activity’s) affiliation with mill-race next to which he stands as he ruptures his relations with Maggie, as well as to the narrator’s particular descriptive language for the flood that sweeps them both away.

As the flood emerges from and within this historically, literally-informed context, both Ketabgian and Brower see something remarkable then taking place. If, following Lauder, a river “hemmed…in by embankments,…a river so artificially treated cannot fail, in a long course of years, to become a magazine of destruction, liable at any time to burst suddenly and awfully over the adjacent regions” (Lauder 164-5), Ketabgian reasons that the novel’s flood “resembles abstract power confined and intensified by a variety of structures” which, I would add, are all manmade and mostly intended to help manage the flowing bodies of water involved (Ketabgian 140). She posits that Eliot’s annotations on this passage suggest that “she too recognized how rigid hydraulic management might pave the way for disaster—whether social, emotional, or ecological” (140). Brower similarly sees a transformation within the novel of what a river “is as an entity,” having consistently been simply “a self-evident course of flowing water” for the entire text prior to the flood (214). At the point of the “cataclysmic conclusion,” however, the flooding of the rivers beyond their banks, they “annihilat[e] their status as rivers just as they annihilate everything else”—a statement that Brower recognizes as tautological in a way that mirrors Tulliver’s own claims: “water’s water” and “a river’s a river” (214). Brower notes that this tautological understanding forms the basis of most of Tulliver’s problems and claims that the novel never offers him a more satisfactory, alternative conception of the material-cum-motion that powers his economic survival. This well-made point about the connection between
Tulliver's own "mind" and the disastrous outcomes of his choosing to behave based on it connects back, again, to his role in the management of his children's minds' and development.

Ketabgian mentions here but does not fully address the "social" and "emotional" ways that flow management works in *The Mill on the Floss* in addition to the "ecological" ways that it does. However—based on the obsessive ascribing of "nature" to character's "minds" and the problems of managing the flows of thought and emotion that emanate from them in the novel—one could be forgiven for taking Lauder's quote about the dangerous over-management of flows in his *Great Floods* as a condemnation of how these socially and emotionally-directed management efforts fail. Tom can be seen in this context as the character whose mind has effectively been "ploughed and furrowed" into operating through a small number of powerful, unchangeable channels while Maggie's exemplifies the "hemmed in" river whose "artificial treatment" means that it "cannot fail, in a long course of years, to become a magazine of destruction, liable at any time to burst suddenly and awfully over the adjacent regions" (Lauder 164-5). The pairing of intellectual and emotional with literal hydrological management, when we recognize them as part of an overarching system, flow dynamics, show that exactly this combination of literal and metaphorical constitute parts of the same thing—flow dynamics' applications throughout Victorian culture.

I posit, then, that Eliot deliberately constructs a fictional representation of this set of topographical and social flow management practices in order to call into question their effectiveness and their tendency to cause destruction in lives of particularly dynamic individuals (much as Dickens does the same over the tendency to "drain" and eliminate circulation of unwanted populations in *Great Expectations*). Brower’s accurate statement that *The Mill on the Floss* does all of the following in regard of its namesake river: romanticizes it, mythologizes it,
and simultaneously recognizes it as “necessary for economic prosperity,” which not only fairly accurately describes the primary impetus for the development of flow dynamics from the time that the first report to the Thames Navigation Commission raised alarm over the diminishing state of England’s rivers and streams, but reminds us of a key point about the management of intellectual flows—that that management, too, had socioeconomic bases (214).

Ketabgian argues that *The Mill’s* flood “fus[es]…physical and emotional force,” which she says “[a]nticipate[s] recent claims for the nonsubjective nature of postmodern affect” in which “psychic power is abstract, collective, and—like waterpower itself—neither owned nor isolated” (142). The fact that it is not owned nor isolated does not prevent men from fighting over legal and practical authority to manage it, however, and Tulliver understands relations among people in his community (who they “ought to be”) in and as part of struggles over and exercising of such authority. That is to say, the management of mental flows constitutes a piece of the way that seemingly abstract formations of cultural management take place—alongside the hydrological management that acts along similar criteria and exemplifies that the abstract and concrete are of a single piece. Brower similarly posits that the novel “incorporates a contemporary conflict of legal philosophies (river-as-river versus river-as-divisible-thing) (225), thanks to a period of hydrological advancement that rendered the precedents of long-held riparian law obsolete, in turn, making it necessary to “think about a river as a divisible entity comprising multiple units of water (and not as a self-evident and self-consistent body)” as in Tulliver’s “a river’s a river” (222). Through examples of water law cases from the 1830’s to the 1850’s Brower shows that, in the time of Eliot’s writing, courts were determining ways to separate “water” and “river” from one another, so that Tulliver’s maxims are “overwhelmed by a
legal-semantic apparatus that defined the words ‘water’ and ‘river’ as potentially divisible things and that, equally importantly, was continually subject to change” (225).  

That one might assert ownership over “power” generally, as Tulliver does over that within the Ripple’s movement, “betrays a fundamental egotism,” in Ketabgian’s words (118). I posit that, when he refutes engineers’ claims that his water-power will remain intact after Pivart’s irrigation scheme is carried out—“it’s common sense, as Pivart’s dykes must do me an injury”—Tulliver expresses an identification of his own being within the natural flow of water which his mill harnesses along its way (164, emphasis mine). If the volume and concurrent power of the Ripple would be “injured,” then the injury would be to Tulliver, according to his thinking, showing the way that his own socioeconomic status and identity are bound up with the water, as if it is him—also showing that he himself betrays his assertion that water is only itself, and a river is only itself. As shown above as well, water, the river, and water-power in the novel exist within a shared set of concepts of hydrological, socioeconomic and mental management that also form the conflicts of “mind” and “nature” for Maggie and Tom—the failed education as a mismanagement of Tom’s mental activity, the narrowing and reinforcing of the subsequent channels in his mind through his working life at Guest & Co. and under the influence of his father’s bitterness, the attempts to stifle Maggie’s naturally powerful intellectual and emotional flows, and the resulting bursting out of her activity.

Thus, “the language of monetary valuation” that Brower observes within the re-thinking of rivers and waters as divisible units of power in the legal system that works against Tulliver is “indicative of a further consolidation of a capitalist mode of production and of the epistemology

Ketabgian also adds about the “convenient fiction” of Tulliver’s claim to the water-power within the Ripple’s movement that it is also belied by the contemporary scientist, Hermann Helmholtz’s, suggestion that, “once we grasp the full extent of energy conservation, claiming possession of this force is akin to claiming that of all other natural force” (Ketabgian 118).
that follows” while also, I posit, relating to the gendered, socioeconomic management of intellectual and emotional flows in *The Mill on the Floss* that do not necessarily inhere in a new economic era but predate it (222). Nonetheless, Archer, Marggraf Turley, and Thomas show that as early as a 1773 tract arguing for free trade in “corn” (for the repeal of the Corn Laws) by John Arbuthnot described the as-if-natural workings of free trade in the image of a well-behaved, idealized river.\textsuperscript{175} In Arbuthnot’s argument, English politicians ought simply to trust themselves to “let corn flow like water, and it will find its level” (qtd in Archer et al 720, emphasis mine). Here again a clearly idealized image of a river has been deployed for rhetorical force but in a directly economic argument which has concrete ramifications for actual people living and working along a Lincolnshire river, which they use to grind grain for market. “In this rhetoric,” say Archer, Marggraf Turley, and Thomas—though without connecting their own statement to Tulliver’s—“water is no longer just water, and its imaginative power is harnessed…to rebrand trade as an inscrutable force of nature” (721, emphasis mine).

We ought to remember, however, that at the time of Arbuthnot’s writing, the first engineers who had been sent by the Thames Commission to assess the state of England’s flowing, inland bodies of water, Mylne and Jessop, were busy discovering just how dramatically they had already been diminished through early industrialization’s use of them. They, in turn, remind their own readers that the easily observable diminishment of these waters lies “not in the Power of Man to encrease (sic)” (qtd in Oliver 227).\textsuperscript{176} This inarguable fact seems to bely the metaphor of free trade deployed by Adam Smith’s followers for the repeal of the Corn Laws, but,  

\textsuperscript{175} In *An Inquiry into the Connection between the Present Price of Provisions and the Size of Farms.*

\textsuperscript{176} Oliver reminds us that the miller as a general historical figure leading into the nineteenth century had always used the “river’s water” as “an object of exchange, charged for by the miller,” though the Commission sought to reorient management of rivers and streams toward their navigability (227).
more importantly for *The Mill on the Floss*, shows how highly economically-charged and how conceptually fraught a statement like Tulliver’s “a river’s a river” actually is in an economic sense. The need to shape and manage rivers via interventions across entire watersheds and with less regard to family-owned, local sites of work like Dorlcote Mill, actually is a response to such diminishment of flowing waters through their use, while at the same time the resulting spread of flow dynamics’ influence create the principles which Pivart’s irrigation diversions follow. All of this helps to make Tulliver’s economic fears perhaps more understandable, and yet everyone, including Tulliver, seems to forget that even in its most positive economic model, the river represents a “force of nature” beyond “the Power of Man” to command.

In this context, Archer, Marggraf Turley, and Thomas posit that the novel constitutes a “parable, in which the ‘material facts’ of corn and water are inseparable from their figurative associations in the rhetoric of free trade,” though, as we have seen, this constitutes only one of multiple ways that flowing water has been figuratively associated in *The Mill on the Floss* (721). Brower defends Tulliver, both his assertions about water and a river and the failed understandings behind them, in light of the legal background that he provides to show that “changing conceptual and semantic boundaries” over water, as a bounded, delimited, divisible economic resource as well as power source make it impossible for him to know how to navigate his family’s and his work’s relationship to the Ripple and Floss (229). Because of this, Brower writes, Tulliver remains “definitively (that is, objectively) neither wrong nor right” in his two maxims concerning water and a river (225). This, according to Brower, means that Eliot’s novel constitutes an attempt “to do justice to her readers’ painful (financial, epistemological) adjustment to the conditions of modernity, in which the logic of ‘water is water’ no longer suffices” (229). The painful epistemological adjustment that Brower identifies matches the same
pattern of obfuscation of individual identity under the pressures of familial and social
enforcement of socioeconomic and gender expectations, the lack of clarity for Tulliver in his
legal relationship to the moving water on which his family’s economic survival depends, which
Ketabgian sees as resembling “recent claims for the nonsubjective nature of postmodern affect”
in which “psychic power is abstract, collective, and—like waterpower itself—neither owned nor
isolated” (Ketabgian 142). I posit that this epistemological, financial, and semantic unmooring
that come about within The Mill on the Floss result from the role of a hydrological set of criteria
spanning multiple levels of more or less literal meaning and application throughout social,
economic, and individual intellectual settings—shaping what is acknowledged as productive and
what is blocked off or diverted as dangerous.

In the hydrological tenets of flow dynamics, a river never exists as just a river. Its
existence implies movement and collection, which also always implies topography through
which a naturally occurring set of watercourses move, toward some outlet to the sea, like Eliot’s
“Mudport.” When humans begin to tap a river or stream like the fictional Ripple for use, it then
may or may not also exist as “power.” However, in The Mill on the Floss, no authoritative
cultural understanding emerges regarding when and where, on what scale, and by whom, such
natural flows can be used, diverted, blocked, or otherwise intervened on for economic,
aricultural, or other production. Yet, flowing water occurs, collects and moves as a natural,
climatic phenomenon, just as the characters’ own streams, currents, or flows of bodily-created
impression, emotion, and thought occur naturally, physiologically, and in an environment of
personal interactions both verbal and non-verbal. At the same time, the culturally-productive
regulation of these naturally occurring flows’ use also becomes the structuring metaphor for the
shaping and reinforcing of cultural limitations on individuals’ thought, emotion, and action in the
novel. None of these attempted systems of management can prevent, however, the utterly natural phenomena of rainfall, nor that of Maggie’s mind’s powerful intellectual and emotional flows, from bursting beyond the expected avenues of expression available to her in Dorlcote and St. Oggs. These two sets of flows—climatic and physiological—collide with and eventually overpower the constraints of their management, becoming as Brower points out, something substantively different from a delimited flow, but a destructive, spreading flood.

The climactic flood only seals the clear criticism that Eliot levies in *The Mill on the Floss* against the destructive consequences that can be wrought in the lives of families and individuals by the implementation of sweeping systems of intellectual and emotional management modeled on the systems of watershed management spreading into the rural areas of England during the time of the novel’s setting and through to the time of her writing. In the same way that a flowing body of water exists dynamically in space in time, changing form, volume, speed, and power based upon the structures placed into it that block and/or divert its material and movement, a “mind” exists in time and space, within a concrete body’s physiology, and interventions intending to block, divert, or channel the thoughts, impressions, sensations, and emotions that flow from it based upon arbitrary social mores can also change the nature of that “mind” and the way its activity emerges. Following this, *The Mill on the Floss* clearly denounces the overarching paradigm that manages culture and topography, thought and economy, as a set of hydrological problems calling for infrastructural intervention in the flood that kills Tom and Maggie and ravages the community they leave behind.
CHAPTER FIVE: “feeling…dammed into a flood”: Hardy, the Flood, and the Insurgent Heart

“Even imagination is the slave of stolid circumstance; and the unending flow of inventiveness which finds expression in the literature of Fiction is no exception to the general law. It is conditioned by its surroundings like a river-stream. The varying character and strength of literary creation at different times may, indeed, at first sight seem to be the symptoms of some inherent, arbitrary, and mysterious variation; but if it were possible to compute, as in mechanics, the units of power or faculty…that exist in the world at stated intervals, an approximately even supply would probably be disclosed” (15, emphasis mine).

“The man who had begun by being merely her amusement, and would never have been more than her hobby but for his skill in deserting her at the right moment, was now her desire. Cessation in his love-making had made her love. Such feeling as Eustacia had idly given to Wildeve was dammed into a flood by Thomasin.” (95, emphasis mine).
~Thomas Hardy, The Return of the Native, 1878.

Introduction

After one issue under the title, The Simpletons, the novel we know as Jude the Obscure bore the name Hearts Insurgent during its serial run. The primacy of the title’s adjective, “insurgent,” hints at an under-appreciated aspect of Hardy’s novelistic works that utilizes his fictional landscapes’ hydrological features to investigate the cultural regulation of emotion and desire he often categorizes as “feeling.” From the Latin insurgère, meaning “to rise up,” the word “insurgent” signified in Hardy’s time “[r]ising in active revolt” generally and “surging up or rushing in” in the context of “the sea or a flood” (OED “insurgent”). As a noun, the word denoted “[o]ne who rises in revolt against constituted authority,” or “a rebel who is not recognized as a belligerent” (OED “insurgent”). I posit that this word’s inclusion in the original title of Jude the Obscure indicates an element of hydrologically-envisioned contestation against that novel’s exclusionary educational, social, gender, and religious teachings and structures—and that this contestation takes place in the foreground of key moments and topographical spaces in several of his novels’ most vital scenes. “Hearts Insurgent,” thus, gestures toward socially
problematic, even rebellious, flowing, or overflowing, against those structures that “condition” its movement and direction.\textsuperscript{177}

This temporary title for \textit{Jude the Obscure} denotes just the beginning of such hydrologically-conceived contests of rebelliousness against cultural restraints in Hardy’s novels. I will show that, throughout his novelistic works, Hardy deploys his knowledge of agricultural practices to stage challenges against social, religious, and implicit political powers’ structuring of the culturally allowable expression of desire, emotion, or other “feeling.” This occurs through failures of, or dangers inadvertently created by, traditional water management features and practices in his Wessex setting. By being involved this way, sites like \textit{The Return of the Native}’s Shadwater Weir or the sheepwashing pool of \textit{Far From the Madding Crowd} bear both literal significance within the Wessex topography and the novels’ storylines as well as symbolic significance that inflects the works’ explorations of social, religious, or other divergence. I will focus here on these sites of struggle in \textit{The Return of the Native} (1878), with contextualization from across Hardy’s novelistic works, most importantly among them, \textit{Far From the Madding Crowd} (1874) and \textit{Tess of the D’Urbervilles} (1891).

Most clearly, Hardy uses traditional structures and practices of rural, agriculturally focused water management in \textit{The Return of the Native} as symbolic expressions of destructive conflict, on one hand. Each of these focuses on liquid movement, specifically on the damming of topographically determined drainage flows, and flooding which unintentionally results under extreme weather or climatic conditions. On the other hand, the sites tangibly function to

\textsuperscript{177} Not coincidentally, as Millgate shows (in \textit{Thomas Hardy’s Public Voice}), the “serial text had been extensively bowdlerized by Hardy…in response to the editor’s concern that his magazine ‘contain nothing which could not be read aloud in any family circle’” (137). This resulted in plot problems which one reader was pleased to point out to Hardy in a letter. The author promised that a volume version not intended only for a “family circle” but for “middle-aged readers” would come later (Millgate 137).
encourage the creation and expression of culturally forbidden, communally-punished “feeling” ranging from economic desires to romantic, erotic attractions that spring up from within the characters uncontrollably.\textsuperscript{178} The very traditional earthen embankments and barrows of manmade reservoirs and primitive “water-courses” for drainage, the masonry and wooden hatches of the Shadwater Weir, bear directly onto such less tangible diversion, blocking, and flooding of “feeling” and its flowing movement which is spiritually as vital for his main characters as those literal movements are for the Egdon Heath topography and community. Within these conflicts, Hardy portrays culturally forbidden, physiological and emotional, sexual attractions and desires as utterly natural, mostly unpremeditated, and physiologically caused and located. He steadily uses the word “heart” and heart-based images and expressions to capture this sense of uncontainable, uncontrollable physiological reaction between characters, which do not always have to be forbidden but are condoned only in certain well-contained, defined courses which are not permitted to reverse, deviate, or fluctuate.\textsuperscript{179} Wessex floods, then, can be seen to unite a multi-layered conflict of transition between modern, industrializing modes of watershed management spreading from the metropolises of England and steadily altering its topography and, thereby, the communities inhabiting it and the disastrous results of conflicts between the social structures and formations that regulate the expression of “feeling” and individuals whose own emotions, desires, and actions rebel against them.

\textsuperscript{178} Sara Malton argues in “‘The Woman Shall Bear Her Iniquity’: Death as Social Discipline in Thomas Hardy’s \textit{The Return of the Native},” Eustacia’s death marks the culmination of a series of community-based punishments against her divergent character and/or behavior (147).

\textsuperscript{179} On the fine point of a “course” of desire fluctuating, as I have said, Hardy explicitly uses the uncommon hydrological term “refluent” in \textit{The Mayor of Casterbridge} as well, during a scene in which Farfare wonders whether Lucetta’s desire still flows fully in his direction (179).
1. *Far From the Madding Crowd*

A brief reading of *Far From the Madding Crowd* serves here as an introduction of my focus with *The Return of the Native*, because the former establishes a precedent for the use of traditional, low-technology, agriculturally oriented hydrological features as sites which enable and encourage the culturally divergent expressions of emotional and sexual desire that are alternately punished, confounded, or subject to delayed gratification. One scene, in particular, helps to show that the investigation of the manmade pools, ditches, and weirs of *Return*—which it preceded by four years—constitute an extension of a vital, perhaps unrecognized, exploration throughout Hardy’s fiction. In *Far From the Madding Crowd*, I posit that the sheepwashing pool of Bathsheba’s farm functions in this way.

In Chapter 18, entitled “the sheep-washing: the offer,” the sheepwashing pool stages the collision of what might be thought of as naturally physical, sexual desires with restrictive social structures based on gender, economics, and class, via the hands-on operation of a traditional, workaday water management structure. The pool is a practically-conceived and built feature—meaning, it did not come from the realm of a theoretically or mathematically informed “hydrodynamicist” like Robison or from an engineer like Bazalgette in London, but from a practical “hydraulics”-minded builder with some hands-on experience. It acts as a roughly adjustable interruption of the river’s natural flow through its watershed, in a strongly idyllic description that almost exaggerates its seeming oneness with the natural landscape around it (perhaps knowingly so in order to point out the actual man-made nature of its control over that
flow and the expectations and controls over natural flows of human desires that it will come to symbolize).  

The pool is “perfectly circular” and “full of the clearest water,” so much so that it might look to birds “on the wing” like “a glistening Cyclops’ eye in a green face” (109). The perhaps ironic celebration of this pool continues with praise of the grass “about the margin” that “was a sight to remember long, in a minor sort of way,” because of the strength with which it almost visibly draws the water from the moist sod (109). Then, as if taking a page from Robison’s foundational, river-idealizing “hydrodynamics,” though in far more skillful prose, Hardy’s narrator describes the pool’s relationship to the watershed within which it sits, again ascribing it such a high level of pastoral beauty that it becomes an object of potentially critical attention. Within its “water-meadow,” which denotes a field near a river that often floods, “everything that was not a buttercup was a daisy, losing their character somewhat as they sank to the verge of the intervening river” that drains the area (109).  

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180 Rosemary Morgan’s Penguin Classics “Introduction” notes that Hardy “places his Wessex construct at the centre of a purposeful anomaly (or anti-pastoralism), as when the verdant pastures where sheep may safely graze transform into grotesque death-traps,” which has the effect of “a close correspondence to the grotesque incongruity of conflicting passions in human affairs and humanity’s collisions of desire and self-destruction (xxviii).” Morgan does not note any hydrological features in this case, but my argument will show that, much more than a “close correspondence,” these features actually inhere in the action of relevant desires, their effects, and the consequences of their being diverted or dammed.

181 Historians of English agriculture, Turner, Beckett, and Afton write, “Hay production from good water meadows was roughly double that of dryland meadows, and where a farmer had access to water meadows he was potentially able to increase the number of animals overwintered” (104). They include correspondence between two farm owners in which one tries to persuade the other to construct a “water-meadow”: “‘You will remember the work is expensive, but once done, afterwards it’s very moderate. One great thing is, the produce goes to assist in the manuring other lands, whilst watered meadows want none brought on them, except water’” (Turner et al 104). Water-meadows provided useful silt, basic insulation against frost, and extended the growing season by encouraging the rise of “capillary” streams (Turner et al 104). While to contemporary agriculture historians, a farmer may apparently still be assumed to be male — which Bathsheba, owner of her own water-meadow, clearly is not — the practice of creating water-meadows “is believed to have originated in the medieval period, and was widespread, particularly on the chalk streams of Hampshire, Wiltshire, and Dorset, by the beginning of the eighteenth century,” meaning that Hardy accurately depicts the nature and provenance of this common practice (Turner et al 104).
“swelling reeds and sedge forming a flexible palisade” at its banks (109). With everything else ranged outward from this unnamed but central river, bright colors of well-watered trees’ leaves—“their colour being yellow beside anything green, green beside anything yellow”—are home to three cuckoos whose calls “at the present moment resounding” (109). To top off this idyll, as Boldwood enters the scene, the buttercups’ yellow pollen “bronze[s]” his boots in “artistic gradations,” as if the natural elements of this landscape, with its visual, aural, and tactile elements, affect the humans who enter it and not vice versa.

However, Boldwood’s arrival at the sheepwashing pool, among the constellation of other characters and their respective desires, or lack thereof, changes the description’s tenor. The sentence following that depicting Boldwood's “artistic” arrival at the pool drops the impressionistic register in favor of schematic description of the pool (after which the men working in and with it follows): “A tributary of the main stream flowed through the basin of the pool by means of an inlet and outlet at opposite points of its diameter,” recounts the narrator dryly. Then he lists the men, beginning, tellingly, with “Shepherd Oak” and then Bathsheba, “standing by in a new brown riding-habit,” her horse’s bridle across her arm (109). We have thus been presented with a turn from a kind of paean to an idealized watershed and toward the structure erected to enable farm work under Bathsheba’s supervision and Oak’s direction.

The wet, dirty, and presumably smelly work of washing the sheep before their shearing consists in moving them through the structure and its controlled diversion of the river’s waters. Using its inlet and outlet gates, the men can roughly set the rate and level of the water’s flow through the pool. They then push the the “meek sheep” into the water from the lower gate, and Oak uses a kind of crutch to force them completely under the surface while also preventing them from drowning (109). Moving them upwards, the sheep are let out of the upper gate, “against the
stream” of the flowing water, “all impurities thus flowing away below” (110). In a partial
diversion and damming of the watershed’s progress in draining the water-meadow via its central
river, the sheep’s wool is immersed in and filled with the pool’s water, then drained by the water
running through the opening of the upper gate, leaving whatever dirt, insects, waste, or other
“impurities” would reduce its attractiveness and price at market to run back into, and eventually
out of, the pool and then to the river.

The practical details of its use having removed the idyllic artistry of the setting, the
sheepwashing pool stages the various culturally problematic movements of desire that drive the
novel’s ensuing plot, while also combining that site’s literal function with the less tangible
movements of desire or “feeling,” which will be so important for this novel and for The Return of
the Native as expressed through the hydrological features of their landscapes. In terms of the
culturally-fraught contexts, both gender’s role in agricultural, social, and economic activity and
the class-based strictures placed on the expression of romantic or erotic desire meet here. The
social classes of the characters are reflected in their physical relationship to the pool, with
Bathsheba nearby in a riding habit—the clothes a reminder of her gender-nonconforming riding
style, specifically, and her proximity to the work which she insists on overseeing that she is
owner and operator of the farm, generally—Gabriel working from the pool’s “brink” in
performing the most skilled aspect of the work, the subordinate laborers immersed in the water
with their bodies soaked and hands on the sheep, and Boldwood standing off until Bathsheba
leaves in anticipation of his desire. That the pool belongs to Bathsheba inheres in the problems
of her lack of desire for Boldwood, as a tellingly ignorant part of the marriage offer he makes her
by the riverbank is that she will no longer be required perform any kind of manual work, “never
so much as…look out of doors at hay making time” (112). Oak himself only works at the brink
of the pool due to his earlier loss of his own herd, which had potentially promised to raise his social status over time as he would have paid off his various loans, possibly even moving from tenant to owner in the long run. The others have no choice but to do as they must clouding up the “clearest water” of the pool by the flushing the “impurities” from the sheep’s wool.

Most importantly, in writing this proposal scene onto the space of the sheepwashing pool, Hardy begins the expression of the novel’s dynamics of desire and emotion (which also fall under the more general term “feeling” throughout *Far From the Madding Crowd* and *The Return of the Native*). These dynamics consist of the natural, physically-experienced, and unpredictable “flushes” of desire, which consistently take linguistic form in flowing, liquid terms. Such feeling emerges early in the novel, but it comes to the fore most strongly here.

Hardy threads this concept through Boldwood’s speech as he begins his proposal, and Bathsheba’s language responds in kind. Boldwood begins, “I feel—almost—too much—to think,” which leads quickly to his pronouncement that he came to propose marriage (110, emphasis mine). Bathsheba initially responds by closing her lips, as if preventing them from releasing any unthoughtful, impulsive speech. Then, she responds with a line remarkably similarly worded (though in the negative) and punctuated: “I feel, Mr Boldwood, that, though I respect you much, I do not feel—what would justify me to—in accepting your offer” (111, emphasis mine). Her “stammering,” as the narrator calls it, just as Boldwood’s seems to, reflects a kind of blockage of regular bodily control, or control of linguistic expression, via “feeling,” and the apparent unruliness of such feeling then consumes Boldwood upon hearing this negative
response. Her answer “seemed to open the sluices of feeling that Boldwood had as yet kept closed” (111, emphasis mine). These “open sluices” release his declaration, “I want you for my wife—so much so that no other feeling can abide in me,” which presents the corporeality, the bodily phenomenon, that romantic or sexual desire constitutes for this novel (as it will for The Return of the Native as well) (111). Given that the focus on the sheepwashing pool’s two-gate design and depiction of their practical use by selective opening and closing come just before the mention of Boldwood’s “sluices” of emotion, the literal and metaphorical water-management structures cannot but be seen as interacting. Also, vitally, they do so as primary literal and symbolic structures within a key moment of misdirected, unrequited desire circling around and to some extent emerging from Bathsheba.

Without working through further close reading of Far From the Madding Crowd as a precedent for The Return of the Native’s hydrological exploration, I posit that such discussions over “feeling” in Far From show that, as a phenomenon emanating from within one person but affecting one or more other characters’ desire, or “feeling,” Hardy writes desire as a kind of liquid medium. When coming into being within one character, feeling moves in “pulses,” “impulses,” or is “pulsating” as if literally moving from the heart—leading to The Return of the Native’s fixation on “heart” (if not also Jude’s title in serial form). When it begins to move outward from the body, it often begins to do so in “flushes,” which then suggest the further flooding beyond internal controls like Boldwood’s “sluices” just described. However, the way

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182 Bathsheba follows her initial refusal with a similar, second response that reveals her lack of “feeling” for him: “I’m afraid I can’t marry you, much as I respect you. You are too dignified for me to suit you, Sir” (111). This takes almost the exactly inverse form to the refusal she gave Gabriel Oak earlier, in which his lower economic standing was a factor in her decision, as the “Sir” she addresses Boldwood with invokes his relative wealth in contrast to her own. In the case of Oak, Bathsheba had also invoke her lack of “love” for him, which seemed cruel even to her given that he “feel[s] so much” (28). Thus, as with Boldwood, though economics factor into the decisions, her refusals turn primarily on “feeling.”
that *Far From the Madding Crowd* sets the stage for further development of such examination in *The Return of the Native* is through the complication of “feeling’s” description as liquid by its conjunction with literal water management features like the sheepwashing pool that allows for a modicum of control over a tributary of the meadow’s silently flowing river. The pool embodies a dichotomy of damming up for useful control that which would naturally flow through and drain a topography, and in this meeting of the literal and symbolic flowing and damming up which Hardy orchestrates, it becomes an image of Bathsheba’s self-acknowledged struggle between her “impulsive nature” and her “deliberative aspect”—her desire to remain independent while also exploring romantic relationships with three men of various social statures (112).183 *Far From the Madding Crowd*’s 99 uses of the word “feeling,” then, inhere in an initial exploration of how its erratic, natural, physiological, flowing nature can or cannot be constrained, governed, or channeled by social and economic structures, and with what consequences. Though Troy, Fanny, Boldwood all die, Gabriel and Bathsheba end up together on the basis of love or mutual desire, framing the sheepwashing pool and the scene around it as a deadly obstacle, though perhaps not for the most central protagonist(s); whereas, *The Return of the Native* uses such features and scenes as more clearly catastrophic, in a way that unites their literal and symbolic resonances.

2. *The Return of the Native*

In a novel in which a central character, Clym Yeobright, explicitly considers his present behavior and future course against a culturally recognized “channel of social ascent” and an

183 For another example of such flowing and flooding “feeling” as captured alongside literal flowing, flooding water in *FFMC*, see the combination of Fanny Robbin’s flooded, partially ruined gravesite, Troy’s reaction to seeing it, and Bathsheba’s own reaction to that of Troy in Chapter 45. No agricultural practices are involved, but Hardy again foregrounds the construction of the church’s gargoyles that enable the flooding, along with the nature of the rocks and soil pertinent to it, drawing attention to them.
illicit pair’s dangerous co-appearance in the novel occurs on the earthen bank of an old reservoir and their death in a flooding weir-pool, the act of damming that which would flow is to invite the possibility of disaster, though simultaneously, individuals whose courses fluctuate, diverge from cultural tenets, or reverse upon themselves equally invite destructive consequences (187, emphasis mine). Although Hardy’s narrator establishes Egdon Heath as a topography “neither so steep as to be destructible by weather, nor so flat as to be the victim of floods and deposits,” he also introduces manmade features into that topography designed to maintain the truth of this statement, or to render and hold that supposedly immutable heath useful, arable, or otherwise productive for its inhabitants (12). Vitally, this introduction of primitive hydrological management structures also introduces the novel’s humanistic interest—the flowing, damming up, and flooding of emotion and desire (often within “feeling”), as Hardy explicitly figures it.

Though Clym Yeobright is the “native” who returns to Egdon Heath, Eustacia initiates the novel’s fluid dynamics of desire and questions about their governing. When she acts upon her culturally divergent desires, she encourages others to do the same, so that the nature of her desires becomes a predominant though dangerous form—one imagined as a flowing liquid. As this desire is dammed up by the enforcement of cultural strictures against its free expression, the resulting flood destroys more than her own life.\(^{184}\) The reserve water supply pool by which she

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\(^{184}\) Though I have no evidence that Hardy read any text featuring this term, what would otherwise be a surprisingly telling coincidence of the etymology of Eustacia’s name reflects this point. From the German “eustatisch,” the word “eustatic” entered English in the nineteenth century and denoted “of or pertaining to eustasy,” which the OED defines as an anglicized “back-formation” from modern Latin stasis and the Greek prefix eu- (OED “eustatic”). The noun “eustasy” refers to a uniform change in water level across a system, or even explicitly a global change in sea level (OED “eustasy”). The terms “hydrostatic” and “hydrostatics” had existed in English since the seventeenth century (the latter meaning the branch of Physics “which treats of the pressure and equilibrium of liquids at rest; the statics of liquids: a branch of Hydrodynamics in the wider since” [OED “hydrostatics”]). And in 1864, William Thomson had suggested a division of the study of “Dynamics” into “Kinetics” and “Statics” in a publication of the Royal Society of London. Thus, Hardy might well have been aware of the term, but if not, then he certainly could have combined the component parts from Greek and physical science to reflect Eustacia’s dominant role in the “statics” of desire rising to a destructive flood stage in The Return of the Native.
waits for Wildeve in Chapter 6 begins the novel’s two interrelated lines of hydrologically-conceived investigation: one, Eustacia’s unique nature and “feeling” emerging and moving as a flow in her and the characters she contacts; and two, the presence of manmade structures that inhibit, partially block, and divert the natural course of water that would otherwise flow down the valleys, water-courses, and primary river of Egdon Heath.¹⁸⁵

This establishing episode by “Captain” Vye’s pool and the tensions that it brings into the narrative constitute a highly charged piece of the hydrological system of Egdon Heath, which has been richly and variously discussed in the past without a specific focus on the importance of the water management sites and structures that this discussion brings. In terms of important contributions to understanding the heath, J. Hillis Miller’s “Philosophy, Literature, Topography: Heidegger and Hardy,” from Topographies perhaps most intriguingly opens up the fictional landscape. Where Rosemary Morgan senses an “anti-pastorial” landscape that features intentionally anomalous dangers in Far From the Madding Crowd’s Wessex (which corresponds to the irony I posited in the scene setting of the sheepwashing pool), J. Hillis Miller reads The Return of the Native as engaged in a kind of remapping of actual topography within a narrative based on those actual places and the “psycho-socio-economic realities of ways of life there,” which results in a “complex form of the metonymy whereby environment may be a figurative for what it environs, in this case the agents who move, act, and interact with the scene” (19, 20). Miller sees it as equally true that Egdon Heath is formative of the characters who move within it and might be said to stand for it, just as much as it is valid to say that the heath performs a symbolic expression of their human relationships (40). Along these lines, Miller writes that while Eustacia’s movement throughout the novel “is motivated, always, by desire,” this desire is

¹⁸⁵ Hardy never names this river that corresponds to the River Frome, or, at least, one of its main tributaries.
ultimately “blocked as the stream is blocked (by the weir, over which an engorged river will eventually crest)” (49). Thus, Miller creates an analogy (“as the stream is blocked,” just so is Eustacia’s desire) which allows for possibilities in the lack of clear primacy between literal, topographical elements and symbolically flowing, dammed, then flooding character elements. From within this ambivalent analogy, Miller sees the “blockage” of Eustacia’s desires as responsible for making it “flow all the more dangerously, as, in Kant’s theory of the sublime,” where “a Hemmung is necessary to the sudden flowing forth, Ergeißung, of emotion in… negative pleasure” (50). A pouring out, or effusion, of deadly desire results from the obstruction of its movement.

However, complicating the matter is that sites like Vye’s pool, earthen “redans” and drainage ditches, and, most obviously, the Shadwater Weir are not nature, nor naturally occurring. They were built in the past by the heath’s residents. This fact complicates Miller’s position that the heath landscape determines character and action just as much as it can symbolize what occurs in the human interactions. As built sites intended to shape the otherwise-natural, such water-management features might be considered a meeting of the two—heath/nature and character—that expresses something about how the two actually do concretely carry out the structuring of one another. Furthermore, this section’s introduction showed how such simplistic, traditional features handed down by local experience and practice (“hydraulics’ rather than ‘hydrodynamics”) were under threat of becoming obsolete in the 1840’s and 1850’s, thanks to the development of more complex, industry-produced systems of drainage and irrigation that were spreading through rural England from its urban centers. This pressure casts the conflict of

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186 The OED defines “redan” as a “simple fieldwork, having two faces which form a salient angle, and normally open at the rear.”
symbolized desire’s blockage and containment within another cultural conflict or era of change for those soon-to-be outdated features themselves.\footnote{187}

Eustacia’s primacy in this examination, as in the narrative, comes from her setting in motion an extended figuration of desire as a naturally flowing liquid—one only dammed up at great risk to the community doing the damming and the individual whose desire will flow. In showing the pool her grandfather believes to be a more than adequate source of drinking water in unusual circumstances like his well’s failure, Hardy’s narrator leads the reader in following “the woman” who is Eustacia Vye to its “redan” (59). On her way, readers learn that her “brain had authorised what it could not regulate” in motivating her walk to the pool, a fact which makes it “evident,” according to the narrator, that “she had been existing in a suppressed state, and not one of langour or stagnation” (57). “Stagnation” would be, if not inappropriate, then nearly out of place, as a descriptor for any person—much more so than “langour” whose first five definitions in the \textit{OED} refer explicitly to a human state of mind and/or body—if not for the presence of the Captain’s old-fashioned pool, reserving water for potential use in irrigation or for consumption under severer circumstances. Like herself, then, this water is not by nature (or topography) “stagnant.” It would run in the nearby ditch if not for the very basic engineering performed in the past which holds it in a similarly “suppressed state” of intended and controlled

\footnotetext{187}{It seems worth noting that Wildeve is an ex-engineer who turned to pub ownership after failing in that profession. This background constitutes a major and obviously conscious choice on Hardy’s behalf from the original version of Wildeve as “Toogood,” an herbalist, as noted by Tony Slade (400). Rather than being a so-called “conjuror” or “white witch” by locals as in the first manuscript, Wildeve becomes a failed engineer. Furthermore, Eustacia specifically considers the fact that he “served his articles with a civil engineer” when considering his newly-inherited eleven-thousand pounds (292). Slade calls this change “a startling development away from Hardy’s original concept,” and though I hesitate to posit anything definitive about this change, a failed civil engineer fits well, macabre as it may be to say, drowned in a failing water management structure and in a novel whose interest in such features is as important as I argue it is (400). (He fails to divert or control Eustacia’s desires but encourages them to the point of their mutual death in the resulting flood—the passage quoted as an epigraph here.)}
motionlessness. The narrator’s connecting of Eustacia’s thoughts while approaching her secret meeting with Wildeve, who has already committed to marrying Thomasin, to the pool’s nature as the result of a structure that prevents flowing, once she arrives there and stands upon the bank, all suggests the possibility of her no longer remaining “stagnant,” of a potential breaking out or flooding. This seems especially true, given that the paddock on one side of its bank is “uncultivated,” infiltrated by the heath and fern which “had insidiously crept in, and were asserting their old supremacy” over the manmade structure (59). The structure is beginning to fail, is moving toward that eventuality, as the heath slowly reclaims it.

This juxtaposition begins to establish the pattern I will explore here of the overlaying of literal levels of water management structures and problematic movement of individual romantic, sexual desires in Return. That Wildeve signals Eustacia by throwing a pebble into into the pool which the fire’s caretaker, Johnny Nunsuch, takes for a “hopfrog” noisily breaking the water’s surface, begins to drive this overlaying home. This first hint at a future breakdown—our breakout—of repression, or “suppression,” of Eustacia’s desires also comes with the first sign of that flooding forth’s ramifications—as it begins a contradiction between Eustacia’s nature and that of the water itself, which effectively foretells her later drowning in Shadwater Weir.

In addition, the breaking of its surface tension as a reminder of the pent-up water’s kinetic potential coincides with what proves to be an insurmountable conflict between the “smouldering rebelliousness” underlying Eustacia’s enticing, if somehow dark, appearance, “the shady splendour of her beauty” which is “the real surface of the sad and stifled warmth within her” (68, emphasis mine). In fact, the narrator informs us, “you could fancy the colour of Eustacia’s soul to be flame-like,” while the “sparks from it that rose into her dark pupils gave the same impression” (69, emphasis mine). Reading back into the initial description of Eustacia
standing next to the fire near the pool, the fact that within “the smooth water of the pool the fire appeared upside down” seems to warn of an uncomfortable, or, rather, impossible, immersion of her flame-like, stifled warmth that wishes to rise to the surface of her eyes and to steer her actions (59). This foreboding image is reinforced by the rhythm of embers rolling down from the bank and dropping “with a hiss into the pool” while Johnny tends it. Thus, Eustacia’s affiliation with fire, warmth, and that with rebelliousness, is presaged as being put out with a “hiss” in the cold water of the heath—if not also within another simple water management structure, then most likely due to that exact rebelliousness (which takes its place within the channels of predominant, conservative, rural Wessex mores over romance, sex, and marriage).

This arrangement sets up an undeniable tension between the pent-up liquid (and by symbolic extension, desire or “feeling”) that would flow, even flood, from its traditionally-designed reservoir, and that structural containment that appears ready to quench the warm flow of “feeling” (or even its sources). In this symbolic extension, then, the initial description of this tension sets the stage for the novel’s key conflicts—the centrality of desire in what constitutes

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188 Trish Ferguson’s “Bonfire Night in Thomas Hardy’s The Return of the Native” shows that Hardy’s employment of Eustacia’s and the others’ bonfires as part of the 5th of November “Bonfire Night” is indeed intended to call up fears of rebelliousness, not only of individuals only but of entire countrysides’ “primitive rebellious instinct[s],” which Hardy emphasizes through the paganism-tinged descriptors many others have noted in his early scenes (90). To this, Ferguson adds that disturbances during this night often constituted rioting, but with a “narrowly focused agenda of seeking redress for economic grievances manifested in personal attacks on unpopular landowners and employers,” which could feature attacks on property, arson, effigy burning, and other disruptive and potentially quite destructive acts (94). Thus, for Ferguson, rebelliousness signified by these bonfires also could entail direct challenges to and attacks against the socioeconomic structure of agricultural England at the time. Specifically in Dorset in 1830 and 1831, she writes, there is evidence that “Bonfire Night” disturbances were motivated by complaints over wages and the general “socioeconomic condition of the rural laborers” (96). While Ferguson sees Eustacia’s death as the “anxiou[s] suppress[ion]” of her “threat of revolution,” she also points out that Hardy’s choice to include a sign at the Quiet Woman Inn reading, “Since the woman’s quiet, Let no man breed a riot,” as “suggestive of other rebellious energies related to those symbolized by Eustacia,” which are represented in their own, repeated bonfire burning (106). Ferguson’s multiple uses of the term “energy/energies” in discussing Eustacia’s rebelliousness suggest that she, too, senses a kind of kinetic, or thermodynamic, nature to Hardy’s writing of her and of unruly, divergent desires in general.
political, economic, or, primarily, sexual rebelliousness in the novel. In the passages immediately following Eustacia’s description via imagery of warmth, fire, and “smouldering rebelliousness,” Hardy uses the word “desire” four times, and it is the “warmth” he specifically describes as “stifled” by Egdon Heath that corresponds to her earlier depiction as “stagnant.” This is not to say that Hardy mixes metaphors here, but the elemental stifling of Eustacia is the containment of, and promise to finally extinguish, her desires—and those desires, like the desires of the novel’s other central characters, flow through them bodily, pumped autonomically by their hearts. No surprise, then, that the novel uses the word “desire” 23 times and the word “heart” or “heart”-based compounds a whopping 83 time to express this idea.

The extent to which “feeling”—as a range of emotional affects from romantic jealousy, to curiosity, to erotic desire, to a more encompassing love, and perhaps to the desire to possess another and even to extreme sadness—drives The Return of the Native would be hard to overestimate. Likewise, given the above statistical view of Hardy’s language, it would be hard to overstate how fully “feeling” appears as a matter of “heart.” Finally, as I have shown, Eustacia’s appearance at her grandfather’s pool sets in motion the novel’s imagining of desire or “feeling” as a flowing, bodily medium. Without diverting the discussion too fully into this repeated imagery, a brief selection of examples here will show that it bears two important aspects: that desire flows, flushes, can be dammed and, consequently, may flood; and that this movement pushes against a kind of hydrological model for restraint and carefulness in action which is conveyed throughout by use of the word “course,” which desire seems created to confound.

In a variety of ways, Hardy makes clear that his characters’ desires and, sometimes, other strong emotions exist as a figurative liquid. Eustacia’s desire for Wildeve in Book I, following his failed attempt to marry Thomasin, is “dammed into a flood” by the impediment of its action
that Thomasin’s interest in Wildeve constitutes (95). When Clym gives his pre-Christian-era artifact from the “opened” barrow to Eustacia rather than to his mother, who recognizes the direction of his affection, she “makes no reply” because “the current of her feeling [is] too pronounced to admit it” (189). In other words, the flood of emotion prevents her speech, much as it partially blocked the speech of Boldwood and Bathsheba in the sheepwashing pool episode of *Far From the Madding Crowd*. Similarly, the stagnation of Eustacia’s inner rebelliousness that was introduced in the opening pool scene reappears during the phase of secret courtship between her and Clym. After Clym calls a lapse in their meetings “sad” rather than “long,” Eustacia responds that he does not feel the length of the absence because of his occupation, while to her, “who can do nothing, it has been like living under stagnant water,” (194). Like the pool of water by which she first encounters and encourages the desires of Wildeve and Yeobright (as I will show momentarily), she feels any pause in the expression of her desire as a stagnation. Also in the same moment, like an only minimally managed body of water (the pool’s water often being undrinkable because of its stagnation), Eustacia expects that they “shall not love like this always” because “[n]othing can insure the continuance of love,” which sounds like a hydrodynamicist’s fear for a useful stream, as it “will evaporate like a spirit” (195). Presumably, the final image denotes a mineral “spirit” which evaporates at room temperature, though not long after uttering these words she agrees to marry him.

Further examples of this pattern then lead back into the eventual destructiveness of unpredictable flows of desire and the cultural restraints placed on them. After Clym begins working as a furze cutter, Eustacia goes on a walk in order to leave the “depression” of her new lot in life, which promises to remain her lot indefinitely. She comes across Wildeve taking part in a “gypsying” dance, and once meeting his eyes, wonders “why the sight of him should have
instigated that sudden rush of blood” sent by her “pulses” that “move too quickly for longer
rumination of any kind?” (255, 256). As she “float[s] round and round” on Wildeve’s arm, her
face becomes “rapt and statuesque” because her soul has “passed away from and forgotten her
features, which were left empty and quiescent, as they always are when feeling goes beyond their
register” (256, emphasis mine). Rushing, pulsing feeling has broken out of the physical body’s
limits, or its ability to convey it, and the stream-like desire of Eustacia that arises in this dance
returns again later in Wildeve’s fateful visit to her and Clym’s home when he expects Clym to be
out working. The narrator remarks in that later scene that “[n]obody could have imagined from
her bearing now that here stood the same woman who had joined with him in the impassioned
dance of the week before, unless indeed he could have penetrated below the surface and gauged
the real depth of that still stream” (273, emphasis mine). Considering this image closely, one
wonders what exactly a “still stream” might be? A stream inherently runs, or it is a pool, puddle,
pond, or any kind of stagnant, non-flowing body of water. It appears, then, that Hardy reiterates
in this moment a dichotomy between that which will naturally, erratically, and perhaps culturally-
inappropriately flow and the structures of constraint that aim to immobilize and collect it to
prevent its divergent movement. The image of “penetrat[ing] below the surface” hearkens back
to the novel’s first pool-side meeting and its ramifications for the pair’s desires, as well, in which
the narration focuses on the first pebble breaking the water’s surface.

The picnic dance that creates this marriage-defying desire which collects and ultimately
floods out of Eustacia’s and Wildeve’s control also features a more-than-usually explicit citation
of social structures by Hardy. “The dance had become like an irresistible attack upon whatever
sense of social order there was in their minds,” his narrator says, “to drive them back into old
paths which were no longer regular” (257). These “old paths” of creating, acknowledging, and,
as it is also mentioned, indulging sexual desires in a way that perhaps resembles the heath’s pre-Christian festivals contrast with the “courses” of nineteenth-century social expectations for romantic relationships, based as they are on patriarchal gender and economic expectations.

The word “course” carries multiple meanings that Hardy takes advantage of in *The Return of the Native* in order to help convey the contestation between erratically flowing, flooding desires and the “social order” that would seek to steer them into well-contained, clearly directed channels. He uses the word “course” some 80 times, though 39 of those come in the phrase, “of course,” and several others simply to denote elapsing time (“in the course of twenty minutes,” for example) (99). The remaining uses of the term combine several of the senses that the *OED* lists for “course” in the nineteenth century. The second primary meaning, “[o]nward movement in a particular path, as of the heavenly bodies, (or) a ship,” for example, directly engages with idea that the village picnic dance sets its revelers onto a different, culturally threatening “path”—though it does so through a metaphorical sense of “path” and “course” that entails another meaning for the latter, a “line of (personal) action, way of acting, (or) method of proceeding” (*OED* “course”).

These interactions of the figurative and the literal “courses” fit within Miller’s sense of the novel’s remapping action and my argument about the water management sites’ place in such a topography. They continue by combining the sense of the word as “[r]unning (of liquids); flow, (or) flux,” which Hardy clearly invokes in discussing the primary river (as the medium flowing) through the heath and the various, sometimes dried-up “water-courses” across the heath like the ones Mrs. Yeobright encounters on the day she dies (as the channel for that medium), and, furthermore, in the meanings, “[t]he line along which anything runs or travels; the path or way taken by a moving body, a flowing stream, etc.,” which accords with Hardy’s descriptions of
characters’ movements in and across the heath. Finally, “course” as the “continuing process (of time), succession (of events)” or “progress onward or through successive stages” maps not only onto the novel’s frequent attention to characters’ paths and progress through life as “courses” (with a specific ramification for the management structures as I will show directly), but it also reminds of the kind of social-moral developmental models often incubated through flows of serial literature as I discussed in Chapter 1. Along those lines, Hardy employs the term “course” in multiple chapter titles in *The Return of the Native*, invoking a now-obsolete meaning of the word as the “continuous connected purport or tenor of a narrative” while still also referring to the intersecting, sometimes blocked, sometimes reversing, courses the characters choose individually and as pairs.

In *The Return of the Native*, a kind of “course” model similar to the forward flowing, dissipation-avoiding personal progress of *David Copperfield* exists in theory and in discussions between central characters, yet its realization as such is tormented by the various tragedies, knowingly or unknowingly unwise decisions, and often because these decisions are made on the basis of “feeling,” which certain chosen courses do not indulge in or reward. Clym’s discussions with his mother and with Eustacia exemplify this, as he specifically calls into question or changes his own “courses.” When informing his mother that he will abandon his Paris-based business in favor of teaching poor, local children, he announces “I am going to take an entirely new course,” to which his mother—perhaps wisely, in terms of the way their society rewards the two forms of work and the way that such differences in economic station affect personal freedom and even survival—questions him (174). “After all the trouble that has been taken to give [him] a start,” importantly, according to Mrs. Yeobright, it is his “fancies” which will be his “ruin” (174). Later, she ironically encourages him on in this new direction, as he seems
“determined to hate the course [he] was pursuing” (187). What his mother perceives about Clym’s actions that he does not are that they are erratic reversals motivated by swings of “fancy” or “feeling” and not evidence of clearly delineated, clearly observable progress. What Clym does recognize about his new “course” in life is that it is a rebellion against what his mother calls his “fancy,” his desire to live in a “world where personal ambition was not the only recognised form of progress” (193). He plans an educational scheme “far enough removed from one wherein the education of youth should be made a mere channel of social ascent” (187). Clym wants to buck the economic basis of social status in his culture, possessing “no desire of that sort” that motivates the privilege-based, English educational system, and at the same time determines that his new “course” against “progress” of this type can be carried out simply by hard work—leading to the failure of his sight. After adding the decision to marry Eustacia to his decision to abandon a successful business for a financially risky, culturally divergent educational career, further alienating his mother, Clym regards that “[i]t had hardly been a propitious beginning, but he had chosen his course, and would show no swerving” (207). In what will quickly become a paternalistic lack of self-recognition, Clym believes that his own reversals of course based on changing desires for his life lie beyond his mother’s and his wife’s fair questioning, he finds the latter’s similar reversals of desire easy to judge.

Desire’s tension against culturally determined or financially or socially endorsed “courses” also more explicitly turn on “feeling” in the context of lust, love, romance, and marriage, and the novel most clearly places Eustacia and Wildeve in the role of carrying out such diversions from “course.” The narrator declares in the early introduction of Eustacia that she considers love “with an ever-growing consciousness of cruelty, which tended to breed actions of reckless unconventionality, framed to snatch a year’s, a week’s, even an hour’s passion from
anywhere while it could be won” (72). Furthermore, “she seemed to long for the abstraction
called passionate love more than for any particular lover,” which makes the objects of her desire,
as much as the courses she pursues toward them, completely unpredictable and potentially
variable over those years, weeks, and hours (71). When Venn attempts to steer her back
toward Wildeve after learning of her new interest in Clym, he finds that “a system of
inducement…which might have carried weaker country lasses along with it,” like a vessel on a
stream, “had merely repelled Eustacia” (95). Similarly, and even more paternalistically, Clym
recognizes after Eustacia brings up their moving to Paris after their marriage, that he was
“confront[ing]” for “the first time…the fact of the indirectness of a woman’s movement towards
her desire” (243). He perceives that Eustacia’s earlier, apparent acceptance of their new life
course was likely a temporary step in the direction of her intended, later return to Paris after all.

This clearly paternalistic, if not misogynistic, observation from Clym’s perspective
reminds us of the social applications of flow dynamics invoked throughout this larger work, in
which an almost solely white, male assortment of authorities helped to promote the concept of a
life lived as a non-dissipated, non-deviating, communally productive course. I would suggest
that Hardy recognizes this fact, given his representations of social injustices generally and those
against women, specifically, and given that it creates a clear irony concerning Clym which he in
no way recognizes. Even his own mother has twice chastised him for his “fancy” in changing
courses, but when he understands that Eustacia still wants to go to Paris and has married him
with the idea of encouraging that outcome despite his lack of intention, he feels justified in

189 “Course” also takes the form of Eustacia’s emotional expression in the key moment in which she
knows Clym’s mother has tried to visit and seen her at the window without being admitted: “Thought,
misgiving, regret, fear, resolution ran their swift course of expression in Eustacia’s dark eyes. She was
face to face with a monstrous difficulty, and she resolved to get free of it by postponement” (283,
emphasis mine).
judging her. While he may consistently reverse “courses”—with completely different objects at
their ends, even—this constitutes to him a different action than his own wife’s “indirectness…
towards her desire” which seems to him fanciful, unnecessary, even trifling. Hardy drives this
irony home in the narratological point that Clym’s new course as a local school teacher
necessitates the trip to Budmouth for reading materials which catalyzes an irremediable “breach”
in the relationships between the triangle of Eustacia, Wildeve, and himself.

After Clym has left and Eustacia has learned that Wildeve has become rich, she meets
him at the inn, and their physical proximity again ignites their mutual desires. Wildeve
repeatedly experiences flushes of “feeling,” and the moment he first learns of Clym’s decision to
abandon business in favor of teaching, with Eustacia in tow, he experiences “a curious heart-ache
within him” that signals the “old longing for Eustacia ha[s] reappeared in his soul” (212).
Wildeve’s bodily reaction echoes Eustacia’s own in the earlier moment when she learned of his
planned marriage to Thomasin, in so far as the “damming up” of desire’s expression has caused a
flood of “fevered feeling” flowing again toward Eustacia (212). From his bodily “heart’s” ache,
Wildeve’s subsequent, soul-based “feeling” for Eustacia pushes the breach of the marriage
contract bonding her to Clym. This breach will then eventually exist as (or in) the flood which
breaches Shadwater Weir and drowns both of them.

In all the novel’s examples of “feeling” flowing contrary to, or problematically between,
various so-called “courses,” one constant remains. Culture, even if on the most local, most basic
level, wants to set these channels of action, and will enforce them, regardless of how arbitrary
they may seem compared to the bodily experience of emotions that the central characters feel

190 I suggest Hardy intended Clym’s dismissive paternalism to read as such, also, in a kind of more wide-
ranging version of what Bathsheba Everdene’ charges about her ability to linguistically express her
“feeling” in Far From the Madding Crowd: “It is difficult for a woman to define her feelings in language
which is chiefly made by men to express theirs” (308).
and often use as a basis of action. Just as the social applications of flow dynamics in urban centers aimed at systematizing a social landscape which forced problematic, “surplus” populations into channels of useful movement (for authorities, if not for themselves), the localized scale of cultural management in Egdon Heath—which corresponds to the relatively primitive set of hydrological management structures there—nonetheless determines the nature of conflict that the novel’s “feeling”-driven characters endure. In this way, the “breach” that begins within the heart of Wildeve, with its “fevered feeling,” harkens back once again to the physical water management structures of Egdon Heath.

These structures that crudely manage water’s movement in and through Egdon Heath do not merely map the novel’s problems of “feeling,” but they function to enable the otherwise more abstract, cultural reinforcement of particular “courses” into the literal topography. During Wildeve and Eustacia’s first meeting at her grandfather’s reserve water pool, the specifics of its architecture actually enable the secrecy of the meetings at night—as Wildeve both “bec[omes] dimly visible against the low-reaching sky over the valley, beyond he outer margin of the pool,” and then “vanishe[s] on the other side of the pool as he had come” after she denies him a kiss on the mouth or face, a kiss of the hand, and then even a handshake in order to dam up the expression of their mutual sexual desire for a while longer, as part of one of her ways of “snatching” short-lived thrills (63, 67). The intervention of Diggory Venn that further impels and complicates the narrative results, similarly, from Johnny Nunsuch’s overhearing of the conversation by being hidden by one of the pool’s earthen banks (75). Hardy closely narrates each of Eustacia’s movements around the pool, up its earthen steps and banks, as if refusing to let his readers ignore the pool’s physicality.
This pool which Hardy first aligned with the active “suppression” of Eustacia’s emotional and sexual dynamism then also becomes the site which facilitates her attraction to Clym and his reciprocal desire for her. After failing to help retrieve the bucket from her grandfather’s well, Clym offers to have water carried to them from relatively far off. Eustacia then leads him to the Captain’s pool to discuss whether its water would serve temporarily for their household. Once there, they only need to look “at each other for one instant” for their desire to emerge. Notably from within her body and not from within Clym’s, “the calm fixity of her features sublimates itself into an expression of warmth” that they both experience without the necessity of linguistic expression or form, erupting once again as a physiological phenomenon, as if a warm stream from the heart (182). The evidence of her Bonfire Night meeting with Wildeve remains in the form of the ashes of the fire, though only Eustacia understands their meaning, but the desire they experience can in no way be lessened or contradicted by it. Hardy even repeats the observation from the first scene by this pool about Eustacia’s “apparent langour” not actually “aris[ing] from a lack of force,” implying again that it is merely “suppressed” or retained within some socialized strictures that perform with desire what Captain Vye’s pool does with otherwise naturally falling and running precipitation. The literal level of physical encounter with the structure and their action in relation to it that reveals this depth of dynamism to the reader for the second time and, presumably, to Clym for the first—thanks to the shape of the pool’s construction, as she mounts the steps built into the boundary bank of the pool’s enclosure (183).

Eustacia throws a pebble into the water after declaring it “the only kind of water we have,” repeating Wildeve’s signal during their first meeting there. In ignorance of her thought that “no Wildeve appeared on the other side, as on a previous occasion,” Clym affirms its purity “at this time of the year” thanks to recent rain (183). From here on, the pool bears a relationship
to the creation and expression of desire between them. After the family strife caused by Clym’s giving the antiquity from the opened barrow to Eustacia rather than to his mother already discussed, spring begins on the heath, and the pool’s state lies at the heart of Hardy’s description of it. The season’s “awakening” is “stealthy” in nature, leading Hardy’s narrator directly to “[t]he pool outside the bank by Eustacia’s dwelling, which seemed as dead and desolate as ever to an observer who moved and made noises in his observation,” but would “disclose a state of great animation when silently watched a little while” (189). This “state of great animation” lying hidden under apparent lifelessness corresponds to the figurative “red spot…that lingered upon [Clym’s] lips like a seal set there” on a night like the narrator describes, when only a keen, silent observer could see the pool’s animation (190). As he “descend[s] into the Blooms-End valley from beside that very pool,” the way the pool’s the water would flow if released or if its banks were breached, he fears the “abiding presence of this impress” will actually be visible to his mother (189, 190). The image of the seal again implies heat in the making of wax malleable to the seal’s shape, and certainly that the two intend to marry.

This pool’s repeated importance to the development of the romantic, erotic desires of Eustacia and Clym for one another drives the conflict between Clym and his mother as well, critical as she already was of his new “courses.” Chapter 1 of Book IV, entitled “The Recounter by the Pool,” depicts a final, familial break between Clym’s mother and his soon-to-be bride (235). Noting that “rencounter” does not indicate a “re-encounter” but a “hostile” one, the by-now familiar, passion-enabling pool can be understood, again, to enable troublesome emotions
After an argument involving the money Mrs. Yeobright had intended as a gift for Clym and Eustacia and perceived personal slights between the two, Eustacia is left standing, “looking into the pool” that captures the sense of her desire’s suppression.

The following death of Mrs. Yeobright that results from her being turned away from Clym’s and Eustacia’s home occurs amid a carefully described aridity across the heath which shows the clear limits of its traditional water management structures. It constitutes “one of a series of days during which snug houses were stifling, and when cool draughts were treats…and when stinging insects haunted the air, earth, and every drop of water that was to be found” (292). Each “valley was filled with air like that of a kiln, and the clean quartz sand of the winter water-courses, which formed summer paths, had undergone a species of incineration since the drought had set in” (269, emphasis mine). Further, all the shallower ponds of the heath “had decreased to a vaporous mud, amid which the maggoty shapes of innumerable obscene creatures could be indistinctly seen, heaving and wallowing with enjoyment” (270). This arid scene of the heath as inhospitable to any earth-bound life other than the “stinging insects” of the air and “obscene creatures” of the mud places Egdon Heath firmly in a context prior to the influence of industrialization and flow dynamics. At this moment, it becomes the environment which kills Mrs. Yeobright, whose final conversation contains a request for water from Johnny Nunsuch, and a telling moment in which she watches a heron rise, “dripping wet from pool in the valleys,” looking as if burnished by silver as the light moves through the streaming water (282). At the height of its flight, the bird seems to her to be in “a free and happy place, away from all contact

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191 Nancy Barrineau also notes the earlier, canceled title: “A little fire kindles a great flame,” thus rendering again the dichotomy between (often cold), wet pool and intense heat and/or fire. As the inception of the ensuing falling out between Eustacia and Mrs. Yeobright in the final, Penguin text, Eustacia “fire[s] up all too quickly” in defensiveness against questioning whether she had received money from Wildeve.
with the earthly ball to which she was pinioned,” and she wishes she could imitate this
tuntethering from the hot, dry earth (282).

Thus far, I have attempted to isolate the nature of “feeling,” especially erotic desire, as a
physiologically occurring, erratically flowing liquid, and the manmade structures intended to
manage water through and in the heath’s topography on a traditional basis. After the death of
Mrs. Yeobright, the separation of Eustacia and Clym, and the renewed contact between Eustacia
and the newly rich Wildeve, these two elements come together to enact the novel’s deadly
catastrophe. Partially by appealing to her desire to go to Paris, which Clym has chosen not to do,
Wildeve stokes enough feeling in Eustacia that when her father’s servant, Charley, lights a fire
by the pool once again in order to cheer her up, she cannot master the ambivalence between her
“impulse to leave the spot” and “a desire to stay,” before Wildeve appears, having taken the fire
as his invitation (332).192 The desire “h[olds] its own…for she remain[s],” largely thanks to her
having become indifferent to “all things honoured of the gods and men” through her suffering
(332). The same signal, the stone splashing into the pool, announces his arrival as “the fire
sh[ines] into each of their faces from the bank stretching breast-high between them” (333). The
specificity of this structure’s role in reuniting them clearly is not an afterthought on Hardy’s
behalf, as it bonds their mutual “feeling” with the physical, water management structure.

Of course, this meeting precipitates the resurgence of their erotic, or romantic, desires,
and leads toward the plan whose hatching will indirectly kill them both and nearly kill Clym.
Wildeve pushes her on what he knows is the sensitive topic of her living with her grandfather
again, and the language Hardy uses in describing her subsequent breakdown into tears (which

192 This dichotomy sounds very much like Bathsheba’s battle between “impulsive nature” and her
“deliberative aspect” which occurred within her near, was embodied in the structure of, the sheepwashing
pool’s gates in relation to the water flowing through them in Far From the Madding Crowd.
Eustacia does not easily or frequently do). Her speech breaks up as she responds, much as Boldwood’s and Bathsheba’s did in the sheepwashing scene of *Far From the Madding Crowd*, as she can only utter, “I—I—,” before she “burst[s]” into quivering sobs, shaken to the very **heart** by the unexpected pity” of Wildeve (333, emphasis mine). The sadness, grief, and pity combined with the background of physical desire flood from her “very heart” and, again, break the flow of linguistic expression. Hardy specifically names this an “**outbreak** of weeping” which both surprises and, therefore, further saddens Eustacia until, after sobbing on for awhile, “the **outpour** lessen[s]” and eventually stops (333, emphasis mine). Slade notes that Hardy made later edits to his first, serialized version of this exact interchange in order to increase the “emotional bond” between the two characters, and this emotional bond clearly leads to an insurgence of emotion from Eustacia’s heart that she cannot contain.

From this last meeting by Captain Vye’s motionless earthen reservoir, the last of the novel’s reversals of course (though not including the “Aftercourses” section added to the volume version) begins in the plan for Wildeve to get Eustacia out of Egdon Heath and on to Paris. Clym’s letter that contains the declaration, “[s]uch hearts as ours would never have been given us but to be concerned with one another,” does not reach her hands before this escape, and Thomasin’s worry that Wildeve had “fallen into the river” when he arrived home so late after the final pool-side meeting clearly foretells the fate of this passion-indulging pair whose crime in their community’s eyes has previously been and soon will have been again indulging desire outside the channels of religiously and legally licensed marriage (339). Clym’s thought that God or nature has only made two “hearts” that can pump emotional, romantic, and erotic connection

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193 *Tess Durbeyfield* will later be a foil for this crying scene, as she is brought through various and continual traumas of physical and psychology types to weep multiple times throughout *Tess of the D’Urbervilles*. These scenes are also replete with imagery of hear crying, or of the tears themselves, as physical renderings of her emotion flooding beyond any physical or mental containment.
in correspondence with one another clearly comes nowhere close to describing the dynamics of Eustacia’s or Wildeve’s emotional, desiring capacities. These flood beyond the strictures of condoned courses, and the heath’s water management features figure in the deadly punishment of that emotional flood by finally bringing the literal flood down upon them, after all the imagery of water’s containment that has surrounded the various courses of desire throughout.

The night upon which these two important sets of imagery combine in tangible fashion bears onto this emotional flood in a combination of climatic and topographical literalness. “Never was harmony more perfect,” Hardy’s narrator says, “than that between the chaos of [Eustacia’s] mind and the chaos of the world without” (Return 345), as a violent storm pours down streams of rain that immediately flush the water-courses that had lain dry in the heat of the summer. These run through the watershed toward the heath’s primary watercourse, the river that moves, in Miller’s words, “in snakelike curves down the righthand margin of Hardy’s map” (Miller 49). As Eustacia moves across the heath to meet Wildeve, growing ever more unsure about the plan, his “heart [i]s beating fast in the anticipated pleasure of seeing her” because “the spell that she had cast over him intensifie[s] against the desire’s direct contradiction of his “maxims…to act honestly towards his gentle wife, and chivalrously towards another woman” (as he supposedly will only help her get to the continent via Budmouth before returning alone to The Quiet Woman) (359). Hardy, thus, orchestrates a meeting of the flooding, heart-pumped “feeling” coursing through and between characters, the constraining social structures for restricting it its movement and expression—a final, fatal reminder of the gendered economics of Egdon Heath—and the rushing of floodwaters through its primitive water-management features.

Eustacia suddenly and finally realizes that her lack of independent money will never allow the plan to work. She would need to ask Wildeve for help, though this promises more
humiliation than she can bear after everything else (though he does brings the money that Thomasin knows he has removed from their home). As the rain soaks her and she begins to cry, she finally reaches the point that the “wings of her soul [are] broken by the cruel obstructiveness of all about her” (346). Shortly after this moment in narrated time, the storm has grown to its peak so that the atmosphere on the heath becomes a “medium” of “water slightly diluted with air,” and the sense of physical obstructiveness that Eustacia feels working against the expression of her life’s desires takes its final form (354).

The violence of the storm, generally, matters less for Shadwater Weir than does the magnitude of the rainfall, and the storm dumps enough water to increase the river’s flow to the point that its collision with the Shadwater Weir punctures that structure intended to partially obstruct and control it.\(^{194}\) The sound emitted by this collision has enough intensity to be the only one audible above the storm, so that its inflection by the “fall of a body into the stream” is audible to Clym and Wildeve who have only just come face to face nearby (360). With a similar level of detail to that which he used in describing *Far From the Madding Crowd*’s sheepwashing pool, Hardy explains the structure of the more complicated weir and the pool fifty feet in diameter “at its foot”—noting that the water flows into it through the weir’s “ten huge hatches” that can be “raised and lowered by a winch and cogs in the ordinary manner” and that the pool itself has sides made of masonry “to prevent the water from washing away the bank” (361). Compared with the fish-weirs or “flash-locks” that variously impeded traffic along England’s

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\(^{194}\) Though specifics of weirs may differ, they all operate on a simple principle, that of partially blocking the movement of a flowing body of water by use of vertically-oriented paddles, or “hatches” as here, which can be manually or otherwise lowered and raised to more or less fully block the water’s flowing, respectively. As described in this work’s introduction, a weir’s partial blockage of flowing motion inherently creates a weir-pool—also called a “charged” pool or “head”—which might be subsequently directed down a mill-race to power a mill or directed for irrigation. Such pools also invited the collection of fish, leading to the tension between those seeking the “fish and flour” mentioned in Thacker’s history of the Thames (6-7) and those seeking to render a watercourse more navigable.
rivers well into the nineteenth century, Shadwater Weir is a more complicated, solid, and permanent structure that apparently spans the entire river and only allows its flowing through any combination of its ten “races,” each of which is controlled via a hatch that acts as a crude valve for controlling the rate and volume of the water flowing through the weir.

Nonetheless, the relatively larger scale and more permanent, sturdy construction of this ten-hatch weir with its cog and winch hatch controls and earth-reinforced, masonry walls fails to stand up to the current of this winter storm’s flood, “undermin[ing] the retaining wall (below the hatches) and precipitat[ing] it into the hole” of the pool below (remembering that most weirs partially obstruct flow to create upstream pools that can be utilized) (361). The more figurative “breach” announced earlier in the narrative, therefore, has become a literal one, as the flood that corresponds to Eustacia’s, Wildeve’s, and Clym’s “feeling” has breached Shadwater Weir.

The flood destroys the water management structure’s integrity and corresponding ability to control it, and this failure kills or injures the people whose emotions the flood embodies in return. The retaining wall’s failure, combined with the “tumbling courses of the currents from the (open or ejected) hatches above,” create a “vortex” at the heart of the pool, “at the curl of returning current” (361). This sight confronts Clym and Wildeve simultaneously. Both men expect the “body” whose fall they heard to be Eustacia’s, though they do not say so, while the “vortex” aptly embodies the simultaneous, competing directions in which “feeling” has flowed between those them and Eustacia.

This unique water feature, created through the disastrous collision of flooding current and motion-restricting obstacle quickly wreaks its havoc. Wildeve, a failed civil engineer, thoughtlessly plunges fully dressed into the pool and to his death. Clym, only slightly less thoughtlessly, removes his own cloak and enters the pool from the downstream, shallower end
but is nonetheless “taken off his legs…instantly” upon wading upstream and is “carried round into the centre of the basin” where the vortex spins (362). Arriving just after this, Venn takes more care to examine the structure of the weir, the pool, and the various currents resulting from the flood’s work before taking action. He retrieves the two men, respectively, by riding an ejected weir hatch as a flotation device while scouting for them, before grabbing them and then pushing into the “strongest race” of current flowing through the hatch-runs in order to escape the vortex’s pull (363). His apparent familiarity with judging currents leads him to direct two others who have come to assist, “Now we must search the hole again,” because “[a] woman is in there somewhere” (363). The narrator confirms that Venn accurately predicts the location for Eustacia’s body. He “[i]s not mistaken in supposing that any person who had sunk for the last time would be washed down to this point,” he identified, “for when they had examined to about half-way across something impeded their thrust” (363). Venn then “vanishe[s] under the stream” in this place, coming up “with an armful of wet drapery enclosing a woman’s cold form,…all that remained of the desperate and unfortunate Eustacia” (363).

Two key points emerge from this catastrophe’s extended, detailed depiction. Venn’s physical strength, calmness, and effective problem solving actually save Clym’s life and, more importantly, emphasize a range of relationships to this wildly dangerous pool in a life-and-death adaptation of Far From the Madding Crowd’s arrangement of characters around its sheepwashing pool. Venn’s knowledge of the various, competing, and dangerous “courses” of desire’s expression throughout the novel correlates with the way that, of the three men who attempt it, he is the only one who identifies how to survive an engagement with the flood-caused currents. He remains on the surface of the water via the removed hatch, as if symbolizing his remaining near but not personally delving into any of those courses of “feeling” throughout the
novel (and even his attempt to prevent that between Wildeve and Eustacia by blocking his movements across the heath via physical traps and frightening him as he walks to visit her by the pool). Wildeve’s immediate flinging of himself into the currents, and Clym’s only slightly more well thought-out plan which remains highly dangerous to him also reflect their relative indulgence in their own erratic “feeling” throughout the novel.\textsuperscript{195} I would even argue that Clym’s attempt to form a plan after consciously acknowledging Wildeve’s recklessness actually exemplifies this precisely, as his own hypocritical belief that his courses throughout are “direct” while someone like Eustacia’s are “indirect.” Finally, Venn’s distinction in this scene allows for the “Aftercourses” which Hardy was encouraged to add to the novel to make a more pleasing conclusion for its readers.\textsuperscript{196}

Second, the orchestration of Venn’s successive retrievals, ending in the revealing of Eustacia’s dead body last, features language that reminds readers not just of the introduction of her “smouldering rebelliousness” but of the pool that was earlier repeatedly affiliated with its expression (while it also contained that image of the flame upside down and seemingly under its surface). Finally, the structures for obstructing and containing the forceful, erratic, free-flowing

\textsuperscript{195} That all three of these men become immersed, injured, and/or drowned in the pool into which Eustacia falls or throws herself reminds us of the reading of her name that I suggested earlier, as if the physical vortex of destructively flooding currents is the systemic rising tide that her life also constituted within the social topography of Egdon Heath.

\textsuperscript{196} In “Aftercourses,” the man who had been called “Venn” throughout the novel is called “Diggory.” In addition, he has become “white” and has bought a dairy of 80 cows rather than subsisting by making and selling reidle (\textit{Return} 374-5). In addition to having singlehandedly rescued Clym, all these aspects of his character seem to prepare him for the role of becoming Thomasin’s husband. In an odd, perhaps disconcerting, way, this transformation mirrors that of the sheep being washed in the scene from \textit{Far From the Madding Crowd} earlier. Reddle, after all, is used to mark sheep for identification and would have been the kind of thing washed out of wool prior to shearing for market. Instead of producing this red material for livestock, he now produces white milk for human consumption. He had presaged his transition of color earlier in the novel, telling Johnny that “I should be as white as you if I were to give up the trade,” but the transition that begins with his own immersion in a flooding weir-pool does oddly correlate to the sheepwashing of \textit{Far From a Madding Crowd} (\textit{Return} 77).
“feeling” she both possessed and encouraged in multiple male counterparts have succeeded in permanently “cooling” and rendering her inanimate. The fact that the flooding river’s water so immediately renders her body a “cold form” emphasizes this drastic change. The heat of the “feeling” she possessed and whose flowing she invoked in others next to her grandfather’s reservoir pool are destroyed here, in the raging, deadly vortex created by the collision of the flooding river and the weir it breaches.

_The Return of the Native_ can, therefore, be seen as a kind of experimentation with the collision of symbolic and literal, topographical levels of powerful, unpredictable flows and the structures that a community creates for regulating, containing, and controlling them. Combined with the historical specificity with which Hardy infuses these structures, as I will show immediately, we can actually come to see the apparently different registers of literal and figurative meaning as two elements of the same homologous, cultural paradigm—what I call flow dynamics—having reached its apex of influence.

Such an exploration can only be possible via Hardy’s knowledge of rural agricultural practices and traditional features for managing water. Many others have explored Hardy’s intense engagement with the flora, fauna, and topography in which he lived and from which he drew his fictional Wessex, but I believe Michael A. Zeitler’s reading of Hardy’s work as influenced by Edward Burnett Tylor’s _Primitive Culture_ bears mentioning here. As Zeitler describes it, Tylor’s belief that “no gesture, tool, syllable, building, employment, or folk tale is too small to give evidence of the cultural whole” helped shape Hardy’s approach to narrating the
topographical and social environment of his Wessex (36). If this is true, then Return’s water-management structures are, in fact, loaded with specific cultural meaning and import.

Furthermore, the historical location of the novel suggests that Hardy also intended to place these features within the context of drastic changes to the carrying out of life in rural England and in Dorset/“Wessex” in particular. The period between the time of the novel’s publication and the time of the novel’s narrated actions—the 1840’s and the late 1870’s—bookended a particular era of agricultural practices and, in turn, rural life. The late 70’s constituted the end of a distinct period in English agriculture, within which new ways of handling water—particularly new materials and methods for promoting better drainage—altered the look and practice of farming and, by extension, of social and communal life in rural England, including Dorset. In The Development of English Agriculture, 1815-1873, E. L. Jones writes, “[t]he mixed agriculture of the early ‘seventies was quite different in aim than that of thirty or forty years earlier,” defining exactly the temporal separation of Hardy’s writing and the time in which he set The Return of the Native (22).

Furthermore, the historical movement around agricultural drainage and irrigation materials and practices described by Turner, Beckett, and Afton in this section’s introduction that

197 To Zeitler’s argument about Hardy’s loading of such material objects within the landscape—and I think, particularly those which demonstrate a historical interaction between humankind and the naturally occurring topography—Miller’s “Topography and Tropography” features a reading of Hardy’s poem “In Front of the Landscape” which shows how the “speaker’s linguistic activity in the poem…is based on taking features of the visual scene…as signs, not merely as perceptual objects, as they are for passers-by,” which, in turn, are translated in a linguistic activity that “transforms the neutral notation of topographical description into…tropography,” or “the mapping of an act of figuration which” constitutes Hardy’s project in the poem (209). I suggest that Miller’s reading here, which preceded Topographies’ reading of The Return of the Native, affirms more than just Zeitler’s argument, but shows a literary work of Hardy’s which brings the kind of remapping of Wessex in The Return of the Native to the work’s formal forefront. Miller argues that it does so because “[w]hat the poem communicates is its self, its own form,”—which, perhaps not coincidentally—is a “tide of visions,” in the speaking voice’s terminology, of the loading of pastness into the present experience of a landscape that Miller reads as “the presence and force of a great flood ramping over the land and sinking it” into “misperception” (197, 199).
centered on changes in land drainage within “arable production” after 1835 did not only address what was considered to be directly “arable” land—which Egdon Heath is not (Turner et al 88, 89). As Jones shows, the claylands and chalklands (like Hardy’s Wessex) did see the systematic interventions that typified the era, but later than the traditionally arable areas—after “the production of cheap tile drains in the 1840s” (15). Turner, Beckett, and Afton also acknowledge that the traditional “running off” of “ill-draining soils by ridge and barrow methods” as Hardy features in the heath topography, had been “recognized…to be an inefficient way of draining land” by the turn of the century (89). Like outdated “ditching,” trenching, and “waterfurrow” construction, then, the barrows and redans of Egdon Heath prove barely capable of providing any kind of irrigation, flood control, or regularized drainage.

This history begins to reveal how the “clayey” heath of The Return of the Native with its primitive “barrow,” “water-courses,” Vye’s dirty pool, and the Shadwater Weir already bore signs, for Hardy, of a cultural obsolescence—even if specifically located within agricultural hydrological practice. Furthermore, these somewhat outdated, primitive, or simply lacking hydrological features of Egdon Heath (from the perspective of the late 1870’s), also hearkened to a time when what seemed like the promise of progress in the expansion of flow dynamics-based thinking into the rural areas including historical south-west England.

The role of the heath’s water management sites’ for the narrative and within my argument, then, can be said to be outsized within Return, in the ways described by both Zeitler and Miller and in the ways that I posit they work within the novel’s depiction of erotic, romantic, and economic desires, emotions, or “feeling.” And not despite the fact that Egdon Heath is not arable land subjected to “mixed farming,” but because of that fact, the primitive and ultimately

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198 Recall also Hardy’s image of the cracking of Egdon Heath’s “clayey” lands during the sweltering summer days during which Mrs. Yeobright dies.
unsuccessful water management features built into its landscape (or not built, in the case of the “water-courses” which dry out and serve as footpaths in summers, yet flood in winters) show the heath as lagging behind historically, as threatened by the “progress” of flow dynamics-influenced hydrology’s spread from the urban-industrial centers. It might be improvable like the other “claylands” or “chalklands” mentioned above, but Hardy includes no sign that the heath has been targeted for improvement in *The Return of the Native*, let alone begun it.

This observation about Hardy’s fictional Wessex, about Egdon Heath, specifically, matches with the historical evidence that changes in English rural agriculture came to Dorset and other parts of hardy’s Wessex most slowly. Where the crop rotation and livestock practices of “mixed farming” that were spread in other parts of England by new drainage, that style of farming had already existed—without the new drainage materials and methods (Jones 22). As Turner, Beckett, and Afton also show, irrigation via “water-meadows” as noted above originated in medieval times yet remained predominant primarily in Dorset, Hampshire, and Wiltshire (most of Hardy’s Wessex) from the beginning of the eighteenth century well into the middle of the nineteenth—marking *Far From the Madding Crowd’s* farming practices as dated in that way as well (104). Furthermore, the lack of other new technologies like threshing machines in those two versions of Wessex correspond to the fact that the last region in all of England to have left record of a threshing machine in use was Dorset, in 1865 (Turner et al 93).

That the historical antecedent to Hardy’s Wessex lagged behind most of the country in adopting the new hydrological emphasis and methods—primarily pertaining to the creation of clearly defined drainage flows but also to irrigation—adds another layer which we can read in the phenomenon that Zeitler and others have noted about how Hardy’s novels occur within a Wessex. That is, he places his narratives within that topography during moments of its
metamorphosis via new technologies that “invade the rural landscape and connect it to the world beyond Dorset” (37). I posit here that if fictional Wessex resists, or is slow to adopt, the kinds of flow dynamics-influenced systematization, regularization, and watershed-level interventions that flourished more quickly in other rural areas of England, then the water management sites I have read in The Return of the Native also connote a rigidity against change, against a new system of hydrological criteria formed in industrialized cities and made possible by the materials only those hearts of industry can produce—like the clay piping so important in the 1840’s.199

In all, Far From the Madding Crowd’s and The Return of the Native’s water management sites, which connect the topographical and economic-cultural history of Wessex to the social lives of those novels’ characters—the uncontrollable, uncontainable flows of their physiological, sexual, and social desires—to the points of slippage between a science-deploying, metropolitan-based culture and further flung localities with a tradition-based, experience-informed embrace of primitive watershed management. The latter take shape in earthen redans for preserving reservoirs in case of climatic emergency, in a failed well, or in a breached, ten-hatch weirs meant to control an otherwise completely unmanaged river whose action so widely varies by season and storm. The charging of those sites’ role in the calamity of Eustacia, Wildeve, Clym, and Thomasin’s mutual and non-mutual “feeling” with such a large cultural shift based on the hydrological criteria and methods for intervention onto topographies that I have labeled flow

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199 Other reminders of this state of being of the heath as a human-managed watershed are the differences between the summer and winter versions of, alternately, the footpaths and water-courses (which heath residents seem to take as inevitable), the already near flood-stage state of the weir-pool in winter, contrasted with what we are told is its generally calm summer version, even the novel’s introduction of the heath as a “face” that never changes. Flow dynamics as a set of hydrological concerns and methods for addressing them, would never have tolerated such inconsistency, such reliance on and submission to climatic factors. Recall that the drying out of small summer streams like those scene in The Return of the Native on the day Mrs. Yeobright dies were the impetus for Arkwright’s initial deployment of a steam engine in Lancashire—to pump water from the lower pool back to the upper pool that ought to have been fed by a stream whose water kept dwindling in summer months.
dynamics lends the liquid register which Hardy deploys in those narratives vital importance. Thus, Morgan’s description of Hardy’s work as resisting “the denaturing, by institutionalization, of human love relationships” actually takes both tangible form and is informed by the literal water management features which enable culturally dangerous, divergent romantic and sexual relationships, while also literally providing the culturally-constructed, deadly punishment of those divergent relationships in the end (xxxi).

I posit, therefore, that dual-layered narrative action (the obviously hydrological and the representationally or symbolically hydrological, both of which are located inside the shifts of Victorian embrace of hydrology in literal and social forms) actually constitutes one of the concrete ways in which Miller’s “remapping” of topography occurs in these novels. In performing this action, the apparently distinct metaphorical and literal actually are revealed as one and the same, aspects of a homologous system that forms the physical and interpersonal structures of lived experience on Edgon Heath. If there is mutual construction of topography/map and character in *The Return of the Native*, it is through not purely “natural” topography but through manmade structures within that topography/map—thus constituting a meeting of the two which seeks to structure how remapping can actually occur. Along with historical (and fictional) Wessex relying on historical structures and methods that belong to an already outdated system, this suggests that even the regularization of “courses” of desire’s expression in Hardy’s Wessex is unrealistic, unlivable, even cruel, and arbitrarily restrictive—while also suggesting that when or if Egdon Heath does adopt new, more highly systematized hydrological materials and

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\(^{200}\) In Zeitler’s words, Clym’s self-described ability to rebel “in high Promethean” fashion by means he is threat to bring “civilization” (through his educational scheme) to the heath’s natural, uncivilized state—which I would argue its primitive hydrological features help to express (84).
methods, such arbitrary, cruelly enforced restrictions may grow even more repressive, more
deadly to free, natural, physiological creation and expression of “feeling.”

3. Onward from *The Return of the Native, Tess of the D’Urbervilles*

The lack of a stated economic purpose for the construction or placement of such a
relatively massive, elaborate hydrological feature as Shadwater Weir in *The Return of the Native*
reflects what is, for Hardy, an equally arbitrary cultural imperative to limit the flow of, concretize
the course of, and collect in less dynamic pools those natural flows that would otherwise work in
an unruly fashion and likely change over time (as streams and rivers naturally do). As an
expression of the arbitrariness of the cultural “courses” that steer the creation and expression of
desire, emotion, and “feeling,” the weir’s partial destruction in the flood that kills Eustacia and
Wildeve and nearly Clym warns readers that cultural restriction of “feeling” can wreak
destruction for individuals whose desires diverge and for the culture who sets the terms of
divergence. When Zeitler writes that the “discontent felt by Clym in Eustacia” in the novel “was
spreading” at the time of Hardy’s writing thanks to the erasure of “long held customs based on an
agricultural community’s direct contact with nature and its communal dependence on the
seasonal cycle,” he credits “industrialization, urbanization, the uprooting of the population,
nationalized education and nationalized culture (becoming) no longer oral but print based” with
doing the damage (95). However, I have shown that the specific water management features in
*The Return of the Native* actually resist such new hydrological materials, structures, and practices
—which Hardy’s demonstrated familiarity with the real-world models of his Wessex would have
included.\footnote{This claim of Zeitler’s would also go in the face of Sara Malton’s argument that the weir constitutes
the capping of Egdon Heath’s communal punishment of Eustacia for her divergent lifestyle.} I interpret this to mean that an already traditionally repressive social regime of
regulating “feeling’s” licensed “courses” only promises to become more so, once the more widely systematized and delocalized influence of flow dynamics’ infrastructural and social applications fully pervade the rural areas outlying England’s growing towns.

When claiming that later Hardy characters like Tess and Jude “will bear the weight of the tragic mythic structures now forcibly divorced from their agrarian roots” in a modernizing Wessex, Zeitler gets at this more ominous future for freely expressed “feeling” in Hardy’s works (95). In *Tess of the D’Urbervilles*, I see the crowning of Hardy’s exploration of desire as a naturally, physiologically flowing phenomenon whose expression’s strict regulation can only lead to disaster in the forms of flooding topographies that expose the inadequacy of those topographies’ structures for regulating flows. This ironic, mutual destructiveness pervades *Tess* but comes to the forefront most clearly in its own flood scene, about halfway through the novel. As opposed to the deadly failure of Egdon Heath’s course-regulating structures that kill off the erratic, flushing “feeling” of that novel’s characters (which Hardy originally intended to be the novel’s final scene), Tess and Angel’s mutual, tragic future is sealed by the flood that constitutes not a final catastrophe but the precipitating event of the tragedy.

In Chapter 23 of “Phase the Third”—entitled “The Rally,” following the phase named “Maiden no More,” and preceding the ominously titled fourth phase, “The Consequence”—the flooding stream over which Angel carries Tess actually creates bodily contact between them, which engenders a desire that can only be seen as natural and would in no way be culturally inappropriate if not for the patriarchal skewing of sexual mores that deems a rape victim an object of permanent negative judgment.202 The same skewed form of religious judgment that permeates the Wessex culture of *Tess* and leads her to frequent outpourings of desperate weeping

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202 I mention these phase names as they show a structural highpoint or “flush” of love, desire, and joy in a “rally” that emerges from the flood scene, which then only gives way to “the consequence” of the tragedy.
depicted in flood-related imagery also leads to an important moment of foreboding when she sees Angel at Talbothys for the first time. The unfairness that emerges in the aftermath of the flood scene is itself foretold here via a “flood” of memories that occur in Tess as she meets Angel — having last scene him at a dance prior to being raped: “The flood of memories brought back by this revival of an incident anterior to her troubles produced a momentary dismay lest, recognizing her also, he should by some means discover her story. But it passed away when she found no sign of remembrance of him” (112, emphasis mine). An uncontrollable rising of memory and fear implies an internalization of the cultural judgment against her, which colors her perception of Angel’s own view of her through knowledge of her past.203

Hardy narrates the “flood” scene in Tess for roughly as many pages as he did The Return of the Native’s weir-pool death scene, and with an equally close attention to each character’s subtle movements, body positions, and feelings. Unlike that earlier flood scene’s winter setting, this one occurs much more out of normal context, in the “hot weather of July” when someone as familiar with the topography as Marian is declares, “Who would have expected such a rise in the river in summer-time!” (142). Nonetheless, storms from the previous afternoon and evening “had hissed down upon the meads, and washed some of the hay into the river,” suggesting a state of primitive irrigation and drainage in the “meads” (meadows) described by Turner, Beckett, and Afton that simply tried to take advantage of naturally occurring streams without the laying of tile or pipe that mostly occurred after the 1840’s. Without adequate drainage, the summer storm has likely ruined or damaged some of the dairy’s hay, and where the four women walking to church would have crossed a stream, they instead confront a “pool that was an awkward impediment” at

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203 The experience Tess has here looking at Angel in a way closely resembles the “tide of visions” the speaker of Hardy’s “In Front of the Landscape” endures, and which cause “misperception” of the landscape he views, as Miller has elaborated.
its “over-shoe” depth (142). Having “gone out to see if the damage to the hay by the flood was considerable or not,” Angel expects to find a flooded pool just where the women are walking, and he knowingly moves that way through the water, which is not so deep as to rise above his tall working boots (143). Thus, the meeting of fashion customs, religious practice, and gender expectations (captured in the women’s clothing, low, dress footwear, and the unacceptability of the idea of showing up at church with any of those wet or muddied) collides with the primitive drainage practices, agricultural concerns, and “anti-Sabbatarian” tendencies of Angel (captured in his work dress, familiarity with his dairy’s drainage problems, and what the following exposition of the scene suggests is his already-present sexual desire for Tess) (143).

The figurative flood(s) of desire that this literal flood (relatively mild as it is) enables begin immediately. As soon as he offers to carry the women across, the “whole four flush as if one heart beat through them,” again invoking the physiological aspect of desire that originates in or is symbolized by Hardy in the heart’s pumping action (144, emphasis mine). As Angel carries Marian around the bend, Izz declares with an apparent mix of fear and thrill that “I have to put my arms around his neck and look into his face as Marian did” (144). After this, as Angel returns for Retty, Hardy’s narrator declares that her “throbbing heart could be almost seen to shake her”—all of which flooding sexual desire, if not also fear, excitement, nervousness, or other emotion, leads to the moment of Angel declaring to Tess, “It will soon be you and I” (144, emphasis mine). In some combination of expression or the “flushing” which Hardy so often invokes, we are told, “[h]er comprehension appeared in her face; she could not help it” (144). At this moment, a conclusion that will have the most tragic possible outcome is reached: “There was an understanding between them” (144). A summer-time flood caused by a lack of modern meadow drainage that creates something like a shin-high pool which the women cannot cross
and still turn up respectably at church afterwards, thus, has led to the outpouring of desires, both requited and unrequited, among the four women and one man.

A by-now familiar alignment of bodily, heart-centered warmth of desire emerges over the flooding water as soon as Tess’s and Angel’s bodies make contact—an utterly natural, even predictable, phenomenon. Nonetheless, Tess is “embarrassed to discover that excitement at the proximity of Mr Clare’s breath and eyes, which she had comtended in her companions,… intensified in herself,” the last word again reiterating the internal, bodily immediacy of the experience of desire or attraction that does not require or follow from conscious cognition (145). He suggests that he performed “three-quarters of this labour entirely for the sake of the fourth quarter,” which she denies understanding, and he then declares, “I did not expect such an event to-day” (145). Tess replies, “Nor I…(sic) The water came up so sudden,” completing the connection between the flooding waters and the flooding emotion that is confirmed in the narrator’s insight: “That the rise in water was what she had understood him to refer to, the state of her breathing belied” (145, emphasis mine).

Through this verbal expression, Tess tries to deny the rising flood of love, romance, and/or sexual desire emerging from within her—at the encouragement of Angel and the opportunity provided by the floodwaters—by mapping that feeling onto the flooding topography that has enabled and yet also symbolizes that feeling’s outpouring in and between both characters. All the same, this attempt is “belied” by her body, even by her cheeks which “burn” with flushing blood against the breeze as Angel exclaims, “O Tessy!” (145). The scene enabled by the flooding and pooling stream in Tess differs from the pool-side encounters of Return, though, in so far as it has been preceded by the events of the the first two phases, “Maiden” and “Maiden no More.” These earlier episodes render the flood’s encouragement of desire a cruel spark in the face of the
cold structures that enforce culturally condoned “courses” for its expression. All that remains for
the reader to discover is how this collision will take place and what its consequences will be.

In the evening following the flood, all four women deal with emotions that surge rapidly
and forcefully beyond the bounds, not necessarily of self-control, but of the actions that are left
available to them by social guidelines over their gender and class. Tess’s “heart ache[s],” so that
she cannot “conceal[s] from herself that she love[s] Angel Clare” despite her understanding that
her past precludes this love’s satisfaction in the only available state of permanent and/or sexual
consummation, marriage (and with a level of “hungry” passion that relates to knowing “that the
others had lost their hearts to him” in the same moments) (146). Hardy drives the obvious
absurdity and unfair, unnatural nature of the cultural courses through which passion, desire,
sexual energy must flow at this point. “Tess’s honest nature had fought against” her falling in
love with Angel, his narrator says, “but too feebly, and the natural result had followed” (146,
emphasis mine). Hardy juxtaposes her “honest” nature and the “natural result” of two young
people’s contact and mutual attraction with the obstacles that his readers knew stood in their way,
the patriarchal judgment of her previous victimization and motherhood.

For the other three women, whose passion is not requited on Angel’s side, only grim
prospects seem open. In order, they are: a wish for death (perhaps in suicide), suicide in favor of
acceding to a different man’s marriage proposal, and giving up a secure position and wages in
order to leave Talbothys and never see Angel again. Though they “writ[e] feverishly under the
oppressiveness of an emotion thrust on them by cruel Nature’s law—an emotion which they had
neither expected nor desired,” the day’s events “had fanned the flame that…burn[s] the inside of
their hearts out” beyond what they can endure (147, emphasis mine). All the same, these women
recognize “the futility of their infatuation, from a social point of view…it’s lack of everything to
justify its existence in the eye of civilization (while lacking nothing in the eye of Nature)” (147, emphasis mine). “Civilization” clearly stands for English culture here, and that culture will not condone an arrangement of flowing passions between multiple women and one man, much like that of The Return of the Native’s microcosm of English culture in Egdon Heath punished the inverse of that potential arrangement. Thus, they must simply suffer the feeling imparted to them through the “Nature” over which they have no control.

In this way, Hardy produces a biting irony through Tess’s flood scene. That irony shows how the cultural designation of particular courses for the expression of emotion and desire between individuals, whose bodies answer only to the physiology granted them by “Nature,” can in no way actually prevent those physiology-based rushes of desire—no more than the primitive, ineffective water management of Talbothys prevents the mid-summer flooding of its streams. The following chapter’s opening reiterates this impossibility, as “the oozing fatness and warm ferments of the Var Vale” in the “season when the rush of juices could almost be heard below the hiss of fertilization” could only render it “impossible that most fanciful love should not grow passionate” (149, emphasis mine). As “fancy” was punished in The Return of the Native, it will be punished in Tess—despite that its encouragement into indisputable, passionate love is clearly described here as stoked by nature (or “Nature”). This description also suggests that human passion belongs more to the growing season, the time of fertilization and “rushing juices,” than to “civilization,” especially given that the “Immortals,” as a hallmark of such “civilization,” will execute Tess for her eventual murder of Alec in the end. At the beginning of this love, though, the “ready bosoms existing (in the pair) were impregnated by their surroundings” (149). These “surroundings” remind readers that humankind exists in animal bodies that respond to their environment.
The final aspects of this cruel irony inhere in the way Hardy constructs the aftermath of the flood scene. A complete absence of an exposition of Angel’s own thoughts after the flood scene suggests that, as a relatively economically secure, educated, single male, he may simply express his emotions and desires (though he did consciously leave off at exclaiming, “O Tessy!”), without feeling a culturally-demanded need to deconstruct, question, and consider the social and economic prospects of a desire for women of equal or lower class. He may simply experience emotion, or “feeling,” and express it to a much wider extent than that allowed to the women. Furthermore, considering Tess and Angel, specifically, because he knows nothing of her past victimization, he remains “innocent” of any proper courses of action regarding her. To his eyes, she is a single, childless, young woman. Thus, readers are granted no insight into what would seem a simple growth of excitement, desire, and perhaps romance on his behalf—further powering the novel’s critical irony about the unfairness of cultural judgments against Tess, who must not naturally cultivate her feelings toward Angel but attempt to use her “honest nature” to fight against what both their bodies unthinkingly drive them to do. Bearing in mind her victimhood constitutes her only “crime” (other than baptizing her dying infant when her father prevents the parson from doing so), while he admits to having deliberately engaged in an adulterous relationship in the past, the flood scene serves as a microcosm of the Tess’s attack on the gendered, cultural construction of “feeling”-regulating courses that oppose natural, physiological realities of human emotion, love, and desire.

I submit that Tess extends and concludes the hydrological mode of exploring these issues which so extensively shaped The Return of the Native. In particular, Tess more overtly invokes “nature” in its flood scene and its aftermath, which highlight the erratic, spontaneous, and “oppressive” intensity of emotions as at least equally characteristic of humanity as conscious,
logical, thinking and deliberate action. The novel’s use of a flood scene as the initiation point of a tragically doomed love, rather than in its destruction, seems to present an even more critical Hardy, writing his second-to-last novel in 1891 and guiding his protagonist through a litany of unnecessary yet seemingly unavoidable punishments that consistently leave her “pouring” out her desperation in tears. He more clearly invokes “nature” in conjunction with the failing water management system of *Tess*, just as he orchestrates the creation of a passionate love whose only problem is the “eye of civilization” on sexually victimized women, and this further suggests the novel’s conclusion that the forces of arbitrary emotional containment only seem likely to grow more powerful once the urbanizing, industrializing, systematizing, city-based culture of England more fully grasps the rural areas outlying those centers. The novel’s final couple are connected only through respective relationships to the now-executed Tess, meaning their relationship begins in a judicial killing rather than in naturally occurring, physiologically experienced interest, desire, joy, or love. The image of this disturbingly-connected pair slowly moving away from the sight of the city where the execution occurred shows the direction from which Hardy sees such ominous influence flowing.
CODA: “Did it flow?”: The Legacy of Flow Dynamics

In Chapter 17 (“Ithaca”) of Joyce’s *Ulysses*, the narrator asks about the water Leopold Bloom seeks from the kitchen faucet: “Did it flow?” (548). He then responds with the same word that famously ends the following chapter, and the novel—“Yes” (548). “Ithaca’s” curiously dominant, omniscient narrator then describes the hydrodynamic infrastructure that Bloom accesses when he “tap[s] the current by turning the faucet to let it flow,” highlighting its administration by a metropolitan-scaled, water-management bureaucracy (548). Joyce’s narrator expends 236 words depicting how and with what political and social connotations the water flows from its origins to Bloom’s faucet tap, so that he can make cocoa for Stephen and himself.

Diverting attention away from any natural topographical feature, except as those relate to describing the flow-management infrastructure, the narrator traces the humanmade interventions onto topography that focus on flow rates and volumes of delivery, precisely as Robison called for in 1822. “From Roundwood reservoir in county Wicklow of a cubic capacity of 2400 million gallons,” he begins, water reaches the “26 acre reservoir at Stillorgan, a distance of 22 statute miles, by way of the Dargle, Rathdown, Glen of the Downs and Callowhill” by “percolating through a subterranean aqueduct of filter mains of single and double pipeage constructed at an initial plant cost of £5 per linear yard” (548). These objective results of an era spent developing infrastructural practices for more predictably delivering regularized flows (here of water for consumption, but likewise for drainage) were built to sustain an urban area whose biological demands exceed what its natural watershed can provide. Extending what began as naturally occurring flows over distance again becomes the telltale task, and human intervention onto topography ultimately provides what would be the result of a natural watershed of an adequate
capacity for Dublin’s needs, if it were to exist as such. At the same time, Joyce’s narrator reveals the reified socio-political power structure behind such intervention.

After reaching Stillorgan, the water flows (in a Bazalgette-esque description) “through a system of relieving tanks, by a gradient of 250 feet to the city boundary at Eustace bridge, upper Leeson street,” though thanks to “prolonged summer drouth and daily supply of 12 1/2 million gallons,” its water “had fallen below the sill of the overflow weir for which reason the borough surveyor and waterworks engineer, Mr Spencer Harty, C. E., on the instructions of the waterworks committee had prohibited the use of municipal water for purposes other than those of consumption,” out of fear for “the possibility of recourse being had to the impotable water of the Grand and Royal canals in 1893” (548). That historical year did involve a drought and failing water supply to the city, a reality which Joyce’s fiction then combines with the social weight of flow dynamics-based urban management. The fear of drought comes on the heals of “the South Dublin Guardians, notwithstanding their ration of 15 gallons per day per pauper supplied through a 6 inch meter, ha[ving] been convicted of a wastage of 20,000 gallons per night by a reading of their meter on the affirmation of the law agent of the corporation, Mr Ignatius Rice, solicitor,” which constitutes in Bloom’s mind an act “to the detriment of another section of the public, selfsupporting taxpayers, solvent, sound” (548). Like the mid-Victorian water “rates” that had been charged to households falling under “poor law” conditions by authorities who wanted to clear their engineered flows of needless, power-sucking diversions and consumptions and to be compensated for them, Bloom reflects a classist view of water provision, which runs under the surface of his own consumption of water for late-night cocoa (also a colonial commodity). In the same way that Taylor, Kay, and others saw populations as improper flows, pooling, stagnating, threatening to flood, Bloom’s attitude contains an accepted, assumed completion of social
hydrology’s expression as a form of social infrastructure. Beyond the *making into infrastructure* of topography, colonial Dublin society’s political, social hierarchy lives on and in that model of infrastructural work.\(^{204}\)

To the chagrin of the post-Victorian culture they wrote in and about, modernists forcibly uncovered that by-now accepted, as if hidden, layer of human shaping of inhabited watersheds—foregrounding the waste removal, water provision, and other such realities of life which men like Bazalgette had literally buried. Recalling that *Ulysses* initially began appearing in serial form, and that Bloom’s first scene features him reading and then using a serial publication as toilet paper, as was common practice by Londoners to the extent that the Queen was lied to about the Thames’ celebratory “confetti” during her abandoned tour of that river in 1858, Joyce’s final exposure of the as-if natural “flow” of “current” into the Blooms’ kitchen completes the novel’s paradigmatic bringing to the surface of those well-contained, closely managed, Victorian flows. Woolf works similarly in her early novel, *The Voyage Out*, whose young protagonist, Rachel Vinrace, exudes a perhaps intentionally naive wonderment about this state of living, belying her travel to an English colony on her father’s merchant vessel and eventual death there: “Under the streets, in the sewers, in the wires, in the telephones, there is something alive; is that what you mean? In things like dustcarts, and men mending roads? You feel that all the time when you walk about London, and when you turn on a tap and the water comes?” (58).\(^{205}\)

In the same way that modernists like Woolf and Joyce took up the literal structuring of life via flow dynamics, they also worked to expose its social applications down to the level of

\(^{204}\) George Bernard Shaw’s *Major Barbara* also features a paternalistic political authority, Undershaft, condescendingly retorting to his daughter, a Salvation Army Major, in regard to any purpose in her recent idealism in attempting to help the poor, “They find their own dreams; but I look after the drainage” (141).

\(^{205}\) She subsequently dies in an English colony in South America, where a kind of slumming trip upriver to a less “civilized” community apparently exposes her, perhaps via water, to the disease that kills her.
individual thought. While Woolf and Joyce often casually get credit for the literary form, if not the phrase, “stream of consciousness”—which is also often assumed to be of modernist make—I have shown how fully Eliot invested The Mill on the Floss with the conflict between thought and emotion as naturally-occurring, unavoidable, physiological flows and the social structures that seek to block and divert them. As I have also argued, Mill then influenced Hardy’s works, whose floods at rural water-management sites precede works like D. H Lawrence’s The Virgin and the Gipsy, which also ties dangerous sexuality in part to that novel’s mill-site. I also posit in this context that the “Ithaca” narrator’s liturgical, question-and-answer approach to storytelling denotes an accompanying foregrounding of narrative production as inherently unnatural, and his narrator’s words’ lack of what might be thought of as “natural flow” show that any such criterion—which is, in truth, a flow-based cultural construction—constitute part of the inheritance of nineteenth-century serial literary expectations.

From this work’s first chapter, where pages to be printed and released as regularized flows of serial literature were described as forming, as if naturally, in the confluence of flowing rag-pulp and watercourses that shaped traditional mill-based economics, to the final chapters in which emotion, thought, and desire are graphed in and on literal flow-management features whose bounds and structural strengths are destroyed by floods, flow dynamics as a cultural force creates deliberately engineered systems for managing individual and collective dynamism. Flow dynamics teaches the value of forming such dynamism into flows which hearken back to the pre-industrial utilization of watercourses for economic and social purposes—though in forms achieved through infrastructural and energetic enhancement. Thus, neither those idealized streams that were harnessed in printmaking and publishing industries, nor the constraints placed on social behavior by metaphorical applications of hydrological thinking can be seen as anything
but artificial, often destructive, exploitative, and wasteful (considering the floods of Eliot’s and Hardy’s works or the fear of apparent disease and classist culture-threatening circulations of *Great Expectations* and *The Wild Boys of London*, which remove value from those works’ much more sustainable economics and redeeming and redeemable protagonists).

The British literature of the nineteenth century exists within and responds to the wide-ranging cultural applications of flow dynamics. It does so in a fittingly wide-ranging way: from investigating the mapping of the new towns and their inhabitants as a body made up of individual, partially autonomous but mutually-influencing vectors of health or illness and in need of healthy drainage, to the consideration of population groups as liquid matter to be managed for the maintenance of socioeconomic and political status quo—especially in regard to the flows of serial literature moving through their minds and bodies—to the pumping downstream of cities’ combined, flowing waste beyond their own sensory thresholds, to the equivalent rendering out of sight of populations deemed to be “dissipated,” “stagnant,” or threatening to “flood,” and even to the attempted blockage or diversion of potentially hierarchy-upsetting, intellectual and emotional activity. By the time of Eliot, and especially Hardy, flow dynamics as a way to shape and manage culture, has gone beyond sanitary social hydrology in population-targeting, metaphorical applications but has become literal in all ways. Though developed as a response to the obvious lack of natural watercourses’ capacity to allow for the continued growth of English wealth, flow dynamics became a set of strictures about whose outcomes both canonical and unknown authors consistently voice concern, if not open critique.

Over the time of this concern and conflict, however, the influence of hydrological thinking melds itself to the language of economics (which has an early iteration in the Corn Law repeal rhetoric about unlimited grain production as a river that will find its own “level” if left
alone, as seen in context of *The Mill on the Floss*). What other paradigm gave us *revenue streams, cash flows, workflow(s), and liquidity* (all with etymologies emerging in the early 20th-century, on the heels of “hydrodynamics”’ rise to cultural predominance)? The economics of flow dynamics also encouraged an era of thinking about economic and physiological consumption as phenomena that could, in fact, grow beyond the kinds of limits that Malthus famously feared, so long as a science continued to develop for extracting increased utility out of the given geography and topography. Flow dynamics’ role in a notion of “sustainability” preceding and directly contradicting our own, then, seemed to show that the demands of industrialized, urbanized, cultural consumption and excretion could sustainably be met via human intervention. Humans could (in this line of thinking) model their versions of natural watercourses on their previous, natural and naturally-limited iterations, while enhancing their capacities via forms and amounts of energetic expenditure that now appear absurdly environmentally and socially irresponsible—all, like the hallmark case of Bazalgette’s new Thames, toward a single-use function.

In addition, though, this model for obtaining more power from natural watercourses and resources generally also encouraged political and cultural authorities to apply its principles to particular groups of people into the 20th century. Such principles encouraged colonialism as an economic endeavor, consumerism, and the ongoing desire and belief in intervening on natural topography in order to reap physical or economic benefit to humankind (or to those in privileged positions atop it). Again, Woolf sensed and depicted the constellation of phenomena that emerged out of the nineteenth-century’s hydrological mania in this regard. She does this in tying the Thames’ shores, its boat traffic, colonialism, and individuals’ economic activities together in “The London Docks” and “Oxford Street Tide” from the collection *The London Scene*. In “The
London Docks,” she reminds readers of the river’s continued role in draining the city’s waste, which now takes a more obvious role than the sewers running in the embankment (“As we go on steaming up the river to London we meet its refuse coming down. Barges heaped with old buckets, razor blades, fish tails, newspapers and ashes—whatever we leave on our plates and throw into our dust bins—are discharging their cargoes upon the most desolate land in the world.” [9]). In “Oxford Street Tide,” Woolf subsequently figures “streams” of consumers, the “river” of Oxford Street’s retail district, and “vessels” of mongers pushing barrows of flowers, clothing, and other goods across that “river” (17), as well as critically judging the district’s attempt to display a flow of goods for consumption in “unending beauty, ever fresh, ever new, very cheap and within the reach of everybody,” as it apparently “bubbles up every day of the week from an inexhaustible well” (20).

The implication of flow dynamics in the 20th-century’s legacy of consumerism and colonialism finds its way to judgment in Conrad’s *Heart of Darkness* as well. Where Alfred H. Hyatt’s *The Footpath Way: An Anthology for Those Who Travel by Countryside* (1906) provides a telling, non-fictional example of such hydrologically-imagined, expansionist thinking, Conrad specifically invokes British flow dynamics’ fixation on drainage as an advancement of civilization in his nightmarish depiction of colonialism. Hyatt writes that the “communion” afforded by England’s rivers with the rest of the world “has established an interchange of blessings, pouring into the sterile regions of the north all the luxuries of the south” as it “has diffused the light of knowledge and the charities of cultivated life” to those “southern” cultures in return (220, emphasis mine). On the other hand, Conrad’s voyager, Marlow’s, discovery of the morally bankrupt, dying colony and its master begins with the incomplete, destroyed drainage infrastructure he finds upon leaving his ship for the colony’s shores.
His early impressions on shore focus briefly but with careful detail on “a wanton smash-up” of “imported drainage-pipes for the settlement (that) had been tumbled” into an unfinished drainage ditch on a hillside and, down to the last pipe, broken (77). Via the objects of broken tiles, Conrad shows that the initial desire to treat Manchester, London and other English towns in the mid-nineteenth century as watersheds to be drained—with the accompanying treatment of people already discussed—which moved into a later effort to systematically irrigate and drain the outlying agricultural districts of England with newly available, industrially produced pipes and tiles, actually precedes and helps shape the initially profitable but morally repugnant and ultimately failed colonial efforts described in his novel.

To this, he combines the economic language of flow dynamics with the racism at the heart of the colonial system in elaborating his view of the station: “Everything else in the station was in a muddle—heads, things, buildings,” though, crucially, “strings of dusty niggers with splay feet arrived and departed; a stream of manufactured goods, rubbishy cottons, beads, and brass-wire set into the depths of darkness, and in return came a precious trickle of ivory” (79, emphasis mine). Gone are Kay’s and Taylor’s despised Irish and other immigrants who “pour” into England’s manufacturing towns and need to be set to work for fear of a civilization-destroying “flood” their too ample collection and stagnation threaten. Now “strings of dusty niggers” carry out the hydrodynamics of colonial economics, all based around the “precious trickle of ivory.” Also like Zietler’s reading of the spread of material culture from England’s nineteenth-century industrial centers into its rural, agricultural areas, the bringing of English drainage pipes to the Congo would imitate the notion of Pater’s that Zeitler describes: that such flow-based objects and practices would supplant the perceived “primitive,” in this case a more distant and apparently racially “other” one.
That flow-based thinking not only remains present in 20th-century economics and environmental and political practices, but also appears under critical eye in some of that period’s most influential fictions reveals the endurance of flow dynamics as a culturally-formative set of ideas and practices. The breadth of its application and sheer force of its influence cannot be understated, and despite its negative ramifications for the environment and for broadly liberal democratic concepts of political participation, representation, and equitable social welfare, its appeal for enabling economic profits and expanding urban centers’ life-bearing capacities set flow dynamics in a position of influence whose language, if not also tenets, remain with us today.
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