New Approaches to Medieval Water Studies

How to Cite: Smith, J L 2018 Medieval Water Energies: Philosophical, Hydro-Social, and Intellectual. *Open Library of Humanities*, 4(2): 28, pp. 1–27, DOI: https://doi.org/10.16995/olh.228

Published: 05 October 2018

Open Library of Humanities

James L. Smith, 'Medieval Water Energies: Philosophical, Hydro-Social, and Intellectual' (2018) 4(2): 28 *Open Library of Humanities,* DOI: https://doi.org/10.16995/olh.228

NEW APPROACHES TO MEDIEVAL WATER STUDIES

Medieval Water Energies: Philosophical, Hydro-Social, and Intellectual

James L. Smith
Trinity College Dublin, IE
jlsmith@tcd.ie

This essay argues for the consideration of energy and an energy-based humanities model in the study of water in the Middle Ages. It also proposes that 'energy', when discussed in the context of the Middle Ages, is in fact a study of 'energies', derived from technology, material culture, and intellectual culture in equal measure. It proposes three genres of medieval water energy as a model for the multi-valent study of the energy politics underpinning medieval society: the philosophical, the hydro-social, and the intellectual. The essay surveys approaches to medieval water history to propose a new approach, and makes an argument for the reimagination of water as an entity of energy with dimensions flowing beyond the history of science and social history dimensions of water history. Medieval thought did not conceive of water as wholly material or wholly abstract, but as a part of a larger world-system spanning the material and spiritual.

Just as medieval people drew on a tiny percentage of gravity flow through hydraulics, so too did the water of medieval intellectual culture provide motive power through the infusion of divine power, setting the world-machine in process. A new approach to medieval water studies follows Imre Szeman's description of energy as an underpinning force within society, shaping its discourses, dialogues, norms, and political ecologies. For the Middle Ages, this model must account for a differing intellectual culture encompassing religious, philosophical, and technical models of water.

Introduction

> The staggering significance of energy as *the* undercurrent and integrating force for all other modes and institutions of modern power has remained remarkably silent, even in this era of so much talk about climate change, energy crisis and energy transition (Boyer, 2011: 5).

The above passage is couched in language familiar to medievalists in its discussion of power: discourses on biopower, biopolitics, vibrant materialism, and the agency of objects have primed the field for power-based analysis. However, it may seem like more of an unfamiliar leap to talk about *energy* rather than *power* in a medieval context. The word energy seems more at home in an age of mass consumption or mass production, biochemistry, or calories consumed, whereas a more abstract term such as power is very much familiar to medievalists: political power, military power, social power, patriarchal power, but also divine powers or the properties of the natural world. Medievalists in disciplines such as ecocriticism and environmental history have embraced the language of power(s) and political entanglement to good effect to explain the often-convoluted transactions of human and environment (for example, Hoffmann, 2014; Schiff and Taylor, 2016). Other studies have explored the notion of energy in more specific terms (for example, Hoffmann, 2007). This has important implications for the focus of scholarship: a putative medieval world predicated on human understandings of power has very different resonances to a world in which social and political action is driven by, underpinned by, and entangled with a broader ecology of energies and motivations beyond the human, in which a decision, behaviour, or action is characterised by the energy regime(s) that enable it.

The study of energy in the humanities is the focus of a growing methodological framework, derived from sociology and now reaching full maturity in volumes such as Imre Szeman and Dominic Boyer's 2017 *Energy Humanities: An Anthology*. This corpus of scholarship is valuable to the study of the medieval environmental humanities in general, and the study of medieval water as a facet of environment. In the case of water, energy functions in physical and mental capacities: it does physical

work, but also provides a complex metaphor for expenditure of mental vitality that I have discussed elsewhere in greater detail (Smith, 2018). This is a unique 'world of water', as Tvedt and Oestigaard (2009: xv) have termed it, one of the 'numerous life-worlds and webs of significance people have spun around water as natural phenomena'.

We talk a great deal of water and power, be it political, religious, or social—water is shaped by power, has power, flows to power, is power (see especially Swyngedouw, 2009). This power is underpinned by energy. It moves freely across areas of life that have previously been considered separate. Take, for example, John Urry's (2010) mobile sociology or Zygmunt Bauman's (2000) liquid modernity: both are material expressions of a fluid holistic system of energies in which the social is an intermingled flow. A recent example of the capacious nature of this vision can be found in Astrida Neimanis's (2017) posthuman feminist phenomenology of water, in which the boundaries of the corporeal, the female, the material, and the aqueous mingle and merge (see also Alaimo, 2010). Hetta Howes (2016) has demonstrated the medieval capaciousness of water's materialism for the narration of an expansive transactional approach to gender.

Tracing the affordances of energy as a foundational influence on social organisation—and the role of water in this system—allows us to make use of some key trends in medieval studies such as non-human agency and vibrant materiality in new ways, giving voice to the invisible energy framework of intellectual and material culture that is sensitive to the co-composition of environment by human and non-human agents. By doing so, and by using water as a case study, I offer a new approach to medieval water studies with wider implications, and a link between the Middle Ages and the energopolitics—the political ecologies and politics of energy—of the twenty-first century. Szeman has signalled the crucial significance of energy in reshaping our understanding of biopolitics:

> [A]s soon as we consider energy in relation to the environment, what we learn puts pressure on our understanding of biopower, and indeed, raises critical questions about the status and utility of the theories of political power we have broadly come to accept (Szeman, 2014 (1): 457).

The goal of this reflective essay is three-fold, and the essay outlines three genres of energy that have emerged in academic discourse surrounding water. First, it argues that energy is not only a crucial word in the vocabulary of medievalists, but that it is multivalent and underpins pre-modern culture at a level every bit as fundamental as the case of petrochemicals in the twenty-first century. The level at which energy shapes medieval activity is often more complex than first imagined, extending into the language used to shape ideas. Secondly, this essay proposes a new approach to water studies by raising the possibility of multiple and intermingling medieval water energies, wholly shaped in word, thought, and deed by a dominant energy carrier. In our case, this carrier is water. Energies, when combined, present a vision of an energy culture in which water was accorded unique and transformative properties. This culture, enabled by its energetic potential, imagined mental labour and the intellectual practices of the literate elite in terms of energy—its generation, its manipulation, its limitations and abundance, and its expenditure. Finally, it argues that this hydraulic society does not manifest itself in material life alone.

Three Energies of Water

In this essay I propose that, for medieval studies, it is more fruitful to see the pre-modern energy humanities as a treatment of *energies*, rather than a singular notion of energy. Energy is, at its heart, the ability to *do work*, but extends far beyond a scientific characterisation when studied historically. It passed through the Middle Ages from Aristotle's *Physics* as the Greek ἐνέργεια (*energeia*) or Latin *energia*, meaning 'being-at-work'. It was a force of potential rather than actuality, distinguished from ἐνδελέχεια (*entelecheia* or *entelechy*), the persistent power of a completed thing or action, or 'being-at-an-end' (Sachs, *Aristotle*: n. pag.). The two were entangled, for they were facets of existence, both means and end:

> The words *energeia* and *entelecheia* have very different meanings, but function as synonyms because the world is such that things have identities, belong to species, act for ends, and form material into enduring organized wholes. The word actuality as thus used is very close in meaning to the word

> life, with the exception that it is broader in meaning, carrying no necessary implication of mortality (Sachs, *Aristotle*: n. pag.).

The process of becoming and achieving life, however, is not wholly physical: it is ontological. Medieval scripture and natural philosophy saw life as an infusion of essence into raw components, a conversion of energy into an entelechy conditionally guaranteed by a divine creator. Thus, energy was a temporary gift from God at the time of creation, infused into Creation and transacted between its parts, but never divorced from its divine origin. This energy was one in essence, and only differentiated in application. Today, we primarily understand energy through its scientific properties—such as the ability of stored energy to generate heat and light, or to invigorate living organisms— and use energy in other contexts as a metaphor, such as praising someone for their energy, or not having the energy to complete a task. We should also view it as something expended to do mental work, and recognise that medieval figurative language was rarely 'just' a figure of speech.

This requires some explanation. In short, I am extending the relationship between energy and activity in two ways. First, I am proposing that a medieval understanding of where energy came from and was expended made spiritual and moral agency a sphere of activity with no distinction between, say, the energy used to power a mill wheel and the energy expended in the performance of devotional activities. This leads me to my second extension of energy and activity: it is not historically appropriate to understand medieval Christianity—especially the activities of, say, monastics—as establishing any distinction between physical, abstract, spiritual, or material. A good example of this model from sociology would be Urry's theory of scapes and flows, in which mobilities are ontologically flattened and directed through a system that contains both material and cultural flows of matter-energy (Urry, 2010). Like Urry, I am proposing a mobile sociology of energy that is not restricted to any form of expression, moving freely through a shared system. This claim is what Urry (2010: 362) describes as a 'post-disciplinary reconfiguration', a useful reframing of the medieval beyond its established boundaries in which energy rehabilitates the

'social powers of objects and nature', encouraging 'an increasing awareness of spatial and temporal processes'.

The daily life of all pre-modern people was dominated by the limited availability of fuel, used for a variety of purposes—combustion, the burning of stored metabolic reserves, muscle power, technologies. Life is a complex assemblage that requires inputs. Energy not only dictated the material conditions of medieval society—its cities, towns, cultures, technologies, and social structures—but also had a profound effect on the articulation of a vocabulary for talking about inner life, a formative shaping of power through an understanding of energy. The hydraulic imagination feels the pull of many 'waters' rather than 'water', as Christopher Hamlin (2000) has put it, and recognises many different corresponding energies. These energies are ever-changing, and historically distinct. Water is their vehicle.

Access to energy is what generated and shaped pre-modern society, as it does today: metabolic energy in the form of nutrition, kinetic energy in the application of muscle, motive energy in the form of technologies and modalities of travel, but also the stranger and more esoteric energies of philosophy, rhetoric, and intellectual expression. None of the iconic elements of medieval culture and technology—European and global—would be possible without it, nor would its Latinate Christian writings. Churches could not be built, fields could not be sowed, ships could not sail, animals could not live, manuscripts could not be produced, philosophies could not be generated, life could not go on: in short, medieval society would not be possible. This is a truism, but the way that it is true is historically unique to the Middle Ages. In his survey of the emerging energy humanities, Szeman (2014 (2): 6) argues that the energy humanist complicates the story of modernity by seeing it as 'oil modernity' and its subjects as 'oil subjects', that is, defined by the transformative effects of their dominant energy source. They are 'creatures and societies that are what they are not only (or even primarily) due to changes in ideology, emancipatory struggles, or technological developments, but because of changes in access to energy' (Szeman, 2014: 8). The same can be said of the Middle Ages, and of our case study, that of medieval water. Being a 'water subject' is about more than the history of science: it is also about intellectual history.

It would be an error to be essentialist in arguing for the exclusive influence of energy, or to imply that energy is uniform in its meaning. Energy is not a unifying materialist grand theory for historical forces: it does *shape* all of society, but it does not *explain* all of society. Historical cultural forces such as social hierarchy or patriarchy are complicated by energy, but not replaced. Lynn White Jr. (1962) famously drew on the *longue durée* methodology of the Annales School, proposing to explain European civilisation using technology: he advanced the notion that advancements in wind, water, and chemical power technologies led to a medieval 'industrial revolution', for example. In doing so, White did not succeed in proving that all history is wholly determined by technology, but that technology deserved to be considered as a foundational influence in discussions of history (for more, see Worthen, 2009). Recent combinations of environmental history with science and technology studies have demonstrated that technology is part of a wider techno-biological ecology, a factor in the functioning of a system that interacts with other factors to shape environment (Jørgensen et al., 2013; Jørgensen, 2014). Energy helps to draw this complex of factors together and explore them. Thinkers such as Szeman or Jørgensen remind us that use of energy is not merely a technology, but also an ontology.

The Case of Monasticism

Energy affordances and dependencies provide a telling profile of pre-modernity. Water was a potent deployment of labour-amplifying energy—more potent than human manual labour, combustion, or animal toil. It was both powerful and useful, qualities valorised by its manipulators. Take monasticism, for example: the wealth and knowledge of Europe's abbeys was generated through water, sustained through water, and its production was hydraulic: monks were the engineer-scholars of the mill and the aqueduct, using both as tools of their moral valorisation. It was not until the Industrial Revolution that the technocratic influence of Churchmen over technologies of energy was offered a serious rival. During the twelfth-century Cistercian expansion, roving technocratic monks who served as *de facto* hydraulic engineers leveraged the learning of the Order to build waterworks. For example, the

Cistercian Geoffrey d'Ainai was sent by Bernard of Clairvaux to the new monastic community of Fountains in Yorkshire, part of a network of skilled craftsmen and technically proficient lay-brothers (Magusson, 2001: 13). They shaped the patterns of thought deployed by powerful water use, allowing the Order to mediate their spiritual discourse, and gave form to their modes of power and influence (see Smith, 2018). The new monastic communities of Cistercianism provided the resources that allowed the spiritual lives of monks and nuns to eschew the often-grinding toil of daily life for a large section of the medieval populace. Ellen Arnold (2007, 2013) has painted a complex landscape history picture of this process in action in the abbey of Stavelot-Malmedy, a twin monastery in the present-day Belgian Ardennes whose early medieval foundation, activities, miracles, and myths were all fundamentally shaped by a relationship with water.

As the monks of abbeys such as those in Arnold's case study reveal, one could consume the stored biochemical energy of plants to feed human beings and animals, allowing muscle power to apply force. Mechanical devices such as windlasses, capstans, and treadmills could amplify this energy, as could the use of the wheel, the sack, or the plow. Biomass could be burned for fuel or intensified through conversion into charcoal (pure carbon), generating heat and energy. Further energy was needed to transport the raw materials needed for these tasks. Fossil fuels were limited: charcoal, coal, peat, mineral coal, wood. And finally, the effects of gravity drove air and water, providing potential energy for the windmill, the conduit, or the waterwheel. Energy was scarce and yet also derived from the application of potential energy mediated by technological regimes (Hoffmann, 2014: 196–214). Large sites such as town and cities consumed greater supplies of ready fuel such as wood in order to heat themselves and power industry, creating webs of economic activity that stretched into the surrounding woodlands (Hoffmann, 2007: 305). Monasticism provides a good example once again, as an energy-hungry undertaking completely dependent on a high yield of the fuel accessible to medieval technology to function: wind, water, and work, as Adam Lucas has put it (2005). It is little surprise, then, that it valorised energy. The famous plan of Saint Gall reveals that the vision of an ideal monastery is also a vision of energy husbandry pre-meditated by its designers,

including agriculture, hydraulics, and industry side by side with devotion and prayer (Horn, 1975).

For example, a monastery existed at multiple dimensions of energy:

1. *Material*: Monks and nuns were overseeing a productive economic and agricultural entity that consumed a large amount of biomass to support its activities, and converted the energy of its environment (water, animal labour, human labour, wood for combustion, the capacity of the land for agriculture) into organised social activities. Water was a material resource.
2. *Philosophical*: The monastery was a place where monks or nuns were recreating paradise, replacing the paucity of energies in the temporal world with the spiritual superabundance of the divine. Abundance of spiritual energies translated into a redeemed landscape that was itself abundant in natural resources. Water was a spiritual resource.
3. *Hydro-social*: The monastery was a point of interaction between the energy registers of social life and those of environment. At the interstices of the social and the aqueous, it was possible to create new emergent properties that could not exist alone. Monasteries were built by rivers because use of water defined not only the economic life, but also the spiritual life, of the community. Water was a meeting point at which hydro-social arrangements could form.
4. *Intellectual*: The intellectual labour of monks and nuns (prayer, affective piety, corporeal discipline, ritual, liturgy) was every bit as much part of the labour of the monastery as physical work. The former justified the latter, and the latter supported the former. Water was a material representation of the vital energies of spirituality, and the technologies of its control were representations of its shaping by human artifice.

As Antonio Sennis has put it, 'Ecclesiastical communities had a strong inclination to look at the space around them in order to find that the perfect correspondence between divine will, natural laws and social order was materially reaffirmed in it' (Sennis, 2006: 279). David F. Noble (1999) has an interesting perspective on this

process, pointing out its link to elite power and the masculinisation of labour such as washing and milling through technology. By valorising the mechanical arts, Noble (1999) argues, the Benedictines and later the Cistercians converted the crafts into industries, equating manual labour with spiritual labour and productivity (the multiplication of labour) with spiritual rectitude. In this elite technocratic culture, success, industry, goodness, and holiness were part of the same socio-technological system of power (see also Oestigaard, 2013). We get a sense of this admixture in the following passage from the 13th-century Cistercian *Exordium Magnum*:

> Here begins the narrative of the beginning of the Cistercian Order, how our fathers left the monastery of Molesme in order to recover the purity of the Order according to the Rule of St Benedict and founded the fertile house of Cîteaux which is the mother of all our houses, since from her, as *if from the purest fountain, the rivers of all the churches of our Order flow* (Burton and Kerr, 2011: 21, italics in original).

The passage sits at the threshold of the socio-natural and the philosophical. It is a discussion of monastic foundation, a twelfth-century political narrative of Cistercian self-imagination. The passage visualises a population of the natural with the social, the spread of ideas equated with the spread of monasteries, the diffusion of spirituality with the development of monastic economy and industry. It is also intellectual and spiritual, an expression of expansion in aqueous terms.

Texts such as the *Exordium Magnum* are hydraulic monasticism at its most evocative: a movement and a culture shaped by the availability of advanced water management, enriched and empowered by its exploitation, and self-narrated with the language of its energy flows. The links between Scripture and nature, culture and water, are intrinsic and fundamental to its meaning. Most importantly, it is a manipulation of energy at multiples registers. A monastery is an ideal medieval example of energies intermingled or intertwined, but each separate register has its own affordances and limitations that are useful tools in the interpretation of a medieval water-based energy humanities.

Philosophical Energies

> Physics may strive to comprehend the nature of the world as it really is, pared down to its essential constituents of force, energy and matter. An environment, however, does not exist in and of itself. It exists only in relation to the being whose environment it is. Thus, just as there can be no organism without an environment, so also there can be no environment without an organism (Ingold, 2011: 77).

For medieval thinkers, energy was not restricted to the forms that we might understand today. *Vis*—force or strength—was a motive potential that shaped, motivated, ordered: the mind had *vis*, nature had it, the cosmos had it, the elements had it, and always with a modifier that determined its unique efficacy. It was unruly and multi-valent, understood as something wild and spontaneous but also orderly. The theoretical apparatus for understanding philosophical energies comes both from modern theory and medieval philosophy itself, a mingling that has provided many fruitful insights (take, for example, Cohen, 2015).

For twenty-first century medievalists, a further vocabulary of energies has permeated discourse. Vibrant materialism, Deleuzo-Guattarian flows of matter-energy, the strange energies of the non-human: another world of energy to consider. Manuel De Landa (1997) has followed matter-energies through humans and populations, creating a new kind of energy-focussed *longue durée*. Water, like other energetic entities, participated in this unruly assemblage of forces as much as it did in the socio-natural world of hydraulic energy. It is crucial, to my mind, to account for the full spectrum of energy when discussing a medieval energy humanities model of water, and so it is with these energies that I begin. I propose that when approaching a culture or an environmental entity—such as water—from the perspective of energy, humanists must account for lesser-known forms of energy. Despite their esoteric status, however, I believe that these energies are an essential part of the puzzle that is medieval energy. Energy is a function of physics in the twenty-first century, but also part of a story that is philosophical, social, and cultural.

It is fitting to begin with the example of an energy that has become familiar to medievalists through emerging trends in discourse: the energy of the assemblage. As Jane Bennett (2010: 35) discusses, there is an energy to assemblages of objects that is hard to quantify using twenty-first century scientific language. Drawing on the Chinese word *shi*, 'the style, energy, propensity, trajectory, or élan inherent to a specific arrangement of things', Bennett proposes that the assemblage has its own distinct and agential energy, but also retains the unique valences of the individual parts. When discussing the energies of medieval water, it is important to see any hydraulic arrangement as an assemblage with its own *shi* as well as the more socially discrete powers ascribed to water by recent trends in water history. Water has a power that is not generated through physics, or its ability to do work. The emergent properties of water are not wholly a function of energy, nor is it wholly material (a medieval version of Bennett's assertion that vibrant materialism is neither vitalism nor mechanism). These energies are constantly at work, and reveal medieval hydraulic endeavours to be part of a system of distributed agency that defies easy narratives of human mastery. Bodies are porous, their boundaries largely conceptual—as Stacy Alaimo (2010) has argued, bodies (human and non-human) are trans-corporeal. Material entanglement has been identified by Stephanie LeMenager as a key puzzle of energy humanities, for 'we can't think our way around it and yet how can we not think with it?' (Bellamy et al., 2016: 7).

Tim Ingold (2011: 24) argues that materiality is a place of continuous transformations and shifts in states. As I have argued elsewhere (Smith, 2014), this was a notion that was familiar for medieval minds, for the material world was understood as a place of restless energy, transmutation, fickle change, and moral uncertainty. The energies described by vibrant materialists such as Bennett are functions of the object-oriented ontologies sketched out by models such as Bruno Latour's Actor-Network Theory (ANT) (2005). They are an energy of entanglement, of an interdependency beyond human ontology and yet apprehended, in part, by humans. It is crucial to identify the energy properties of water as deriving, in part, from these energies. Humans glimpse an incomplete picture of a non-human entanglement that defies easy classification. Water has a vibrant agency sensed by

humans, a radiation of potential derived from the forceful interaction of its parts. As Simondon (1980: 66) put it, 'living matter is far from being pure indetermination or pure passivity. Neither is it a blind tendency; it is, rather, the vehicle of informed energy'.

For medieval thinkers, water—and the structure of Creation—had a vibrancy that gave it dynamism and life. It was, in a manner that Simondon could never have predicted, a vehicle for informed energy *par excellence*, the shaping potential of the Trinity. The whole cosmos was an outpouring of energy from a vast an inexhaustible reservoir, the *fons vitae* or source of life. This energetic property was a physics of Creation, derived from human material encounters with water and yet thought to serve as a pattern at the most fundamental cosmic level. It explained causation in material terms, and this materiality was a form of Bennett-esque *shi,* derived from the potency of an assemblage working in harmony, and yet possessed of its own distinct sub-energies. This example from the fourteenth-century *The Mirror of the Source of Life* by John of Hildesheim offers an insight into a medieval theory of a fluvial matter-energy, eternally recharged through salvation so that '[e]very intelligent living being which flows immediately from the first one remains so inexhaustibly and continuously alive that, according to the law established by the first one, at no moment could it of itself cease or interrupt its being' (John of Hildesheim, trans. Schaer, 1996, n. pag.).

Christian vitalism such as that articulated above draws on a vibrant materialist inspiration as much as it does on the practicalities of medieval water management. It discusses the workings of life itself in fluvial terms by equating the magnetism of one form of valorized energy to another. By drawing on the motive and fluvial properties of water to present a vision of the Trinity, undivided and undiluted and yet eternally flowing forth, the spiritual materialism of water draws on a form of divine *shi*, its assemblage speaking of organised potential. Several recent medievalist and early modernist studies demonstrate that delving into the intersection of water philosophy and material philosophy is very profitable (Cohen, 2013; Cohen, 2015; Cohen and Duckert, 2013; Cohen and Duckert, 2015; Duckert, 2017; Noble, 2017).

The first genre of energy derives from theory, but is significant in practice for several reasons. First, it reminds us that energy is not a function of physics alone—water's ability to do work, for example—but also of culture and ontology. There are energies derived from the interconnectivity of life that are intuited by humans and incorporated into intellectual models. Water is eloquent in this regard, forming part of what Louise Noble (2017) has described as a mythography of water. Cultural meaning and influence is linked to what we moderns might describe as scientific properties, but also derives from the human intuition of meaning stemming from these properties. The non-human is a realm of connectivity and agency that medievalists have tapped into in recent years, and speaks in the language of energy. Passages such as the example from John of Hildesheim tap into the physics of water to make spiritual meaning, but also exhibit traits apprehended by theories such as that of the assemblage, vibrant materialism, and object oriented ontologies. There is a reason why social science has found value in theorists such as Deleuze, Guattari, and Latour, and writers such as Ingold and Hodder (2012) have deemed entanglement to be an essential component of archaeological and anthropological scholarship.

Hydro-Social Energies

> At the heart of the environmental humanities is the insight that anything and everything deemed natural is, of necessity, cultural; how we name and frame our relation to the natural world and the environment is expressed through linguistic terms and concepts that explain and name it, is culturally contingent, and changes over time (Szeman, 2014: 3).

Hydraulic energy seems at first glance to be wholly independent of humans, and yet shaped by them. If we subject the history of water to what Gaston Bachelard (1983: 135) would term an 'overly clever' (read: overly scientific) understanding of water history, we lose other, more esoteric, energies. Bachelard recognised this reality, the reveries of water shaping the mind prior to interpretation or thought. Human dreams of matter permeate even the most pragmatic feats of engineering. The scientific properties of water and its ability to turn a mill wheel or water a garden are human interventions,

and yet water as we experience it is wholly shaped by these forces. Recent scholarship has refused to make this distinction, for society and water's kinetic power form part of a single array, a socio-natural arrangement (see Linton and Budds, 2014). Like Bennett's notion of an organisational energy derived from interrelationship, a *shi*, scholarship of socio-natural sites such as watersheds and coastlines insist on the peculiar social and intellectual energies derived from the human shaping and manipulation of water's ability to enable travel, provide cleanliness and nourishment, and do work. Layers of energy emerge as we begin to interrogate these arrangements. As Winiwarter et al. (2013: 105) have pointed out, the very point of interface that creates socio-nature—the locus at which the 'natural and social are intertwined, in our bodies as well as in the world'—is predicated upon energy transactions:

> [H]umans are able to use their bodies to process the information they have gathered with their senses. How does the body accomplish this feat? By means of energy: Senses react to electromagnetic radiation, sound waves or direct bodily contact, all of which elicit nervous responses in the receptors of the body – we see, hear or feel (Winiwarter et al., 2013: 105).

Our sense-impressions are a product of the human ability to apprehend energy. Tribble and Sutton (2011) have described these networks as 'cognitive ecologies'. Victoria Blud (2016) has described the intermingling of cognitive theory and medieval medico-philosophical knowledge to create literary expressions of embodied and extended cognition. When we see water, we see its energy, the effects of its motion, its fluid dynamics, its materiality. These energies inform culture, shaped through what Veronica Strang (2005) has termed 'common senses' for the generation of meaning. The socio-natural model also understands human practices as intrinsically linked to the expenditure of energy:

> [T]he energy involved in the production and maintenance of arrangements becomes a central question of the study of arrangements and practices. Energy is never destroyed during a process; it changes from one form to another. Therefore, one should rather focus on exergy, that is the part of

> energy that is available to be used…. Exergy allows a waterwheel to be moved, allows the water in a pot to be heated. (Winiwarter et al., 2013: 106).

This model is crucial for the understanding of an energy humanities model of medieval society. Exergy in medieval society was scarce even when energy was abundant (that is, the ability to do work depends on the availability of energy to be used) and thus society was dependent on the learning required to harness exergy coupled with the available labour power of human and animal muscle. In this world, power went to those who could opt out of the labour required to perform physical labour; hydraulics is a machine for cultural self-expression as much as a machine for the amplification of work.

The knowledge to channel water power was held in a high degree of esteem: it was a descent of the golden days of Rome, an act imbued with spiritual power through the aqueous language of Christian spirituality, and a source of labour that gave time for scholarship, intellectual culture, and complex political ecologies. Noble (2017: 460) describes the process as a 'powerful imaginative collusion between water and engines', a Bachelardian dream of hydraulic engineering. The engines of energy present in water management generate a corresponding cultural energy expressed through a mythography that maintains an imaginative hydro-social arrangement across time. To understand medieval water in the light of energy humanities is to assert that elite culture exists because of its abundant energy, to see medieval spirituality as a homage to an inexhaustible reservoir of power undreamt of in pre-industrial society, and an exercise of enormous influence in equal measure. As is the case for oil in the twentieth century, water's influence is hidden in plain sight:

> For those who want to understand the past and present configurations of the human relation to the environment, and who want to do so in part to enable a significant change in this relationship so as to address the climate crisis, focusing on energy can help to identify a key, material component of human development that, while foundational to the form and character of human societies, is only now beginning to be seriously investigated (Szeman, 2014: 5).

As Szeman (2014: 6) puts it, 'the insights of the energy humanities hope to complicate this picture of modernity through an insistence on the role of the expanded availability of energy in this story of progress'. For the Middle Ages and the energy narrative of water, we must ask how an understanding of medieval discourses—ideas, political decisions, literature, spiritual narrative, philosophy—are products of the absence or abundance of energy. A socio-natural understanding of medieval societies as hydraulic societies recognises that culture cannot be understood without environment, and vice versa. It recognises that society cannot be understood without environment. The result of hydro-social energy is social and intellectual, a 'hydraulic imagination', as Noble (2017) has recently put it. Literature is shaped by the use of energy, as is philosophy. These permeate the process of intellection itself, replicating the language of energy in the practice of thought. In my third genre of medieval water energy, the shaping of technologies for channelling and exploiting the energetic potential of water are recreated within the mind for the water management of the soul and the hydraulics of thought itself.

Intellectual Energies

In this third genre of energy, we see a distinctly medieval articulation: hydraulic energy mediated through philosophical energies and pressed into service as a form of intellectual rhetoric. By doing so, medieval intellectuals were able to construct a narrative of energy mastery that merged their control of the natural world with the manipulation of thought through the arts of memory, letter-writing, preaching, and rhetoric. In a spiritual context, energy was scarce and yet also derived from the application of potential energy mediated by artifice. The *machina mundi* was given force by divine energy—the prime mover. This is clearly demonstrated by a diagram in British Library MS Royal 19 C I f. 34^{v}, in which two angels can be seen turning the created world with a pair of cranks. Energy came from outside of the temporal system, flowing into it with a power given movement by the gravity of causative principles. It then gave the elements their own unique affordances and traits, which merged to form the matter from which the created world was composed. Just as medieval people tapped into a tiny percentage of gravity flow through hydraulics, so

too did the water of medieval intellectual culture provide motive power through the infusion of divine power, setting the world-machine in process.

The shape of medieval European societies was defined by its use of water technologies—aqueducts, gravity flow pipes, reservoirs, fish ponds, mills—and the same language also occurs within intellectual and spiritual discourse, with its abundances of wheels, flows, rivers, mills, and other applications of intellectual energy through the abstract language of the kinetic. It is as important to understand the abstract dimension of water as it is to understand technology, social practices, or socio-natural arrangements. Material environments are shaped by human practices into arrangements, which in turn interact with practices as socio-nature (Winiwarter et al., 2013: 106). The same is true of intellectual environment: they are shaped, and then shape, and are re-shaped. This is the principle motivation for structuring this essay in layers: although it is true that medieval water use and medieval cultural beliefs are inextricably linked, it is important to look deeper and see this bond at the level of philosophy, of literature, of spiritual ontology. They are the socio-nature of the mind.

Dominant energy regimes cut to the heart of fundamental metaphorical forces and the shaping of argument. The construction of medieval thought, with emphasis on monastic intellectual culture, was an act of craft, and craft is an expenditure of energy. It requires raw materials, labour (human and animal), and transport, and may in turn create technologies that manipulate or conserve energy. These factors come into play in the context of water power, which generates a metaphorical vocabulary for complex exercises in intellectual labour. A fitting example of the rhetorical expression of scholarship in terms of labour—and energy expenditure—appears in Hugh of Saint-Victor's *Didascalicon*, a treatise on the Seven Liberal Arts:

> Take a look at what the mason does. When the foundation has been laid, he stretches out his string in a straight line, he drops his perpendicular, and then, one by one, he lays the stones, and still others, and if by chance he finds some that do not fit with the fixed course he has laid, he takes his file, smooths off the protruding parts, files down the rough spots, and the places

> that do not fit, reduces to form, and so at last joins them to the rest of the stones set into the row (Taylor 1991: 141).

Craft is the companion of energy. Hugh discusses the mason as a model for intellectual labour and edification, but draws on a series of practices made possible by energy-amplifying devices such as the Roman treadmill crane (*magna rota*) or the wheelbarrow. The energy expended to complete a feat of erudition or of theological reasoning was divinely inspired, and thus drew on a sacred economy that spanned the technological, the social, the material, the abstract, and the moral.

The discussion of mental craft in terms of building was a common medieval trope, and tapped into a process that expended energy to create structure such as castles and cathedrals: initiatives reliant on technologies and methods to maximise energy efficiency. It is also important to understand that a medieval notion of energy was not the same as ours, and that the source of energy was thought to derive from God and move through Creation through a series of transactions.

> Tropes were the building blocks of medieval physics: Aristotle's *Physics* repeatedly used metaphor to explain the relation among various causes—material, formal, efficient, and final. Metaphors of building a house, fashioning a bronze statute, and growing an oak all illustrated the intertwined nature of material and immaterial causes (Robertson, 2010: 111).

The language of causation did not discriminate in essence between genres of energy, and thus it is unsurprising that the material language of one mingled with that of another. Stories of medieval thought and of medieval water technology intermingle. Take the technological affordances of the aqueduct, for example. It was a powerful water management technology inherited from the Roman world and deployed to good effect within medieval society. It brought wealth, social power, and the ability to exert control over the flow of water in a socially transformative fashion. It was also an image *par excellence* for the controlled mediation of spiritual salvation within medieval spiritual and philosophical literature.

Bodies and networks merged into flows of energy. For example, the Virgin Mary was the mediatrix of graces, transferring the untapped potential of Christ into the world. Christ himself brought salvation to the world, spreading the Word to all corners of the earth and infusing its waters with baptismal power. The two may seem coincidentally similar, but were understood within medieval thought to be typologically linked. A good example of this merging of energies appears in the *Sermo de Aquaeductu* of Bernard of Clairvaux (1968), in which a sermon in praise of Mary dwells at length on the divine knowledge that is channelled through the conduits of grace, and through Mary the mediatrix of graces. To reiterate the earlier point about the masculinisation of energy, it is also important to read this line of thinking of a deployment of gender, of female religious authority, and as an instrumental technology of energy (see Mooney, 1999; Smith, 2018).

They were two facets of a nutritive energy principle that shaped and articulated itself in all aspects of medieval human endeavour (Smith, 2016; Smith, 2018). Twenty-first-century discussions of socio-natural sites propose that our phenomenal and psychological experience of landscape is a function of energy, and that an ecology that includes bodies, ideas, and technologies is mental and physical in equal measure. This assertion, when applied to the Middle Ages, had further intriguing implications.

Conclusion

Understanding specifically *medieval* energy and *medieval* water requires a shift in the valences attributed to universality. The power of salvation flowing from the Trinity was not qualitatively different from the energy used to turn a mill wheel, just as 19th-century science has conditioned us to see water as interchangeable at a material level. However, the intellectual implications of each differ vastly. Medieval energies were part of a single energetic whole, derived from God and yet expressed in many unique forms. As I have explored elsewhere (Smith, 2018: 31–36) natural philosophy revealed the forces that made the sea roll and the rains fall, but it also posited their origin in the same power that made baptism possible or theology powerful: one Trinity, one source, but many expressions. This creates a tension between the universal and the specific that is historically distinct. This may be reductive, but is also

productive. To understand the manner in which monks imagined energy to shape and define their abstract vocabulary and their daily lives, for example, we must first accept that their notion of energy, and of its origin, differed from ours. The medieval vision of energy was a form of 'master narrative' of the kind that Christopher Hamlin (2000: 314–15) warns against, but it is a narrative with different affordances that allows internal heterogeneity and diversity that are fruitful for study.

What are the implications of seeing medieval Europe as an energy landscape—shaped at a fundamental level by water—rather than as, say, a collection of political entities or societies? The two are by no means mutually exclusive, but offer markedly different scholarly affordances. The dominant paradigm defines the environmental history of Europe—and indeed the world—as a history of interaction and agency. Regardless of the agent—human, non-human, environmental forces, material technologies, societies—the most fundamental enabler is energy. Scholarship has complicated the picture, arguing for the place of formerly subaltern elements and bringing them into the scholarly picture. The picture becomes richer when energy transactions are considered, for they underpin every decision, every event, every action, and every entanglement.

We are accustomed to interpreting water as an agential entity, and to pointing to its hydro-social entanglement with human cultural life. It remains to delve deeper into its role as energy, its capture of kinetic and nutritive force. In this role, we can see it as deeply influential, shaping the subjects, technologies, guiding paradigms, and societal mores of the Middle Ages. The addition of an energy humanities-inspired layer of interpretation to our picture of a hydraulic medieval past adumbrates previously hidden connections between ecologies, political actions, technologies, and ethical interactions. It reveals unlikely commonalities that, although familiar to medieval minds, are often overlooked. Water is more than a symbol, a resource, a neighbour to humanity, a collaborator. It is part of language of culture, the syntax of technology, the structure of philosophy, the dominant forces of epistemes, and the very structure upon which human action is predicated.

The implications of a multi-valent medieval energy humanities go far beyond water. The importance of energy-bearing processes or entities—the production and

consumption of food, reproduction and child birth, animal husbandry, agriculture, political ecology—are justified and placed within an energy web. Their importance within medieval culture is explained as a function of energy. We can see many twenty-first century forces as linked by the petro-culture that we inhabit, and the same is equally true of the Middle Ages. The highest yield of energy in a system has the greatest effect—today it is petroleum, in the Middle Ages it was water—and yet any energetic force has power. This new approach to medieval water studies gives water power beyond the already massive influence already ascribed to it, but what else does it unlock?

Energy itself is pluripotent: it is not wholly scientific, social, or material. It is an assemblage of powers derived from the organic interconnection of different registers. This unity is a truth that functions on all levels of my multi-energetic model: interconnection produces vibrant material energy; ecological interconnection and the interconnection of physics generates hydraulic energy; and interconnection produces social and intellectual energies in abundance.

Competing Interests

The author is the volume co-editor and the advocacy coordinator of the Open Library of Humanities. The submission was handled by an external editor and a double-blind review was conducted.

References

Alaimo, S 2010 *Bodily Natures: Science, Environment, and the Material Self*. Bloomington, IN: Indiana University Press.

Bachelard, G 1983 *Water and Dreams: An Essay on the Imagination of Matter*. Dallas, TX: Pegasus Foundation.

Bauman, Z 2000 *Liquid Modernity*. London: Polity Press.

Bellamy, B R, LeMenager, S and **Szeman, I** 2016 When Energy is the Focus: Methodology, Politics, and Pedagogy—A Conversation with Brent Ryan Bellamy, Stephanie LeMenager, and Imre Szeman. *Postmodern Culture*, 26. DOI: https://doi.org/10.1353/pmc.2016.0004

Bennett, J 2010 *Vibrant Matter: A Political Ecology of Things*. Durham, NC: Duke University Press.

Bernard of Clairvaux 1968 Sermo in natiuitate beatae Mariae Uirginis (12th c.). In: Leclercq, J and Rochais, H M (Eds), *Sancti Bernardi opera*, 5: 275–88. Rome: Editiones Cistercienses.

Blud, V 2016 Emotional Bodies: Cognitive Neuroscience and Mediaeval Studies. *Literature Compass*, 13: 457–466. DOI: https://doi.org/10.1111/lic3.12266

Boyer, D 2011 Energopolitics and the Anthropology of Energy. *Anthropology News*. pp. 5–7. May. DOI: https://doi.org/10.1111/j.1556-3502.2011.52505.x

Burton, J and **Kerr, J** 2011 *The Cistercians in the Middle Ages*. Woodbridge: Boydell & Brewer.

Cohen, J J (Ed.) 2015 *Prismatic Ecology: Ecotheory beyond Green*. Minneapolis, MN: University of Minnesota Press.

Cohen, J J 2015 *Stone: An Ecology of the Inhuman*. Minneapolis, MN: University of Minnesota Press. DOI: https://doi.org/10.5749/minnesota/9780816692576.001.0001

Cohen, J J and **Duckert, L** 2013 Ecomaterialism. *Postmedieval*, 4.

Cohen, J J and **Duckert, L** 2015 *Elemental Ecocriticism: Thinking with Earth, Air, Water, and Fire*. Minneapolis, MN: University of Minnesota Press.

De Landa, M 1997 *A Thousand Years of Nonlinear History*. Cambridge, MA: MIT Press.

Duckert, L 2017 *For All Waters: Finding Ourselves in Early Modern Wetscapes*. Minneapolis, MN: University of Minnesota Press.

Hamlin, C 2000 "Waters" or "Water"? –Master Narratives in Water History and Their Implications for Contemporary Water Policy. *Water Policy*, 2: 313–325. DOI: https://doi.org/10.1016/S1366-7017(00)00012-X

Hodder, I 2012 *Entangled: An Archaeology of the Relationships between Humans and Things*. Oxford: Wiley-Blackwell. DOI: https://doi.org/10.1002/9781118241912

Hoffmann, R C 2007 Footprint Metaphor and Environmental Realities: Environmental Impacts of Medieval European Cities. In: Squatriti, P (Ed.), *Natures Past: The Environment and Human History*, pp. 288–325. Ann Arbor, MI: University of Michigan Press.

Hoffmann, R C 2014 *An Environmental History of Medieval Europe*. Cambridge: Cambridge University Press. DOI: https://doi.org/10.1017/CBO9781139050937

Horn, W 1975 Water power and the plan of St Gall. *Journal of Medieval History*, 1: 219–58. DOI: https://doi.org/10.1179/030907209X12501949543278

Howes, H E 2016 *In Search of Clearer Water: An Exploration of Water Imagery in Late Medieval Devotional Prose Addressed to Women*. Unpublished PhD Thesis: Queen Mary University of London.

Ingold, T 2011 *Being Alive: Essays on Movement, Knowledge and Description.* Oxford: Routledge. DOI: https://doi.org/10.4324/9780203818336

Jørgensen, D 2014 Not by Human Hands: Five Technological Tenets for Environmental History in the Anthropocene. *Environment & History*, 20: 479–489. DOI: https://doi.org/10.3197/096734014X14091313617163

Jørgensen, D, Jørgensen, F A and **Pritchard, S B** 2013 *New Natures: Joining Environmental History with Science and Technology Studies*. Pittsburgh, PA: University of Pittsburgh Press.

Latour, B 2005 *Reassembling the social: An introduction to actor-network-theory*. Oxford, New York: Oxford University Press.

Linton, J and **Budds, J** 2014 The hydrosocial cycle: Defining and mobilizing a relational-dialectical approach to water. *Geoforum*, 57: 170–80. DOI: https://doi.org/10.1016/j.geoforum.2013.10.008

Lucas, A 2005 *Wind, Water, Work: Ancient and Medieval Milling Technology*. Leiden: Brill.

Magnusson, R 2001 *Water Technology in the Middle Ages: Cities, Monasteries, and Waterworks after the Roman Empire*. Baltimore, MD: Johns Hopkins University Press.

Mooney, C M 1999 '*Imitatio Christi* or *Imitatio Mariae*?: Clare of Assisi and Her Interpeters'. In: Mooney, C M (Ed.), *Gendered Voices: Medieval Saints and their Interpreters*, pp. 52–77. Philadelphia, PA: University of Pennsylvania Press. DOI: https://doi.org/10.9783/9781512821154-006

Neimanis, A 2017 *Bodies of Water: Posthuman Feminist Phenomenology*. London: Bloomsbury.

Noble, D F 1999 *The Religion of Technology: The Divinity of Man and the Spirit of Invention*. New York: Penguin.

Noble, L 2017 A Mythography of Water: Hydraulic Engineering and the Imagination. In: Marchitello, H and Tribble, E (Eds.), *The Palgrave Handbook of Early Modern*

Literature and Science, pp. 445–65. London: Palgrave Macmillan. DOI: https://doi.org/10.1057/978-1-137-46361-6_21

Oestigaard, T 2013 *Water, Christianity and the Rise of Capitalism*. London: I. B. Tauris.

Robertson, K 2010 Medieval Materialism: A Manifesto. *Exemplaria*, 22(2): 99–118. DOI: https://doi.org/10.1179/104125710X12670926011996

Sachs, J *Aristotle: Motion and its Place in Nature. Internet Encyclopedia of Philosophy*. Available at: https://www.iep.utm.edu/aris-mot/#H2 [Last Accessed 19 September 2018].

Schaer, F 1996 John of Hildesheim: The Mirror of the Source of Life. Online Reference Book for Medieval Studies (ORB). <http://www.the-orb.net/encyclop/culture/philos/fonstrans.html> (accessed 19 September 2018).

Schiff, R and **Taylor, J** 2016 *The Politics of Ecology: Land, Life, and Law in Medieval Britain*. Columbus: Ohio State University Press.

Sennis, A 2006 Narrating Places: Memory and Space in Medieval Monasteries'. In: Davies, W, Halsall, G and Reynolds, A (Eds.), *People and Space in the Middle Ages*, pp. 275–94. 300–1300. Turnhout, Brepols.

Simondon, G 1980 *On the Mode of Existence of Technical Objects*. London, Ontario: University of Western Ontario.

Smith, J L 2014 Fluid. In: Cohen, J J (Ed.), *Inhuman Nature*, pp. 115–131. Washington, D.C.: Oliphaunt Books.

Smith, J L 2016 *Philosophia Divitur*: The Ecodiagrammatic Patterns of the Pierpont Morgan, M. 982 Leaf. *Parergon*, 33: 1–21. DOI: https://doi.org/10.1353/pgn.2016.0001

Smith, J L 2018 *Water in Medieval Intellectual Culture: Case Studies from Twelfth-Century Monasticism*. Turnhout: Brepols. DOI: https://doi.org/10.1484/M.CURSOR-EB.5.112274

Strang, V 2005 Common Senses: Water, Sensory Experience and the Generation of Meaning. *Journal of Material Culture*, 10: 92–120. DOI: https://doi.org/10.1177/1359183505050096

Swyngedouw, E 2009 The political economy and political ecology of the hydro-social cycle. *Journal of Contemporary Water Research and Education*, 142: 56–60. DOI: https://doi.org/10.1111/j.1936-704X.2009.00054.x

Szeman, I 2014 (1) Conclusion: On Energopolitics. *Anthropological Quarterly*, 87(2): 453–464. DOI: https://doi.org/10.1353/anq.2014.0019

Szeman, I 2014 (2) *On the Energy Humanities; or What can Philosophy Tell us About Oil (A Preliminary Sketch)?* Alberta, Canada: European Union Centre of Excellence Working Papers, Number 4.

Szeman, I and **Boyer, D** 2017 *Energy Humanities: An Anthology*. Baltimore, MD: Johns Hopkins University Press.

Taylor, J 1991 *The Didascalicon Of Hugh Of St. Victor: A Medieval Guide to the Arts*. New York: Columbia University Press.

Tribble, E and **Sutton, J** 2011 Cognitive Ecology as a Framework for Shakespearean Studies. *Shakespeare Studies*, 39: 94–103.

Tvedt, T and **Oestigaard, T** 2009 Introduction. In: Tvedt, T and Oestigaard, T. *A History of Water, Series I, The World of Water*, 3: ix–xxii. London: I. B. Tauris.

Urry, J 2010 Mobile Sociology. *British Journal of Sociology*, 61. DOI: https://doi.org/10.1111/j.1468-4446.2009.01249.x

White, L T, Jr. 1962 *Medieval Technology and Social Change*. London, Oxford, New York: Oxford University Press.

Winiwarter, V, Schmid, M, Hohensinner, S and **Haidvogl, G** 2013 The Environmental History of the Danube River Basin as an Issue of Long-Term Socio-ecological Research. In: Singh, S J, Haberl, H, Chertow, M, Mirti, M and Schmid, M (Eds.), *Long-Term Socio-Ecological Research: Studies in Society-Nature Interactions Across Spatial and Temporal Scales*, pp. 103–122. Dordrecht: Springer. DOI: https://doi.org/10.1007/978-94-007-1177-8_5

Worthen, S 2009 The Influence of Lynn White, jr.'s Medieval Technology and Social Change. *History Compass*, 7: 1201–1217. DOI: https://doi.org/10.1111/j.1478-0542.2009.00615.x

How to cite this article: Smith, J L 2018 Medieval Water Energies: Philosophical, Hydro-Social, and Intellectual. *Open Library of Humanities,* 4(2): 28, pp. 1–27, DOI: https://doi.org/10.16995/olh.228

Published: 05 October 2018