

## Surveying Medieval Perceptions of Nature Using a Combination of Historical and Scientific Sources

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In a modern world facing unprecedented anthropogenic environmental disaster, the academic interdisciplinarity is more relevant than ever. Environmental history is an area of study that requires the collaboration of historians and scientists alike. However, research is typically done from a one-sided perspective with little effort to understand the other. As many experts agree, geography heavily influences history.<sup>1</sup> Environmental historians must use scientific proxy data regarding past ecological conditions in addition to a variety of historical sources, including religious texts, art, mythology, architecture, economics, and pieces of literature, to reconstruct past perception of nature. By doing so, the historian can gain a deeper insight into the scientific phenomena going on at the same time as historical events and movements to find potential connections. This can be seen in many different areas of environmental history research. This study analyzes various sources of medieval European animals, plants, water, and land use to gain an understanding of the diverse attitudes that people living during this time period held towards their environment. This ensures that environmental historians do not fall into the habit of resorting to approaches that make false generalizations, as leading figures in the field, such as Joyce E. Salisbury and Richard C. Hoffman, have criticized.

The study of animals in medieval society is an effective starting point to build an understanding of the ways in which humans historically viewed themselves as part of the animal kingdom. Literature is an invaluable source for historians to analyze the manner in which animals were depicted. A key piece of literature that features the use of animals as metaphors for human behaviour comes from thirteenth century Germany. Gottfried von Strassburg's romance epic *Tristan and Isolde* may have been one of the first works of literature to use the personification of nature to tell its story. This piece is particularly interesting to study because animals were often viewed as a symbol of the more negative aspects of romance: sexuality and promiscuity.<sup>2</sup> The animals that Strassburg chose to represent certain human characteristics and behaviours provides insight into how medieval society likely perceived their animal counterparts. For example, the main character Tristan is often associated with the boar. Strassburg writes, "how he devised his helmet and in token of Love's torment raised the fiery dart upon it" regarding the boar symbols depicted on his

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<sup>1</sup> Richard Hoffmann, *An Environmental History of Medieval Europe* (Cambridge University Press, 2014), 6.

<sup>2</sup> Joyce E. Salisbury, *The Beast Within: Animals in the Middle Ages* (Routledge, 1994), 77.

weaponry.<sup>3</sup> The boar in medieval society represented male sexuality and church writers actively sought to warn about what they believed to be 'excessive lust' of the animal.<sup>4</sup>

Another interesting metaphor in *Tristan* is the representation of Isolde by a falcon. Here one can contrast the depictions of female and male sexuality using animal symbolism. The use of a bird of prey is certainly revealing about the seductress trope in historical literature. The metaphor of the falcon in *Tristan* is meant to capture the predator-prey dynamic of romance as Isolde seduces Tristan.<sup>5</sup> Strassburg describes Isolde as having the ability to “attract many thoughts and hearts that themselves safe from love’s disquietude,” with “her eyes roving like a falcon on its bough.”<sup>6</sup> It likely is not a coincidence that the hypersexualized female character of the book was connected to an animal that was becoming trained and domesticated in medieval society. There is discussion of purchasing falcons, among other “fine birds”, near the beginning of the epic before the reader is introduced to Isolde.<sup>7</sup> It is important to note that falconry was used to assist in hunting practices to catch more food and even for mere sport or entertainment.<sup>8</sup> Towards the end of the epic, the characters Tristan and Isolde are outwardly sexualized as Strassburg highlights “whenever the occasion suited they had their fill of what lovers long for.”<sup>9</sup> The epic *Tristan* in particular reveals the way that animals were perceived to be closely associated with sexual behaviours condemned by the Church.<sup>10</sup>

Hunting practices and dietary habits also reveal the ways in which medieval society regarded animals for subsistence. Hunting is a particularly powerful example of the ways in which humans view themselves within the animal kingdom, especially in medieval society. The domestication of dogs diversified hunting practices. Some breeds of dogs were bred and trained specifically to help their owners hunt which was commonly practiced in the medieval period.<sup>11</sup> In regard to hunting, however, written records from the elite classes indicate a much more complex relationship between humans and animals beyond ownership. The animals that were chosen by sport hunters reveal how wealth and status were intertwined with their game, rather than just subsistence hunting. Hunting events put on by royalty involved massive amounts of people in a

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<sup>3</sup> Gottfried von Strassburg and Francis G. Gentry, *Tristan and Isolde*. (Continuum, 1988), 69.

<sup>4</sup> Salisbury, *The Beast Within*, 80.

<sup>5</sup> Joyce E. Salisbury, *The Medieval World of Nature: A Book of Essays* (Garland Publishing, 1993), 78–79.

<sup>6</sup> von Strassburg and Gentry, *Tristan and Isolde*, 107, 145.

<sup>7</sup> von Strassburg and Gentry, *Tristan and Isolde*, 31.

<sup>8</sup> Robin S. Oggins, *The Kings and Their Hawks: Falconry in Medieval England* (Yale University Press, 2004), xvi.

<sup>9</sup> von Strassburg and Gentry, *Tristan and Isolde*, 163.

<sup>10</sup> Salisbury, *The Medieval World of Nature*, 81.

<sup>11</sup> Oggins, *The Kings and Their Hawks*, xvi.

ceremonial fashion in order to display their wealth and power.<sup>12</sup> Hunting records further indicate that often 'prize' or exotic animals such as jackals, tigers and reindeer were specifically brought in for the royal hunt with the sole purpose of sport rather than food.<sup>13</sup> Unfortunately, human entertainment often came at the expense of the animal which only further complicates the role of animals in medieval society. The analysis of hunting records reveals the role of animals in human entertainment in medieval society.

Archeology has provided invaluable proxy data through the remains of animal bones that provide historians and scientists with the information needed to put together an idea of the medieval European diet. Not only does it become apparent which animals were used for subsistence, but also the differences in what people of higher or lower classes ate in comparison to each other. For instance, the animal bones found near medieval upper class residences are often from far younger animals.<sup>14</sup> This find has several important indications. To a scientist, these bones reveal that the animals eaten by the medieval upper class were raised with the purpose of providing food since they were killed while still young and unworked, therefore its meat would be of better quality.<sup>15</sup> To a historian, this indicates symbolic hierarchy attached to one's diet and their place in society.<sup>16</sup> This further highlights the diverse perceptions of the role of an animal in medieval society and the human diet. These broad range of sources clearly provide historians with numerous interpretations of the attitudes medieval society held towards the environment, including themes of behaviour, domestication, and entertainment.

Perhaps less straightforward is the use of plants in medieval society and how a broad range of sources can help form an understanding of the attitudes held towards the botanical environment. Personal and autobiographical literature most commonly hold important information for a historian to analyze when studying the perceptions of plants in medieval society. These pieces often include observations and ideas that more abstract works of literature tend to avoid. The writings of Piero Crescenzi, a thirteenth century lawyer with an interest in horticulture, are insightful historical sources when examining the ways in which medieval farmers thought to manipulate and select their crops. Drawing inspiration from Aristotle's speculations regarding hybridization of plants and animals, Crescenzi wrote extensively of grafting and its possibilities for improved fruits and crops.<sup>17</sup> Similarly, the writings of thirteenth century theologian Albertus Magnus further show the knowledge and attitudes medieval

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<sup>12</sup> Thomas T. Allsen, *The Royal Hunt in Eurasian History* (U Penn Press, 2006), 8–9.

<sup>13</sup> Allsen, *The Royal Hunt in Eurasian History*, 9–100.

<sup>14</sup> Hoffmann, *An Environmental History*, 117.

<sup>15</sup> Hoffmann, *An Environmental History*, 118.

<sup>16</sup> Hoffmann, *An Environmental History*, 118.

<sup>17</sup> Steven Epstein, *The Medieval Discovery of Nature* (Cambridge University Press, 2012), 32–33.

farmers had of their crops. Referring back to wheat, he noted that farmers knew of the fact that strains of wheat could be manipulated, quite often through natural causes such as cross-pollination in the wind.<sup>18</sup> Albertus, like Piero, also wrote of grafting as a "guiding human hand intending and able to improve Nature."<sup>19</sup> Interestingly, not all cereal grains were seen to be of equal value since barely, millet and oats among others were used by the peasantry while bread grains like wheat were reserved mainly for the nobility.<sup>20</sup> This may have played a role in the desire for improving crops while also producing better surviving crop yields overall.

The scientific analysis of agricultural crops is particularly important since it provides unique evidence of how humans have interacted with their environment. Domestication is commonly associated with animals, as discussed previously, but also includes plants. Genetic studies of plants can reveal invaluable information to environmental historians about the ramifications of human domestication of crops. For example, there is a very unique history found in the genetics of wheat (*Triticum spp. L.*), which was domesticated approximately twelve thousand years ago.<sup>21</sup> Throughout the Middle Ages, there was a clear emphasis on cereal grains, which constituted as a large part of the human diet, spurred on with improved agricultural practices and a growing population.<sup>22</sup> Although medieval farmers would not have had any knowledge of genetics, there is evidence of human selection of traits for the highest quality crop such as freeze tolerance or other desirable features.<sup>23</sup> Hybridization of wheat crops would not come until the nineteenth century, but it was the selections done by medieval farmers and their unintentional genetic consequences that paved the way for this scientific breakthrough.<sup>24</sup> These genetic studies show a human attitude of biological interference as medieval farmers favoured certain phenological traits in plants to suit their needs.

Medieval cookbooks are an exceptional underused source for an environmental historian to gain an understanding of attitudes towards nature, especially in terms of the role of plants in the diet. Vegetables were generally perceived as food of the lower classes, unless prepared in certain ways such as the use of spices to be acceptable for the nobility.<sup>25</sup> These vegetables commonly included cabbage, chickpeas, lentils, spinach, turnips, mushrooms and lettuce.<sup>26</sup> Many times these were paired with food

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<sup>18</sup> Epstein, *The Medieval Discovery of Nature*, 23.

<sup>19</sup> Epstein, *The Medieval Discovery of Nature*, 24.

<sup>20</sup> Hoffmann, *An Environmental History*, 116–117.

<sup>21</sup> Alecia M. Kiszonas and Craig F. Morris, "Wheat breeding for quality: A historical review," *Cereal Chem*, 2018 (95), 17.

<sup>22</sup> Hoffmann, *An Environmental History*, 116.

<sup>23</sup> Kiszonas and Morris, "Wheat breeding for quality," 18.

<sup>24</sup> Kiszonas and Morris, "Wheat breeding for quality," 18.

<sup>25</sup> Massimo Montanari, *Medieval Taste: Food, Cooking, and the Table* (Columbia University Press; 2015), 151.

<sup>26</sup> Montanari, *Medieval Taste: Food, Cooking, and the Table*, 152.

items from the lower quality cereal grains to constitute a peasant meal.<sup>27</sup> This contrasts with the preferred meal of bread and meat the upper classes enjoyed.<sup>28</sup> While the differences in the quality of meat between the upper and lower classes have already been discussed, it is no coincidence that vegetables were associated with the peasantry. Perhaps the connection between the natural environment and vegetables, since they are grown from the soil, may have influenced people's negative perception of using it as food. There was also considerably more wealth and power associated with owning animals for meat rather than vegetable gardens. Many of these vegetables, and occasionally fruits, had to be handpicked from the forest by peasants to provide enough food for themselves and their families.<sup>29</sup>

On the other hand, floral gardening was perceived in many different ways during this period and can be examined using both archeological and literary perspectives. Medieval gardens often served three purposes: food, medicine and beauty.<sup>30</sup> Gardens formed a uniquely intimate relationship between humans and nature as they became places for relaxation and required special care to keep alive.<sup>31</sup> This was especially true of the higher classes who tended to gardens for more recreational rather than survival purposes, since elaborate and well-maintained gardens often symbolized the status of its owner.<sup>32</sup> A key part to maintaining the aesthetic of the garden is through weeding, which does in fact have medieval roots. Weeds, or as Sir John Dalton Hooker described: "the tramps of our flora," are species that compete with the desired plants in the garden.<sup>33</sup> Archeological seed remains can help botanists piece together a good idea of what Medieval gardens likely would have looked like, including the types of plants that were chosen to be part of the garden.<sup>34</sup> Staple garden species included the "columbine, rose, lily and violet," which also had some important literary meanings associated with them.<sup>35</sup> Roses, for example, often alluded to the Virgin Mary in medieval literature.<sup>36</sup> These sources show that plants could also be perceived as objects of beauty in medieval society.

Dental analysis of human remains from the Middle Ages is also an incredible source of proxy data called ethnobotany that indicates the use of plants as both food and medicine. Scientists can collect dental calculus, the

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<sup>27</sup> Montanari, *Medieval Taste: Food, Cooking, and the Table*, 154.

<sup>28</sup> Hoffmann, *An Environmental History*, 115.

<sup>29</sup> Angelo Gismondi, et al., "Dental Calculus Reveals Diet Habits and Medicinal Plant Use in the Early Medieval Italian Population of Colonna," *Journal of Archaeological Science*, 20 (2018), 556.

<sup>30</sup> Patricia Skinner, *The Medieval and Early Modern Garden in Britain: Enclosure and Transformation, c. 1200–1750* (Routledge, 2018), 5.

<sup>31</sup> Skinner, *The Medieval and Early Modern Garden in Britain*, 6.

<sup>32</sup> Skinner, *The Medieval and Early Modern Garden in Britain*, 6.

<sup>33</sup> Alfred W Crosby, *Ecological Imperialism* (Cambridge University Press, 1986), 149.

<sup>34</sup> Skinner, *The Medieval and Early Modern Garden in Britain*, 9.

<sup>35</sup> Skinner, *The Medieval and Early Modern Garden in Britain*, 57

<sup>36</sup> Skinner, *The Medieval and Early Modern Garden in Britain*, 6.

mineral deposits on the teeth, and analyze the compounds found within it to discover what had been consumed in that person's lifetime.<sup>37</sup> This research is essential in understanding the ways in which medieval society viewed plants for medicinal purposes. A study done in 2018 found the presence of a fracture in the bones of a medieval Italian farmer in addition to medicinal metabolites in the teeth, revealing that this person was aware of its potential analgesic properties.<sup>38</sup> The same study also found the presence of multiple common medicinal plants such as foxglove, hyssop and mugwort in the dental calculus of other analyzed remains.<sup>39</sup> Not only does dental analysis provide solid evidence of the knowledge that medieval people had about the medicinal properties of plants, but this also indicates a unique relationship between society and the environment. In this case, some medieval people likely viewed plants to better their lives for pain management and saw how their environment could provide this for them. This also shows considerable study and observation of the environment they lived in since it would have taken many generations of passed down knowledge to perfect the use of these medicinal plants while avoiding harmful ones. Overall, the examination of these various sources indicate that plants were central to medieval society in many different facets, depending on its purpose.

Water, a defining feature of the environment, has been exploited by humans long before the Middle Ages. Due to the highly religious role of water in Christianity, it is valuable to examine various literature works to be able to understand the ways in which water played a symbolic role in the medieval citizen's life. The eyewitness account of Italian chronicler Giovanni Villani during the 1333 floods of Florence show the incredible range of perceptions that medieval society had towards the environment and its connection to religion. His writing reveals that natural disasters like floods were seen as an act of "divine judgement" to punish humans for their sins.<sup>40</sup> Water, and more specifically holy water, was believed to "[wash] away the stains of sin."<sup>41</sup> These literature works introduce ideas of medieval society's susceptibility to the environment and the use of religious symbolism to explain natural phenomena like floods. Villani's report further indicates that some were beginning to question if the flood was caused by a natural turn of events rather than any religious origin, highlighting the range of beliefs and ideas held towards the environment.<sup>42</sup>

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<sup>37</sup> Gismondi, et al., "Dental Calculus," 557.

<sup>38</sup> Gismondi, et al., "Dental Calculus," 563.

<sup>39</sup> Gismondi, et al., "Dental Calculus," 563.

<sup>40</sup> Gerrit J. Schenk, "...prima ci fu la cagione de la mala provedenza de 'Fiorentini...," Disaster and "Life World" Reactions in the Commune of Florence to the Flood of November 1333," *Medieval History Journal* 10 (2007), 357.

<sup>41</sup> Laurence Etherington, "Canons of Environmental Law: Pollution of Churches and the Regulation of the Medieval 'Environment,'" *Legal Studies (Society of Legal Scholars)* 36, no. 4 (2016), 578.

<sup>42</sup> Schenk, "...prima ci fu la cagione de la mala provedenza de 'Fiorentini' ...," 368.

Religious institutions, such as monasteries, also often designed infrastructure that used existing waterways to their advantage. For example, archeological remains indicate that construction of fish ponds was common in monasteries that brought in specific species of fish of their choosing.<sup>43</sup> While meat from land animals was often restricted by Christian customs during certain periods of time or holidays, fish were seen as an appropriate substitute because they perceived to be much purer or cleaner than their terrestrial counterparts.<sup>44</sup> Monasteries often constructed far bigger projects than fish ponds to use the natural waterways to their best advantage. In medieval Italy, written monastic records demonstrate that it became quite common for churches to own mills within their communities.<sup>45</sup> These mills had various purposes, such as cloth and grain in the Middle Ages. This meant that monasteries had to go to great lengths to manage the waterways in order to manipulate natural river flows by using channels to feed the mill.<sup>46</sup> This was in addition to the other needs of the community like removing waste and providing clean water for ritualistic washing in the mornings and before every meal.<sup>47</sup> This architecture reveals the perceptions about water itself as well as the ways it can be redirected or controlled for human use in medieval society.

The mastery of monasteries over water was a topic of many religious pieces of literature. One such work, *vita Remaculi* in the Stavelot monastery, describes the story of Remacle's fountain with a special focus on the healing properties of its waters that were under monastic control.<sup>48</sup> This clearly forms a connection between the benefits of human, and even more specifically Christian, domination over the environment. The religious importance of water undoubtedly influenced the ways that medieval Christians perceived the aquatic environment. However, it seems that this paved the way for increased human interference and exploitation of the environment.

Manipulation of natural waterways far exceeded the boundaries of monastic communities in medieval feudal society. Archeological data affirms that the construction of mills, aqueducts, ponds, channels and other water management infrastructure displayed the wealth and power of the individual owner or monastery.<sup>49</sup> For example, mills constructed on larger rivers have been tied to larger profitability of the lord, boosting their

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<sup>43</sup> Paolo, *Working with Water*, 86.

<sup>44</sup> Richard Hoffmann, "Economic Development and Aquatic Ecosystems in Medieval Europe," *American Historical Review* 101(1996), 638.

<sup>45</sup> Squatriti, *Working with Water*, 13.

<sup>46</sup> Squatriti, *Working with Water*, 95.

<sup>47</sup> Squatriti, *Working with Water*, 90–95.

<sup>48</sup> Ellen Arnold, "Engineering Miracles: Water Control, Conversion and the Creation of a Religious Landscape in the Medieval Ardennes," *Environment and History* 13, no. 4 (2007), 483.

<sup>49</sup> Arnold, "Engineering Miracles," 478.

status.<sup>50</sup> Recalling that some medieval people believed natural disasters such as floods were acts of God, the ability to control water through engineering was truly admirable at the time. The success of a mill operation directly correlated to the status of the lord, showing a dominance over both his tenants and his environment.<sup>51</sup> Despite the fact that water was highly regarded in the church, many monasteries and villages were built so that wastes were emptied downstream into the waterways and carried away.<sup>52</sup> Furthermore, political records show that laws were put in place to try and conserve declining fish populations due to overfishing.<sup>53</sup> Analysis of fish bone remains coincide with these records, supporting the fact that overfishing was becoming a problem in medieval Europe.<sup>54</sup> Evidently, these sources show that medieval societies took a rather exploitative attitude towards their aquatic environment despite their religious connection to the water.

All these research areas can be combined when examining historical and scientific sources pertaining to medieval attitudes towards the land use and environmental exploitation that dramatically transformed the European landscape. Mass deforestation is a defining feature of the strained relationship between medieval society and the environment. Hoffman claims that forests were, in the eyes of medieval society, "an important piece of nature to be colonized by humans."<sup>55</sup> As already established, medieval agriculture was rapidly growing alongside the demand for cereal grains to feed the rising population. In order to accommodate this demand, land had to be cleared and prepared for crops to grow. This was done by a process of tearing the trees from the ground, mass burning and ploughing the open soil.<sup>56</sup> Geophysical technology has been a useful tool in assessing the environmental consequences of medieval clear-cutting efforts. This technology, including resistivity surveying, magnetic surveying, and ERT, can find buried remains of medieval structures and settlements which can help determine how much land was colonized for agriculture.<sup>57</sup> When combined with soil core samples, this proxy data can be extremely accurate since scientists are able to identify microscopic clues of human activity like ceramic or ash preserved in the soil.<sup>58</sup> Beyond agriculture, geographical proxy data can show scientists and

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<sup>50</sup> Squatriti, *Working with Water*, 60.

<sup>51</sup> Squatriti, *Working with Water*, 53.

<sup>52</sup> Hoffmann, "Economic Development and Aquatic Ecosystems," 643.

<sup>53</sup> Hoffmann, "Economic Development and Aquatic Ecosystems," 648.

<sup>54</sup> Hoffmann, "Economic Development and Aquatic Ecosystems," 649.

<sup>55</sup> Hoffmann, *An Environmental History*, 182.

<sup>56</sup> Hoffmann, *An Environmental History*, 121.

<sup>57</sup> Igor V. Zhurbin and Alexander V. Borisov, "Non-destructive Approach for Studying Medieval Settlements Destroyed by Ploughing: Combining Aerial Photography, Geophysical and Soil Surveys," *Archaeological prospection* 27, no. 4 (2020), 344.

<sup>58</sup> Zhurbin and Borisov, "Non-destructive Approach," 345.



historians specific land use patterns in terms of residential space and any deforestation involved in establishing settlements or villages.

Various sources of written records can supplement the historical research that the geophysical data is missing. For example, the Domesday Book, a survey conducted in 1086 on behalf of King William, revealed to historians that upwards of two-thirds of English woodland had been lost due to deforestation.<sup>59</sup> Agricultural and manorial records indicate the transition of the two-field crop rotation to three fields with the demand for cereal grains and animal powered machinery.<sup>60</sup> The emergence of the three-field crop rotation drove the need for the mass deforestation that characterizes medieval environmental history. Furthermore, the movement towards increasing agriculture with the three-crop field rotation in the Middle Ages are consistent with a climate that was in favour of agricultural prosperity. It also serves as excellent evidence that medieval attitudes towards the environment could often be exploitative as they destroyed woodland ecosystems across Europe in order to grow their agricultural practices. Many wetlands were also drained for the purpose of increasing agricultural land, often to create pasture lands as settlements became more permanent and livestock lived close to the farmers.<sup>61</sup> Monastic documents, such as property records, are limited in their ability to establish land use patterns but with the support of proxy data may prove to be important historical sources. Research done on the Rieti basin in Italy that had been drained in the Middle Ages using monastic documents in addition to pollen and sediment samples was able to successfully build an understanding of how its medieval inhabitants had changed the land in the pursuit of agriculture.<sup>62</sup>

When trying to understand the medieval perceptions of nature, it is important to analyze the broader climatic conditions that may have been influential in building these attitudes. While natural disasters like floods occurred more on the local level, large-scale climate fluctuations throughout the Middle Ages have been identified using scientific proxy data like ice cores and tree rings. Dendrochronology is a scientific analysis of growth rings to find age, growth anomalies or other data from the tree. Numerous dendrochronological studies indicate abnormally cold temperatures in the year 536 CE with the presence of narrow rings correlating to reduced growth.<sup>63</sup> Ice core samples also found peaks in

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<sup>59</sup> Hoffmann, *An Environmental History*, 121.

<sup>60</sup> Hoffmann, *An Environmental History*, 125.

<sup>61</sup> Edward M. Schoolman, Scott Mensing, and Gianluca Piovesan, "Land Use and the Human Impact on the Environment in Medieval Italy," *The Journal of interdisciplinary history* 49, no. 3 (2018), 424.

<sup>62</sup> Schoolman, Mensing, and Piovesan, "Land Use and the Human Impact," 430–437.

<sup>63</sup> R. D'Arrigo, et al., "Spatial Response to Major Volcanic Events in or about AD 536, 934 and 1258: Frost Rings and Other Dendrochronological Evidence from Mongolia and Northern Siberia: Comment on R. B. Stothers, 'Volcanic Dry Fogs, Climate Cooling, and Plague Pandemics in Europe and the Middle East'," *Climatic Change* 42 (1999), 240.

acidity around this time period, but the research has not been as consistent as with the tree rings.<sup>64</sup> Similar studies were done for the years 934 and 1258 CE which also showed climatic abnormalities. Various historical written records across the globe, particularly by rural communities and their lords, support the scientific research with reports of irregular temperatures coinciding with crop failures, famine and even disease.<sup>65</sup>

The expansion of settlements meant natural resource exploitation was increasing at the same time. Analysis of literature, especially biblical passages and narratives, can be useful in forming an understanding of where medieval perceptions around resource exploitation came from. Some historians have argued that this exploitative attitude comes from Christian ideology that promotes the idea of human domination over the environment, which could have easily justified the mass natural resource exploitation and subsequent landscape changes. Lynn White Jr. cited Genesis 1:28 which says, "Be fruitful and multiply and fill the earth and subdue it and have dominion over the fish of the sea and over the birds of the heavens and over every living thing that moves on the earth."<sup>66</sup> While this may have influenced the attitudes of medieval Europeans towards nature, it certainly does not explain the exploitation on behalf of non-Christian cultures.<sup>67</sup> This is why it is important to examine proxy data in addition to historical sources, since the exclusion of one may lead to a biased conclusion. Knowing that geography heavily influences history, it is certain that a number of phenomena influenced the diverse medieval attitudes of environmental exploitation beyond religious teachings.

The interconnectedness of environment and history is crucial to navigate modern ecological crises. Historians must use scientific proxy data regarding past climatic conditions in addition to a variety of historical sources including religious texts, art, mythology, architecture, economics, literature to reconstruct past perception of nature. Perhaps in doing so, modern society can learn from medieval society and their attitudes towards the environment to secure a more sustainable future and build a better relationship with nature. Animals continue to be subject to abuse by human owners for entertainment, subsistence, or even cosmetic testing purposes. Plants, on the other hand, have become much more valued in modern society when compared to the Middle Ages. Vegan and vegetarianism has rapidly grown in popularity for health and environmental concerns. Genetic engineering has helped feed fruits and vegetables to the entire planet, although medieval farmers could not have imagined the impacts of their actions would ever lead to such a scientific breakthrough. Furthermore, the way humans have treated their water supply has dramatically worsened

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<sup>64</sup> D'Arrigo, et al., "Spatial Response," 240.

<sup>65</sup> D'Arrigo, et al., "Spatial Response," 239.

<sup>66</sup> Hoffmann, *An Environmental History*, 88.

<sup>67</sup> Hoffmann, *An Environmental History*, 90.

since the Middle Ages. Pollution of oceans, lakes and rivers is appalling as human wastes like plastics fill them up. Manipulation of water continues today similar to the Middle Ages for many of the same reasons that past societies desired. Earth's landscape is nearly unrecognizable from a medieval lens as colonialism, industrialization and globalization have dramatically transformed the diverse environments on our planet.

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