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**Mosasaurus**

*Interactions between armies and ecosystems in the Meuse Region, 1250-1850*

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**MOSASAURS.**  
**Interactions Between Armies and Ecosystems in the Meuse Region, 1250-1850.**

**English Summary**

'Mosasaurs. Interactions Between Armies and Ecosystems in the Meuse Region, 1250-1850' argues that armies' conscious and concerted protection and conservation of ecosystems long predates the rise of modern environmentalism, and that this supposedly modern behaviour is just one element in a complex web of interconnections between armies and their surrounding world. The title 'Mosasaurs' serves as a suitable metaphor for this analysis, for it draws attention to the role of military men in the discovery of a new genus of prehistoric sea reptiles, which are, in the same way as armed forces, commonly portrayed as destructive monsters. Armies could exert destructive forces similar to a natural disaster on ecological systems, but as with the mosasaur genus, this is only one aspect of a complex reality.

In this way the thesis contributes to current debates about the ecological impact or 'environmental footprint' of military forces. Environmental organisations as well as peace movements have denounced the widespread ecological destruction military forces bring about through warfare and the development of new (atomic) weapons since the 1960's. Defence departments have responded to this criticism by drawing attention to the fact that military domains often promote biodiversity. Both sides tend to use the historic past in a simplistic manner: armed forces have either always been destructive, and still are now, or modern armies have adopted new protective attitudes towards the natural world in recent years.

The Meuse Region, or the basin of the Meuse River, is a suitable geographical framework to study the reciprocal interactions of armies and ecological systems because it is relevant for both military and environmental history. The Meuse Region assumed considerable strategic importance in a European context because rivers were crucial to military movement: they facilitated the transportation of heavy equipment and supplies, provided clean running water, and could be turned into a defensive line. Studying the Meuse Region means transgressing traditional linguistic and political boundaries, as it incorporates parts of France, Belgium, Germany, and the Netherlands.

The choice for 1250-1850 as chronological limits draws attention to continuity between the Middle Ages and Early Modern Period. The High Middle Ages were characterised by a series of changes- environmental, social, economic, cultural, military etc.- that constituted a background or framework that remained dominant until it was replaced by another series of changes during the nineteenth century. Key aspects of army-ecosystem interactions, such as the garden-wilderness dichotomy, stone fortifications, the predominance of soldiers in armed forces, and gunpowder, can be traced back to this period.

The ecosystem concept provides a good theoretical framework to organize the multifaceted relationship between armed forces and the world that surrounds them, but it is too complex to apply directly to historical sources. The thesis is thus divided into five chapters (frontiers, fortifications, disturbances, policing, and army health) that together represent the three levels encompassed in the notion of ecosystem: landscapes, biotic communities, and pathogens. Landscapes embody the non-living environment, biotic communities living beings, and pathogens health and disease. Both frontiers and fortifications are examined as militarized landscapes, ecological settings in which the impact of armed forces has become so significant that it can be considered as a defining characteristic.

The first theme, frontiers, connects modern military training practices to the historic management of landscapes that had to be prepared for a potential enemy attack. Current military domains are the isolated remnants of much more encompassing military influences on frontier landscapes, but still draw on the garden-wilderness dichotomy developed during the Middle Ages. Rulers or cities presented their own territory as a 'garden', referring to the Garden of Eden, which had to be defended against the 'wilderness' that lay beyond. Paradoxically enough, the very defence of a territory often depended on wilderness elements as well (woodlands and waterways). The Meuse River retained major symbolic value as a frontier between France and the Holy Roman Empire since the Early Middle Ages, but in practice its economic importance and seasonal fluctuations in its water level ensured that it rarely served as a real dividing line. Armed forces eventually protected and constructed their own 'wilderness' to solve these issues: the Hollandic Water Line and forest barriers. Military training was an integral element of the ways armed forces interacted with frontier landscapes. They either opted for enclosed areas or large uninhabited spaces to avoid conflicts about land use. Changes in agriculture in combination with a relative growth in army size encouraged the creation of the military domains that still exist today.

The following chapter, fortifications, compares the ecological value of abandoned fortifications to their past ecological influences, when armed forces still managed them. It argues that historical defensive structures were much more varied than fortresses and city walls, and contributed significantly to ecological diversity. They also have to be considered in the context of larger defence systems, which implied mechanisms of cooperation and communication. Technological developments, notably the introduction of gunpowder weapons, did not end the continuous role of medieval fortifications, but stimulated their incorporation into newer structures. Plants remained an essential part of premodern defences, as did stonewalls, and water-filled moats. The rise of the engineer profession further stimulated landscape diversity by facilitating the construction of inundations and mining galleries. This variety in turn supported a remarkable range of plants and animals, as demonstrated by the publications of nineteenth-century naturalists. Armed forces had an

essential role in promoting biodiversity, but they were not the only actor. Some garden plants established themselves in fortifications despite intense military opposition, and maintaining defensive structures remained a duty of the general population until well into the early modern period.

The chapter about disturbances addresses armed forces' harmful actions towards communities of living beings. It reveals that armies often exerted destructive forces similar to natural disasters on ecosystems, but also that the effects of the disturbances were very ambiguous. The most obvious aspects of military destruction; woodcutting, livestock raiding, killing, and burning, were not necessarily the most meaningful in a long-term perspective. From an ecological point of view, disturbances are important because they make nutrients available. This means that for every species negatively affected, there could be another taking advantage. Historical sources associate warfare with the spread of wilderness, or uncontrolled nature, symbolised by wolves. The chaos armies brought about reduced human control over their environment, which gave unwanted species opportunities to spread to new areas, and allowed waterways such as the Meuse to assume a more natural behaviour (including flooding). The strongest evidence for long-term effects, however, comes not from warfare as such, but its preparation and aftermath: arms or gunpowder production and impoverishment. These processes stimulated the overexploitation of wood, the enclosure of common lands, and the proletarianization of a significant part of the rural population. Armed conflicts might also have accelerated the effects of climate change by contributing to the disappearance of vineyards in the northern half of the Meuse Region and the decline of herring fisheries.

The fifth chapter, policing, examines armies' protection and conservation of biotic communities in the context of processes of state formation. Armed forces became involved in the safeguarding of fauna and flora because conflicts over natural resources had deteriorated into warfare, or to safeguard important military needs. The functionaries ordinarily tasked with limiting access to ecological assets, such as forest wardens or guards, could thus depend on the armed support of the general population or soldiers when faced by a superior force. Soldiers also limited access to fortifications in military garrisons in order to preserve these unique green and uninhabited spaces in urban contexts. Distinctions between armies and the general population became increasingly problematic, however, as paid military service gradually became the norm. This not only encouraged government efforts to prevent both military recruits and potential warhorses from leaving their jurisdiction, but also caused major social unrest. Soldiers displayed both disciplined and disorderly behaviour, and remained a constant threat to law and order, even though they served as a model for other state functionaries. Military authorities themselves did not perceive environmental crimes as a particularly important offence. This paradox eventually contributed to the formation of military police units, which had to control both the military and civilians.

The last chapter, army health, questions the traditional narrative of medical progress from the Renaissance onwards by drawing attention to disease prevention. It maintains that medieval armies were already well aware of the need for basic hygiene, and that frameworks established during the Middle Ages were still important during subsequent centuries. Armed forces became more vulnerable to disease because of changes in their own organisation and the conflicts they participated in. They became larger, more permanent, and were more likely to move between different disease environments, factors that would have increased the risk of epidemics. A combatant's diet also became significantly poorer over time as a result of logistical difficulties as well as a gradual reduction in soldiers' social status. The growing need to maintain a distinct military identity further encompassed intrusions in human and animal bodies or forced them to stay in unhealthy spaces. Significant improvements in army health did eventually occur, but depended on the imposition of stringent disciplinary measures. Armed forces' concern with maintaining the health of their own members, human and animal, did give them an important role in the development of natural history, however, with the discovery of the mosasaur genus as one of the most known examples.

In conclusion, armies protected and preserved ecological systems centuries before the rise of modern environmentalism because it served military needs. The biological diversity that could be observed in the Meuse Region in 1250-1850 would not have occurred if they had not intervened. Armed forces were an essential, but hardly the only, factor of importance. The agency of other social groups, animals, plants, and an ecosystem's non-living elements (the Meuse River itself, soil structure, weather) was very significant as well. Many species in fact established themselves despite strong military opposition. This emphasis on armies' historical contribution to ecological conservation is meant as a stimulus for current military forces to make more substantial efforts to be environmentally conscious. Technological developments during the hundred and fifty years have given them far more capabilities to influence ecosystems in a detrimental way. It is time protective measures are stepped up in parallel.