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Mosasaurs

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

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7. General Conclusion

The role of military men in the discovery of the mosasaur genus, a major contribution to natural history, was clearly not an isolated event, but should be seen as emblematic for the wide ranging, and often surprising, spectrum of army-ecosystem interactions. Armies' conscious and concerted protection and conservation of ecosystems did indeed precede the rise of environmentalism by at least several centuries, as demonstrated throughout this study, whose chapters represent the ecosystem concept: frontiers, fortifications, disturbances, policing, and army health.

Fortifications in the Meuse Region enhanced the diversity of the landscape by their use of linear elements such as ditches, hedges, stonewalls and underground galleries. The plant and animal diversity in nineteenth-century fortresses was so extensive that it drew the attention of contemporary naturalists (chapter 3). Armed forces also created or conserved wilderness in the form of woodlands, inundations and heathlands. Some of these served as defensive elements within frontiers, others developed as a consequence of military training practices. Many have now become natural reserves (chapter 2). Simply maintaining the health of the people and animals that constituted an army led to the construction or preservation of gardens (chapter 6).

This protective role has its limits. Armed forces preserved specific landscapes, biotic communities, and species, but in the long run their contribution remained largely restricted to militarized landscapes, landscapes for which military use was a defining element (chapters 2 and 3). Armies played a very significant role in the conservation of unique ecosystems within frontiers and fortifications, but outside these contexts they only interfered when normal regulating forces (e.g. forest or field guards) proved to be insufficient. Soldiers mainly became involved in policing practices when restricting access to ecosystems or natural resources resolved around attempts to control the movements of people and horses perceived as indispensable for them (chapter 5).

Armies were an essential, but not exclusive factor in the ecological richness of militarized landscapes along the Meuse. These landscapes came about as result of complex and constantly changing interactions between several actors. Aside from geographical and geological features, other social groups, animals, and plants also proved quite capable to exert influence, sometimes in direct competition with soldiers. The use of mining galleries and inundation basins was largely determined by local hydrography and soil structure. The spread of garden plants in fortifications cannot be explained by referring solely to gardens managed by army members, but also needs to take the presence of calcareous materials, gardens

cultivated by local inhabitants, and the capability of plants themselves to colonize new spaces into account (chapter 3).

The ecological richness of these landscapes, then, was to some extent unintended. Armed forces protected specific ecosystems, and promoted landscape diversity, because this diversity had military value, not because they had an interest in the natural world in the same way as environmentalist organisations. Military courts and regulations, referring to the military as an organisation, did not consider environmental degradation as a particularly important crime, unless it was considered as a form of insubordination. When armies did interfere in the protection of ecosystems, they often had to act against their own colleagues or adversaries (chapter 5). The importance of natural history in a military context likewise derived from the need to ensure army members' own wellbeing and simple survival on campaign (chapter 6).

On the other side of the spectrum the role of military disturbances proved to be as ambiguous as protective behaviour in the strict sense of the word. Armies could exert destructive forces similar to natural disasters on ecological systems, even with the relatively primitive tools at their disposal, but the short- and long-term effects of such disasters is quite debatable. Permanent degradation was more an exception rather than the rule, testimony to the surprising resilience of the affected humans, animals, and plants. Despite large-scale woodcutting, trampling of agricultural fields, floodings, and burned houses, very few settlements were abandoned permanently as the result of warfare (chapter 4).

Disturbances were also not necessarily detrimental to the survival of ecological systems. Some ecosystems can only exist when processes of ecological succession are slowed down or interrupted. Frontiers and fortifications present a very strong case for long-term interactions, but they could only be conserved through short-term disturbances or interventions: simple maintenance, and military training exercises. If peasants, citizens, or paid labourers did not remove vegetation from the walls and ditches at regular intervals, the walls would have crumbled down and the ditches turned into land. The grazing of sheep in military fortifications and the keeping of carp in water-filled ditches were likewise very practical measures to ensure basic maintenance (chapters, 2, 3, and 6).

The emphasis on human intervention is primordial, because all ecosystems within the Meuse Region were manmade to some extent (chapter 1). Unwanted species, such as wolves, but also weeds and thorn bushes, could therefore profit from the lack of repression during warfare to re-establish themselves. This also draws attention to animal agency, for the capability of these species to react quickly to such sudden opportunities is remarkable. Even though this spread of wilderness, or uncontrolled nature, was again reversed as soon as peace returned, restoring a community and associated ecosystems to a pre-war state could take several decades (chapter 4).

It is in fact quite unclear to what extent warfare in itself was a sufficient factor to explain permanent ecological changes. The best examples of such long-term effects, such as the deforestation of the banks of the Meuse River and the disappearance of vineyards in the northern half of the Meuse Region during the early modern period, cannot be understood by considering armed conflicts on their own. Deforestation processes originated in a pressing need for wood, as fuel and timber. Arms and gunpowder production, as well as shipbuilding, had a far more important role in this regard than sieges, which, while very destructive, were relatively rare and short-term events. In the case of vineyards and herring fisheries, warfare seems to have simply accelerated the impact of climate change (chapter 4).

The continuous role of environmental pressures, weather and climate, but also geographical and geological features, on armies' behaviour should therefore not be underestimated. It confirms the value of referring to reciprocal interactions between armies and ecological systems. The often-harmful effects of the weather on fortifications and army members were a constant factor throughout the 1250-1850 period, and in many ways they still are (chapter 6). While engineers did devise increasingly effective measures to control local hydrography, actual supply of water in times of need, as a defensive line or as drinking water, remained problematic. The Meuse River itself continued to be a constant source of problems because it is fed by rainwater. Depending on the exact season, multiple fords could appear or disappear, river traffic could become impossible, and worse of all, the Meuse could leave its riverbed and flood the very defences built on its banks (chapters 2 and 3).

Military forces responded to these challenges by creating their own artificial wilderness. They made or contributed to the construction of channels, and planted or protected woodlands on heathlands, near frontiers, and in the outworks of fortresses. This demonstrates the difficult distinction between manmade environments on the one hand, symbolised by gardens, and uncontrolled nature, symbolised by wilderness, on the other (chapter 2). Ideas about wilderness also contained a very practical yet cynical element, for the areas perceived as being outside one's own garden, outside one's main defences, were far more likely to become victims of armies' disruptive activities, which encouraged the spread of actual wilderness or geographical features and species considered to be undesirable (chapter 4).

Because of this importance of ecological pressures substantial differences could be observed within the Meuse Region. The choice for particular forms of defence, such as water versus woodlands or mining galleries, was largely determined by soil characteristics. Marching armies preferred the banks of the Meuse River itself or fertile agricultural lands such as Hesbaye, and avoided large stretches of perceived wilderness, in the shape of seemingly endless wood-or heathlands of the Argonne, Ardennes, and Hohes Venn whenever possible. The latter areas still experienced a significant military presence, but it assumed

different forms. These stretches of wilderness served as frontiers, refuges, sources of wood and military training grounds. In this way, armed forces actually contributed to the seemingly unchanging geographical characteristics of these areas (chapters 2 and 3).

Political or economic factors were essential as well. Many scholars have overemphasised their importance, however, and neglected ecological influences. Fortifications built alongside the Meuse River did not just defend river crossings, but also served to collect tolls. The Campine saw relatively limited military action until it found itself in the middle of war-making parties during the Eighty Years War. The construction of new village forts (*schansen*), often in the most inaccessible part of the community, was a direct response to changing political circumstances. The Prince-Bishopric of Liège's policy of neutrality from the sixteenth century onwards, which entailed a relative absence of standing armies and fortresses adapted to resist artillery, was of major consequence for army-ecosystem interactions (chapter 3).

Standing armies and artillery fortresses refer to two main, and well-known, changes within the early modern period. They brought about tensions between the military as an organisation and more traditional forms of military service, and contributed to the use of former soldiers as government functionaries tasked with controlling natural resources (chapter 5). The spread of gunpowder weapons simultaneously encouraged further diversity within a limited number of medieval fortifications and brought about the abandonment of most others (chapter 3). The use of larger armies, which also tended to move regularly between different disease environments, increased morbidity and mortality rates, with early modern soldiers on average being more likely to succumb to an epidemic than their medieval predecessors (chapter 6).

Despite these developments, major continuity could be observed in the Meuse Region between the High Middle Ages and the nineteenth century. Key aspects of current armed forces, such as the military-civilian divide, gunpowder weapons, passports, engineers, university-educated doctors, industrialised arms production, and military domains, originated in this era, but at the same time older traditions and structures continued to play a significant role. The garden-wilderness contrast dominated military perception of frontier landscapes, medieval stone fortifications retained their defensive value, wolves profited from warfare to spread to new areas, distinctions between armed forces and the general population were not drawn very rigidly, and soldiers still had some control over their own health conservation (chapters 2, 3, 4, 5, and 6).

The years 1250-1850 can therefore be seen as an intermediary period in the history of the Meuse Region, during which military attempts to control ecosystems became more intensive, without causing a break with older management practices. Most of the tools army members employed to maintain and improve their own place in ecological systems (axes,

spades, shovels, and torches, but also man and animal labour, manure, and herbal remedies) had been around for thousands of years. Human interventions are not necessarily detrimental. They can actually increase biodiversity by creating more variation within landscapes. Armies contributed to this diversity because their needs often opposed those of other social groups. They protected or damaged specific communities to preserve their own health or gain a strategic advantage. Historical armed forces had close and extensive contacts with ecosystems' other components. Military commanders valued horses and waterways because movement would have become almost impossible without them, while their subordinates had to gather food and forage on the spot, and needed wood for the building of fortifications, the making of weapons, and shielding themselves from the cold.

In modern armed forces, by contrast, soldiers have to devote much less attention to such matters, for military engineers and doctors ensure that environmental constraints on military operations (e.g. difficult terrain, disease) are reduced as much as possible. Military organisations are not unique in this regard, since humans' general impact on ecological systems has become so intensive and all encompassing during the last century and a half that many other species are driven to extinction. The nineteenth century can be considered as a main turning point because several key changes occurred in a relatively short time frame: military forces established their own domains, which civilians were no longer allowed to enter, they adopted new gunpowder weapons (the machine gun, breech-loading rifles and artillery), fortifications (concrete and barbed wire), means of transport (railroads, steamships) and communication (telegraph, radio) on a massive scale, and university-educated doctors introduced innovative medical theories, which became especially important in increasingly global and industrialised conflicts.

Any chronological limit is artificial to some extent. The successful German invasion of France in 1940, for instance, was made possible by French generals' misguided perception of the Ardennes as an impassable wilderness, and even though this campaign will forever be associated with tanks and other mechanised vehicles, the *Wehrmacht* still depended on the labour of tens of thousands of horses. The use of plants in fortifications did not disappear with the introduction of concrete and barbed wire, but remained important in the context of camouflage. Interactions between armies and ecosystems remained as complex as in the Middle Ages. In fact, current debates about the ecological impact of military forces demonstrate that even today these influences are very ambiguous and cannot be reduced to environmental destruction or conservationism.

In this way, the army-ecological interactions examined here shed new light on military history in general. Rather than focussing on technology and the beginning of modernity, it demonstrates the continuous importance of frameworks established during the Middle Ages, and draws attention to the ecological aspects of state formation. The emphasis

on ecosystems rather than political actors contributes to a more global military history in which technology and military doctrines are just two elements among many in the complex interactions between armies and ecological systems. Instead of highlighting the impact of gunpowder and drill, it is worth explaining to what extent European armies could establish themselves on other continents because they managed to adapt to and influence local ecosystems, something that they would not have been able to do without native support and indigenous knowledge.

This emphasis on placing discussions about the ecological influences of military forces on a sound historical footing is not to ignore the very real changes that came about during the last decades through the efforts of environmentalist organisations. The spread of chemical and atomic weapons has added a whole new level to problems regarding the 'environmental footprint' of the military. Self-congratulatory statements that today's military forces are doing something unprecedented or are more environmentally conscious than their predecessors are not only simplistic, but also counterproductive because they imply that further efforts are unnecessary or at least non urgent. Armies' destructive capabilities have increased significantly in the last century and a half. It is only logical that conservationist efforts have to be stepped up in parallel. Merely continuing practices that are centuries old and calling them 'progressive' and 'modern' will not do.

The Meuse Region in 1250-1850 provides an excellent case study that challenges traditional interpretations of armed forces' relationship with their surrounding world because of its strategic importance, but it is also relatively small when seen in a global, or even European perspective. What the debate really needs therefore is more research regarding historical army-ecosystem interactions, preferably in a long term and transnational perspective. This will reveal whether the army-ecosystem interactions that could be observed in the basin of the Meuse River are unique or resemble those in other regions. Armies around the world have influenced ecosystems and were influenced by them from the very beginning of human warfare, firm evidence of which dates back to the Neolithic period at the very least. Despite the praiseworthy efforts of peace organisations it is unlikely that the near future will see the end of warfare. A better understanding of how armies and ecosystems interacted in the past will be indispensable for dealing with the ecological consequences of today's and future military actions. In this way, we might be able to bring about a real green turn in the present world as well as military history.