# INTRODUCTION

AT A HILL named Sint-Pietersberg, just outside Maastricht, around the year 1780 labourers digging out limestone found the skull of a large creature resembling a whale or giant crocodile. It belonged to an animal that measured fifteen to seventeen metres in length. This remarkable specimen, the "Grand Animal de Maastricht," had reached such fame by 1794 that the *Commissaires des Sciences et des Arts* present with the Army of the Sambre and Meuse, which had invaded the Austrian Netherlands to spread the ideas of the French Revolution, ordered soldiers to search and confiscate it from its rightful owner. They located the skull on November 8, 1794, only four days after the surrender of the Dutch garrison of Maastricht.[1] It was brought to the newly established Muséum national d'histoire naturelle in Paris, where in 1808 the zoologist George Cuvier (1769–1832) identified it as an extinct species of lizard.[2]

The history of this skull is a well-known event in the history of science, but its seminal nature is somewhat overstated. Dr. Johann Leonhard Hoffmann (1710–1782), director of the military hospital of Maastricht, had already come into the possession of similar fossils around 1770, and made his observations known through correspondence with other scientists.[3] It was not until 1829, however, that the mysterious animal was definitively identified: the English geologist Gideon A. Mantell named it *mosasaurus hoffmanni* in honour of the man who made it famous. "Mosasaurus" literally means "lizard of the Meuse."[4] The discovery of these fossils is a landmark in the history of science because *mosasaurus hoffmanni* was one of the first extinct species ever identified. The fact that a species could die out implied that the world as it was known in the eighteenth or early nineteenth century was different to the one God created. It therefore challenged the generally accepted worldview at the time and paved the way for the evolutionary theory of Charles Darwin.[5]

The area around Maastricht, and the Sint-Pietersberg in particular, is well known for its layers of limestone, which have continued to provide large quantities of fossils until this very day. Military men had a key role in the discovery of the mosasaur genus, because this landscape had both ecological and strategic value. Officers of both the Dutch and French army expressed considerable interest in the underground network of the Sint-Pietersberg because a besieging army might use it to assault the fort, built on this hill in 1702, from below (see figure 1). During the siege of 1794 Dutch and French

**1** Lacour, *La République naturaliste*, 73–80; 105–30; Rompen, "Mosasaurus Hoffmanni," 37–40; van Schaik, *De Sint-Pietersberg*, 383.

**2** Cuvier, "Sur le grand animal fossile."

**3** Faujas de Saint-Fond, *Histoire naturelle*, 59–67, 215–30; Rompen, "Mosasaurus Hoffmanni," 37–63; van Regteren Altena, "Achttiende-eeuwse verzamelaars"; van Regteren Altena, "Nieuwe gegevens."

**4** Rompen, "Mosasaurus Hoffmanni," 77–80.

**5** Rudwick, *Bursting the Limits of Time*, 68–70.

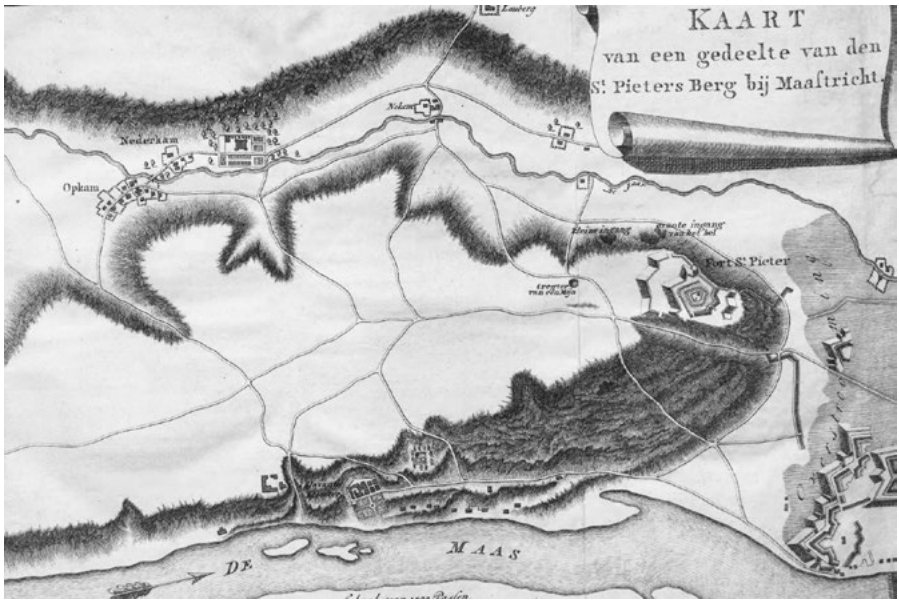


Figure 1. Map of the Sint-Pietersberg and Fort Sint-Pieter, late eighteenth century (Faujas de Saint-Fond, *Natuurlijke historie*).

soldiers actually placed explosives in the quarries to attack their adversaries' positions.[6] The close connection between military and scientific exploration is also reflected in the oldest publications dedicated to the Sint-Pietersberg, which were all written by soldiers or scientists attached to the military.[7]

The term "mosasaurs" serves as a suitable metaphor for the following analysis, not only for the specific historical circumstances that led to the identification of this genus, but also because it suffers from the same stereotyping as armed forces. Mosasaurs, sea lizards who lived during the Late Cretaceous Era (101 to 66 million years ago), are commonly portrayed as destructive monsters. While this particular species, *mosasaurus hoffmanni*, was in fact a huge and fearsome predator, it is only one member among a genus of over forty species, which had an important and complex role in the functioning of ecological systems in which they lived. While the largest mosasaurs ate almost everything smaller than themselves, others specialized in eating molluscs, sea urchins, gastropods (snails and slugs), or squid. Different species therefore occupied different ecological niches.[8] In the same way, there is no doubt that armies can adopt the shape of

**6** Notermans, *Fort Sint-Pieter*, 23–25; van Schaik, *De Sint-Pietersberg*, 380–88; van Regteren Altena, "Achttiende-eeuwse verzamelaars," 107.

**7** Bory de Saint-Vincent, *Description*; Faujas de Saint-Fond, *Natuurlijke historie*, vii–viii; Mathieu, "Notice sur les orgues géologiques."

**8** Schulp, "On Maastricht Mosasaurs," 99–111.

large destructive forces of tens of thousands of armed persons who destroy everything in their wake, but as with the *mosasauridae* genus, this is only one aspect of a multifaceted being.

This book considers interactions between armed forces and their surroundings from a long-term perspective, more specifically the region of the Meuse river (or Maas in Dutch and German) in the period from 1250 to 1850 as the river flows from northern France through modern-day Belgium and the Netherlands into the North Sea at Rotterdam. It argues that armies' conscious and concerted protection and conservation of ecosystems predates the rise of environmentalism by several centuries, and that this supposedly modern behaviour is just one element in a complex web of interconnections between armed forces and ecological systems. In fact, the ecological impacts of armies, past or present, can only be understood when one distinguishes between long- and short-term effects.

Studying the reciprocal impacts between armies and ecosystems means analyzing exchanges between ecosystems in general and one of their specific components. In more practical terms this means highlighting interventions by armed forces, while acknowledging that many factors, natural as well as cultural, contributed to actual ecological results. As this book argues that historical armed forces had a significant impact on ecological systems, it needs to demonstrate that a certain ecological consequence would not have occurred, if armies had not intervened.

By drawing attention to armed forces' historical role in the preservation of ecosystems, this book contributes to current debates about the ecological impact, the "environmental footprint," of military forces. These discussions date back to the 1960s and particularly the Second Indochina or Vietnam War (1955–1975), which saw the massive use of pesticides (the infamous Agent Orange). This fuelled an increasingly powerful peace movement, and also prompted some of the first academic studies on the ecological effects of warfare. Arthur H. Westing, a biologist who saw active service in the U.S. army, played a pioneering role in this regard. He was one of the first researchers to study environmental destruction in wartime and the need to devise measures to prevent, or at least reduce, these effects.[9]

By the late 1980s and early 1990s environmental organizations went a step further and criticized armed forces' role in large-scale pollution and environmental degradation in both war and peace. The continuous connection of such critics with the peace movement is made clear by a small German edited volume from 1988, which is titled *Natur ohne Frieden*, "Nature without Peace." The cover page depicts a tank riding down a tree with a peace dove flying over it.[10] Conservationists were also quick to make comparisons with historical examples. Gerd Schuster, editor of the journal *Natur*, argued that "a mentality of medieval mercenaries governs at least the higher echelons of the (West) German Army." Another journalist equated that same army with "medieval rob-

**9** Westing, *Warfare in a Fragile World*.

**10** Achilles, ed., *Natur ohne Frieden*; Gleditsch, "Armed Conflict and the Environment"; Skrotzky, *Guerres*; van Mourik, van Teijlingen, and Vertegaal, *De natuur onder vuur*.

ber barons."[11] The presumed similarity to medieval mercenaries is of particular interest within the context of this study because it reveals that the stereotyping of the Middle Ages is both explicit and implicit. The modern German word for mercenary (*Soldner*) is also the medieval German word for soldier.

It is unclear to what extent the sheer horror of being called "medieval" contributed to a change in attitudes, but military organizations have put substantial effort into presenting a different image to the general public from the 1980s onwards. Most military forces, national or international (NATO), now have a specific webpage dedicated to presenting an image of an organization for which environmental conservation is a major concern. Such websites invariably refer to military domains which have increasingly been turned into nature reserves during the last decades, or at least receive special protection because of their biodiversity value. In recent years they have facilitated the comeback of wolves in Western Europe.[12] There is also an increasing awareness among conservationists of the ecological value of former militarized landscapes as unique environments. Abandoned bunkers from the World Wars have become home to bat colonies, and the demilitarized zone between North and South Korea constitutes a rare paradise for endangered species. The Indian army has special "Environmental Task Forces" to carry out afforestation and irrigation projects, particularly near the frontiers with Pakistan, Bangladesh, and Nepal, while the armed forces of countries such as South Africa and Botswana can claim that they actively protect wildlife against poachers. In recent years soldiers have also become increasingly involved in the protection of the Amazonian rainforest.[13]

The ways that the historic past is used within these important, but also very complex, debates, is striking. A clear tendency exists, though, to either ignore historical examples of the close entanglement between armies and ecological systems altogether or refer to them in a simplistic manner ("mercenaries," "robber barons"). This is based on two more or less contradictory assumptions. The first supposition is that due to technological "backwardness," historical armies were not able to influence their environments in a cognisant and meaningful way and are thus not relevant to current debates. The second assumption is that armed forces have always been destructive, even though their potential impact on ecological systems did increase with technological developments. In both instances, however, protective or non-destructive behaviour is presented as something "new," as an accomplishment of environmentalism, environmental organizations, and modern military forces.

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**11** "Allzu deutlich war nämlich geworden, dass zumindest in höheren Riegen der Bonner Verteidigungsarmee, eine Art mittelalterliche Söldnermentalität herrschte." Lange, "Raus aus den Kartoffel," 209; Schuster, "Täuschen und Tarnen," 14.

**12** Brunel, *Les missions militaires*; de Wolf and Fautsch, "Les sites militaires"; Gilissen, *Missie natuur*. For a critical discussion of military forces' rhetoric, see Coates et al., "Militarized Landscapes"; Woodward, "Khaki Conservation"; Woodward, *Military Geographies*, 85–103.

**13** Adeney Thomas, "The Exquisite Corpses"; Boosten, Jansen, and Borkent, *Beplantingen*; Brunel, *Les missions militaires*, 71–72; Havlick, "Disarming Nature"; Henk, "Biodiversity and the Military"; Sabo, ed., *Tanks and Thyme*.

Historians have certainly picked up on these themes and made their own contribution to these debates: in the last decade several monographs have been published on the environmental consequences, mostly devastation, of the American Civil War, the World Wars and the Cold War.[14] A growing number of works are also concerned with the impacts of disease or weather and climate on the conduct of warfare.[15] These analyses have favoured rapprochement between military and environmental history, and it is perhaps even possible to speak about a "green turn" in military history. Still, environmental studies relating to warfare before "modernity," before the industrialization of warfare in the nineteenth century remain quite rare. The works of J. R. McNeill and Richard P. Tucker need especially to be mentioned here.[16] Other scholars, from the field of history as well as archaeology and literature, have also contributed significantly to the study of army–ecosystem interactions even though they do not link themselves explicitly to debates about the "environmental footprint" of modern military forces.[17]

In premodern Europe, however, there were no strict dividing lines between armed forces and general society. This book therefore considers armies or armed forces as temporary or permanent social groups characterized by the fact that their members carry weapons, whose main purpose is the management of organized and collective conflicts in which the use of—potentially—lethal violence is the essential element: war.[18] Such a definition might seem unproductively wide. It emphasizes that function, rather than a debatable numerical minimum or political legitimacy, is an army's key characteristic. Even setting a minimum limit for the concept of army is counterproductive in light of the relative growth in army size during the period 1250–1850.[19]

Furthermore, such a characterization avoids the assumption that warfare inevitably revolves around battles and sieges or that armies can only be raised by "states." Many armed forces had a very short lifespan, especially before the late seventeenth and early

**14** Bader, *Wald und Krieg*; Best, "The Historical Evolution"; Brady, *War Upon the Land*; Brauer, *War and Nature*; Closmann, ed., *War and the Environment*; Coates et al., "Militarized Landscapes"; Corvol and Amat, eds., *Forêt et guerre*; Hupy, "The Environmental Footprint"; Masson-Loodts, *Paysages en bataille*; McNeill and Unger, eds., *Environmental Histories*; Meyerson, *Nature's Army*; Muscolino, *The Ecology*; Pearson, *Mobilizing Nature*; Russell, *War and Nature*; Shively Meier, *Nature's Civil War*; Tucker and Russell, eds., *Natural Enemy, Natural Ally*.

**15** Degroot, "'Never Such Weather Known in These Seas'"; Degroot, *The Frigid Golden Age*, 154–95; McGready, "Contested Grounds"; Winters, ed., *Battling the Elements*; Zhang et al., "Climatic Change, Wars, and Dynastic Cycles."

**16** Agoston, "Where Environmental and Frontier Studies Meet"; Bankoff, "Wood for War"; Garnier, "Les ressources naturelles"; Gordon, "War, the Military, and the Environment"; Hughes, *Environmental Problems*, 150–62; Mayor, *Biological and Chemical Warfare*; McNeill, "Forests and Warfare in World History"; McNeill, *Mosquito Empires*; Tucker, "The Impact of Warfare." See also the special issue "Environments of War" of the *Hungarian Historical Review* 7:3 (2018).

**17** Childs, *The Military Use of Land*; Hanson, *Warfare and Agriculture*; Hevia, *Animal Labor and Colonial Warfare*; Hill and Wileman, *Landscapes of War*; Pluskowski, *The Archaeology*, 294–326; Trautmann, *Elephants and Kings*; Withers, "The Ecology."

**18** This characterization adopts Alexander Moseley and Keith F. Otterbein's definitions of warfare: Moseley, *A Philosophy*, 14–16; Otterbein, *How War Began*, 9–10.

**19** A useful overview is provided in Lynn, "The Evolution."

eighteenth century. They were assembled for a particular purpose and disbanded afterwards. Even so, marching, standing guard, maintaining fortifications, and simply staying healthy by securing access to food and shelter were far more pressing issues on a daily basis than preparing for combat. If an army actually engaged the enemy it was most likely in the context of skirmishes, incursions, and sudden assaults, rather than major battles or sieges. The relative importance commanders attributed to such actions changed over time, and so did the terminology: from the medieval *chevauchée* or *Reise* to seventeenth-century partisan warfare, and eighteenth- or nineteenth-century "little war" (*petite guerre, Kleinkrieg*, *guerrilla*). Still, from the perspective of army–ecosystem interactions these aspects of warfare remain among the most significant.[20]

The people who actually make up an army will be referred to as "army members." While it might seem more logical to opt for terms such as "soldier" or "military," this would also mean that the specific meaning of these terms in historical sources is ignored. "Army members" is in fact much closer to the terminology the sources themselves adopt ("men of war," "men of arms," "armed people," "army people").[21] The term soldier, of medieval origin (*soudener*, *soudoier*, *Soldener*), derives from Latin *solidarius*, which is literally "someone who receives a solidus," a golden coin of the Late Roman Empire, or "paid man" in a more general sense. It refers to combatants who receive monetary compensation for their services.[22] When the term soldier appears in this study, it is always with this specific meaning.[23] In a similar way, the term "military," derives from Latin *miles*, *militaris*, and indicates matters relating to war or armies in general (as in military history). It only became the preferred term to refer to a specific kind of army, characterized by uniforms, a strict hierarchy, and clear distinctions from the general population ("citizens") during the eighteenth and early nineteenth century. When this study uses the term military it is in the general sense, unless stated otherwise.[24]

Armies included, and still include, a considerable number of persons in their ranks who cannot be referred to as "soldiers," and to a lesser extent "military." These could be wagoners, servants, pioneers, medical personnel, combatants' partners and children, and so forth. During the eighteenth and nineteenth century commanders and govern-

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**20** Lomas, "Raids and Raiding"; Parker, *The Army of Flanders*, 12–13; Picaud-Monnerat, *La petite guerre*; Rogers, *Soldiers' Lives*, 237–53; Satterfield, *Princes, Posts and Partisans*; Verbruggen, "Military Service."

**21** "Gens de guerre," "Kriegsvolk," "legervolk," "gewapenden," "Reisiger," "gens d'armes," "mannen van wapenen." The terms *gens d'armes* and *mannen van wapenen* could also refer to a dominant group within armies (men-at-arms) or even a social group identifiable by its martial qualities (squires). In medieval Latin *miles* (plural *milites*) generally referred to knights specifically rather than combatants in general: Lind, "Genesis of the Civilian," 52–53.

**22** The word soldier spread from French (*soldat*) to Dutch (*soldaat*) around the late sixteenth century, and to German (*Soldat*) in the early seventeenth century. Schulten, *Contribution*, 104–5.

**23** Contemporaries mainly distinguished soldiers according to their function or geographical background. The use of the word mercenary remained rather limited until the late eighteenth or nineteenth century. DeVries, "Medieval Mercenaries"; Govaerts, "'Fire-Eaters,'" 9; Percy, *Mercenaries*, 68–90; Sikora, "Söldner."

**24** Bardin, *Dictionnaire*, 12:3640–41; Lind, "Genesis of the Civilian," 59–64.

ments put considerable effort into turning armies into military organizations. These processes entailed that the aforementioned individuals either adopted a more official presence (for instance, the militarizing of transport services and administration) or were excluded from army contexts (such as women and children).[25] In recent years scholars have started to question this close association again, by referring to the rise of private security companies and the blurring of distinctions between military and police forces in the fight against terrorism.[26]

Establishing a clear definition of the second cornerstone of this book, the ecological system or ecosystem, is no less problematic. The concept conventionally refers to all of the organisms, meaning plants, animals, fungi, and microorganisms that live in a particular habitat (a community or multiple communities), along with their immediate physical and chemical environment. Living and non-living elements constantly interact with each other through flows of energy and matter (such as food chains). In theory, the term ecosystem cannot be limited to a certain spatial or temporal level. The Meuse River itself is an ecosystem, but so is a forest or a lake. Some might argue that the whole globe is one huge ecosystem.[27]

This very lack of spatial and temporal limitations makes the term both thought-provoking and problematic. The concept of an ecological system was originally developed in the early twentieth century; the term was coined in 1935, on the basis of lakes. A lake is a closed system that can be reasonably well defined in spatial terms. In most cases, and the Meuse Region is a good example of this, it is very difficult to pinpoint where one ecosystem ends and another begins. The fact that "everything is connected to everything else" does not help either. Many scholars therefore prefer to examine a single aspect or level within ecosystems, such as the non-living environment (landscapes), living beings (biotic communities) or even pathogens (organisms or materials that cause disease), and individual species.[28]

In order to approach the subject in a systematic way these same distinctions will be adopted. The first two chapters, frontiers and fortifications, represent the landscape level or the non-living environment, comprising soil structure, hydrography, and land use. Landscapes are considered here as ecological milieux that are created through the mutual engagement of environment and people. A landscape is simultaneously a material reality and a cultural construct.[29] The next two chapters, disturbances and policing,

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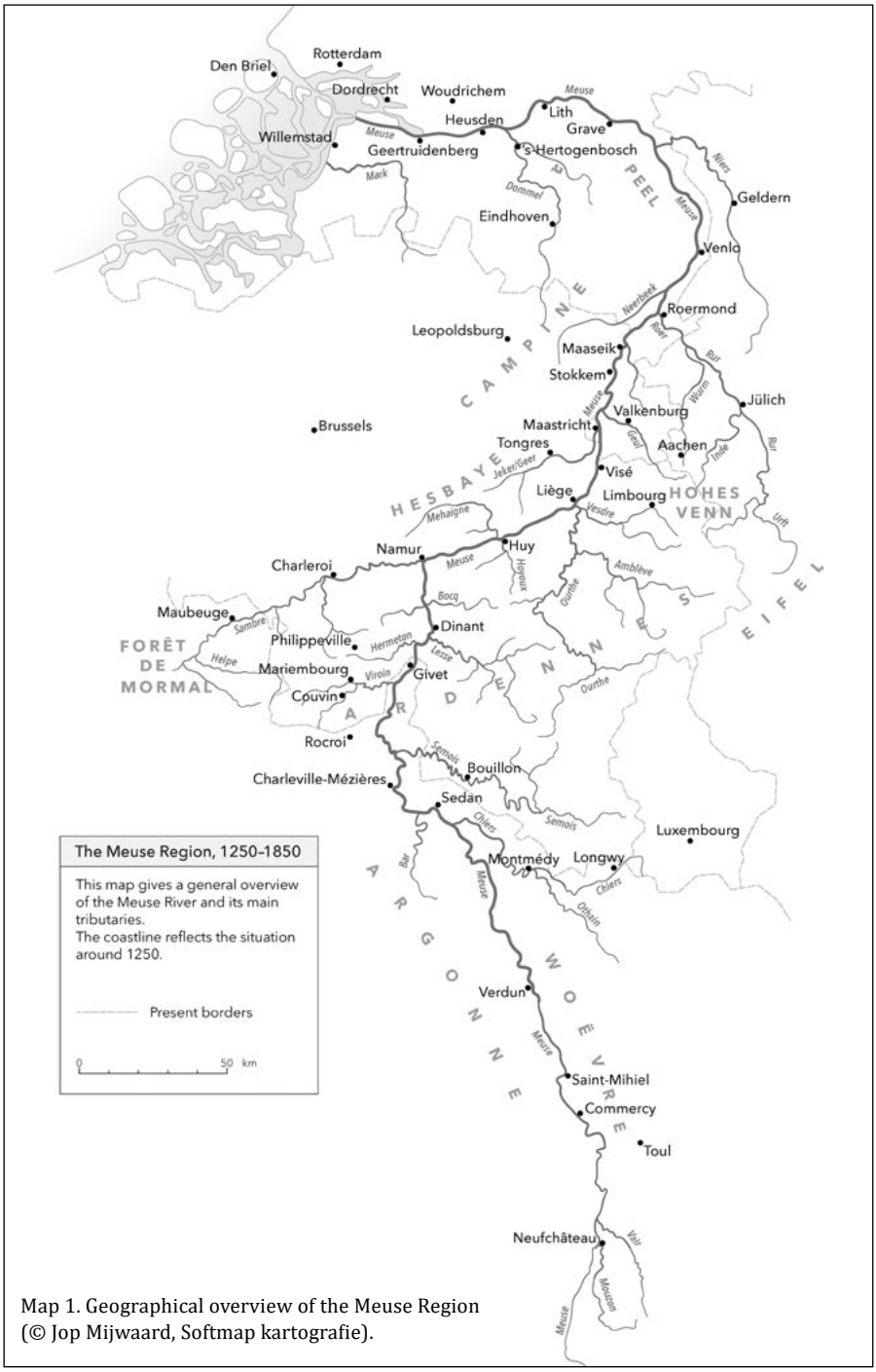
**25** Cardoza, *Intrepid Women*, 166–228; Mayer, *Belonging to the Army*; Tachon, *Enfants du troupe*, 225–40.

**26** Woodward, "Military Landscapes," 51–52.

**27** Park and Allaby, *Dictionary*, 135; Chapman and Reiss, *Ecology*, 187; Willis, "The Ecosystem," 270.

**28** Golley, *A History*; Raffaelli and Frid, "The Evolution"; Willis, "The Ecosystem."

**29** Many different definitions of "landscape" exist, depending on one's field of study. In ecology for instance, landscapes can also be studied as units consisting of multiple ecosystems or ecotopes (the smallest homogeneous mapable units of land). This description focuses on the socio-cultural dimensions of the word landscape to emphasize the close entanglement of "nature" and "culture." Förster, et al., "Towards Mutual Understanding"; Ingegnoli, *Landscape Bionomics*, 3–9, Jones, "The Elusive Reality of Landscape," 232–34.




Map 1. Geographical overview of the Meuse Region (© Jop Mijwaard, Softmap kartografie).

are concerned with living beings or fauna and flora (humans, animals, and plants). The final level comprises only one chapter, army health, and examines pathogens, or disease and disease prevention. These distinctions are not absolute, but should be seen as a shift in emphasis, as no single aspect of the ecosystem concept can be studied in isolation. Such a methodology also fits into the traditional geographical understanding of a region as multiple landscapes that share similar characteristics. The Meuse Region is composed of several distinct landscapes that are nevertheless related because they are part of the same river basin, and these landscapes in turn comprise diverse kinds of living beings and pathogens.[30]

Despite the ambiguity of "ecosystem" as a concept, it still provides a suitable framework to think about the natural world in a way that more traditional notions, such as "nature" and "environment," do not allow. It does not assume for instance that humans are fundamentally different from the world that surrounds them. Its rising popularity from the 1970s onwards originates to a large extent in its adoption by environmentalist movements.[31] What is important for this study is that it permits the organizing of complex interactions between armies and their surroundings in a manner that is meaningful to military and environmental historians, or to historians and researchers of other disciplines.[32] The concept of ecosystem provides a sound theoretical basis, while the actual chapters concern themselves with one of the three levels encompassed by the ecosystem concept: landscapes, biotic communities, and pathogens.

Now we have established working definitions of the two corner-stones of this book, it is time to say something about its geographical framework: the Meuse Region or the basin of the Meuse River, meaning the river itself and its tributaries.[33] The Meuse River measures about 925 kilometres or nearly six hundred miles, ranges from Pouilly-en-Bassigny on the plateau of Langres (in Lorraine), at an elevation of 409 metres, down to the North Sea, and is part of a basin that stretches over thirty-four thousand square kilometres (see map 1). Because it is mainly fed by rainwater, the Meuse's behaviour can be quite unpredictable, a characteristic of considerable importance for army–ecosystem interactions. Today it is officially referred to as the Meuse from Meuse-en-Bassigny

**30** Baker, *Geography and History*, 109–29.

**31** Chapman and Reiss, *Ecology*, 92–93; Park and Allaby, *Dictionary*, 144, 287; Radkau, *Natur und Macht*, 29–32; Wiegleb, "A Few Theses," 104–7; Worster, "History as Natural History."

**32** Some researchers have adopted the concept of "hybrid systems" to bridge the traditional divide between "nature" and "culture." This analysis agrees with the general idea of hybrid systems, but does not adopt the terminology, because it might lead to unnecessary confusion. If one accepts that the term ecoystem in itself emphasizes connections between living and non-living beings, including humans, there is no need for yet another term. Human perceptions of their environment can easily be examined as a factor of importance regarding interactions within ecosystems. Hoffman, *An Environmental History*, 5–20.

**33** The most important tributaries of the Meuse are, from source to estuary: Saônelle, Mouzon, Vair, Chiers, Bar, Sormonne, Semois, Viroin, Hermeton, Lesse, Molignée, Bocq, Houyoux, Sambre, Mehaigne, Hoyoux, Ourthe, Berwinne, Voer/Fouron, Geer/Jeker, Geul, Geleenbeek, Rur/Roer, Neer, Swalm, Niers, Raam, and Dieze.

onwards. The initial watercourse is simply known as "the Brook" (*le Ruisseau*).[34] The Meuse Region is relatively sparsely populated, especially if compared to the neighbouring Scheldt basin in Flanders, and the most important settlements lie directly on the Meuse River itself. Note that on map 1 the Meuse estuary reflects the situation around 1250 in order to draw attention to the processes of land reclamation that have occurred during the medieval and early modern period.

The choice for a geographical approach, inspired by Fernand Braudel's famous monograph on the Mediterranean, serves as an alternative to the traditional emphasis on political entities, and more particularly nation states. This is not to say that the concept of "region" is unproblematic. Its role in geography is similar to that of "period" in history. It refers to a set of lands that share some specific characteristics, but its exact size and limits can diverge widely depending on the subject, and researchers' individual preferences. The Meuse Region from an economic or political point of view does not necessarily correspond to this geographical framework. The importance of the Meuse as a political boundary for the Kingdom of France, for instance, far extends these geographical limits.[35]

The basin of the Meuse as a subject of study is valuable because it provides a geographical framework that is relevant for both military and environmental history. If historians refer to the Southern Netherlands as the "battlefield" or "cockpit" of Western Europe, then the Meuse valley certainly is a highway to that battlefield. Rivers were crucial to military movement, especially before the invention of railways, for several reasons: they considerably facilitated the transportation of heavy equipment and supplies, provided relatively clean (running) water and served as a defensive line. It is hardly surprising therefore that the Meuse Region assumed considerable strategic importance from at least the Late Roman Empire to the World Wars (with the struggle for Verdun in 1916 and the battle of the Bulge in 1944 as the best-known examples). The role of the Meuse is in this sense quite similar to that of other major rivers, such as the Rhine and Danube.[36]

A comparison of the Meuse and Rhine is of particular interest here because of their proximity. Some geographers might even argue that the Meuse River is a tributary of the Rhine. While the symbolic value of the Rhine as a boundary between France on the one hand and Germany on the other is well known, this perception is a relatively recent phenomenon. In the broader historical context of this study the Meuse Region has been far more important as a boundary marker between the kingdom of France on the one hand and the Holy Roman Empire, dominated by the Habsburgs, on the other. The linguistic and political variety of the Meuse Region is also more considerable than that of the Rhine, especially if the former's smaller geographical dimension is taken into account. In this way, this study transgresses different historiographies organized by nation states.

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**34** Breuer, *Die Maas*; Guillery, *La Meuse*; Loicq, *Les noms*, 253–56; Suttor, *La Meuse*; Vereerstraeten, "Le bassin."

**35** Baker, *Geography and History*, 156–63, 182–93.

**36** Agoston, "Where Environmental and Frontier Studies Meet"; Babinger, "Die Donau als Schicksalstrom des Osmanenreich"; Schmid, "The Environmental History of Rivers"; Suttor, "L'espace fluvial"; Suttor, *La Meuse*.

Diversity within the Meuse Region is indeed essential to this analysis. Being part of a geographical belt that stretches from northern France and the Low Countries to the western part of Germany and northern Italy, and being well known for incorporating some of the most densely populated areas in Europe, the Meuse Region stands out because relatively sparsely populated regions dominate it. The riverbanks of the Meuse River are very fertile and so are a handful of other areas, characterized by fertile loam or clay soil, such as Hesbaye. If the Meuse Region is considered as a whole, however, the most common landscapes are mountainous forests (Woëvre, Argonne, Ardennes, Eifel) and peat or heath lands (Hohes Venn, Peel, or the Campine, also known in Dutch as the Kempen). Many armed forces have been drawn to the Meuse Region because of its strategic importance, but most of them preferred to remain in the fertile parts, especially the river valley of the Meuse itself.

The soil characteristics of the Meuse Region are also important when it comes to construction materials. Some settlements, especially in the southern and middle parts of the basin, had access to relatively large quantities of wood, while inhabitants of the lands near the Meuse estuary started to run out of suitable construction wood as early as the High (or Central) Middle Ages. The local presence or absence of raw materials, such as wood, coal, or stone, had a substantial impact on trade patterns along the Meuse River, because river transport was mainly limited to such high-volume, low-value goods. The valley of the Meuse from Givet to Maastricht is well known for its layers of limestone, which come very close to the surface. Because of the presence of calcium carbonate these landscapes contain unique vegetation that only grows on calcareous soils. Many sites, including the aforementioned Sint-Pietersberg, have now received special protection because of the rare species that live there (notably herbs, flowers, butterflies, and bats). This might seem to be a consequence of their inherent geographical features, but some of the most valuable ecosystems are actually man-made (the grasslands and quarries). The dominance of limestone as a building material is of major consequence for the ways fortifications in the Meuse Region interact with ecosystems at large, especially in a long-term perspective.[37]

Our chronological limits, 1250–1850, reflect the general emphasis on a long-term perspective. These parameters do not constitute absolute boundaries, but serve, in the same way as the geographical scope, as an alternative framework. They transgress traditional chronological divisions and bring the importance of the Central Middle Ages as a transformative period in European history to the fore. As will be argued below, the Central Middle Ages were characterized by a series of changes—environmental, social, economic, cultural, military, and more—that constitute a background or framework that remains dominant until it was replaced by another series of changes during the nineteenth century. The main turning point is around the year one thousand, or the years 1000–1300 more generally, rather than the fifth or fifteenth century. This is not to argue that the 1250–1850 period did not experience significant changes, only that many historians privilege such transformations above forms of continuity with the Middle Ages.

**37** Breuer, *Die Maas*, 54–76; Rousseau, "La Meuse," 99–121; Suttor, *La Meuse*.

The object is to open up research perspectives, rather than to replace one determinism with another.

Landscapes that are considered archetypical for specific areas in the Meuse Region, or even as "natural" landscapes, such as the ponds of Woëvre, the heathlands of the Hohes Venn or the Dutch coastline, were to a large degree created during the Middle Ages. Pro-environmental organizations put much effort into recreating or maintaining such ecological milieux because they encompass species that can be found nowhere else. Paradoxically this often involves cutting down the very forests and trees that for many people represent true "nature." People may be aware that these landscapes have become much scarcer or even disappeared because of changes in land use, particularly during the last hundred and seventy years. Few of them realize, however, that they are to a large extent recreating medieval landscapes.[38]

These older landscapes both originated in and brought about changes in agricultural practices (e.g., the three-field system) that supported significant demographic growth during the Central Middle Ages. The extent of this growth is reflected in the fact that most of the settlements that currently exist in the Meuse Region can trace their history back to precisely this period. The great majority of cities today had already obtained municipal charters granting them rights during the Middle Ages. It is noteworthy that the few exceptions to this general pattern often have a military origin (such as Charleroi or Leopoldsburg). Of no less importance is that these settlements built specific stone structures—fortresses ("castles"), urban walls, and churches—which retained a major military role until the eighteenth or nineteenth century. This same period also saw the development of an ideology centred on the "Three Orders" (i.e., those who pray, those who fight, those who work), even if the reality could be rather more complex. The association of nobility with knighthood is of particular importance for subsequent chapters. Finally, the development of a money economy also encouraged the renewed spread of paid military service (soldiers) for the first time since the Late Roman Empire.[39]

The political fragmentation of the Meuse Region came about during this period as well, notably as a result of the disintegration of the Duchy of Lorraine (Lotharingia) into a multitude of relatively small principalities. The original division, between Upper and Lower Lorraine from the second half of the tenth century, was quickly followed in the eleventh century by a further series of separations, as local aristocrats consolidated their power.[40] By 1250 the following principalities had emerged: the duchies of Lorraine, Brabant, and Limburg, the bishoprics of Verdun, Liège, and Toul, and the counties of Bar, Champagne, Rethel, Chiny, Luxemburg, Hainaut, Namur, Loon, Jülich, Guelders,

**38** Barends, et al., eds., *Het Nederlandse landschap*; Girardot, *Le droit et la terre*, 1:239–48; Nienhuis, *Rhine-Meuse Delta*, 49–79; Noël, *Quatre Siècles*; TeBrake, *Medieval Frontier*, 190–220; Webb, "The Traditional Management."

**39** Bartlett, *The Making of Europe*; Burgers and Damen, "Feudal Obligation or Paid Service," 785–86, 789–90; Dejongh and Thoen, "Arable Productivity"; Hoffmann, *An Environmental History*, 119–54; Hoppenbrouwers, "Town and Country"; Krieger, "Obligatory Military Service"; Napran, "Mercenaries and Paid Men"; Pounds, "Population and Settlement"; van Bavel, *The Invisible Hand*, 145–69.

**40** Alberts, *Overzicht*; MacLean, "Shadow Kingdom"; Milis, "Counts, Cities, and Clerics."


Map 2. Political overview of the Meuse Region in 1250 (© Jop Mijwaard, Softmap kartografie).


Map 3. Political overview of the Meuse Region in 1789 (© Jop Mijwaard, Softmap kartografie).

and Holland. Furthermore, there were several more or less independent lordships, principalities, and cities, such as Commercy (from the Germanic *marka*; march), Stavelot-Malmédy, and Aachen (see map 2).[41]

Despite numerous attempts at unification, the Meuse Region remained highly fragmented from a political point of view. In 1789, on the eve of the French Revolution, the borders of the kingdom of France already closely resembled the current situation, while the northern half of the river basin was still divided among various rulers as well as the Dutch Republic (see map 3). Ecclesiastical territories, such as the Prince–Bishopric of Liège, were a major factor of continuity because their survival did not depend on the fortunes of one family. French expansion from 1792 onwards briefly united the entire Meuse Region, but new splits followed in 1814–1815 (with the division of the northern half of the basin between the Kingdoms of the Netherlands and Prussia) and in 1830–1839 (with the secession of Belgium and Luxembourg).

In this way, this book emphasizes the importance of a "peripheral" region that has received far less attention in historical studies of the late medieval and early modern Low Countries than neighbouring "core" regions (Flanders, and the more densely populated parts of Holland and Brabant). This is partially the result of the relative availability of source material, but the fact that the history of this region does not fit well into traditional narratives of the rise of the Burgundian/Habsburg composite state or the Dutch Republic certainly plays a role as well.

The claim that frameworks established during the Central Middle Ages lost most of their significance only in the nineteenth century can best be illustrated with two examples: gunpowder weapons and the so-called Columbian exchange. Military historians traditionally attribute great importance to the fifteenth and sixteenth centuries because of the effects of gunpowder weapons on fortifications' architecture. While such devices did become relatively more efficient during those centuries, these same scholars often neglect to emphasize that gunpowder had already spread to Europe during the thirteenth century.[42] The oldest written reference to a gunpowder weapon in the Meuse Region comes from the 1346 city accounts of Aachen: an iron gun that shot arrows.[43] It took almost three centuries (thirteenth to sixteenth centuries) before gunpowder weapons transformed the way (new) stone fortifications were constructed. Another century would pass before the need to carry gunpowder weapons caused a divergence between warships and other types of vessels. As far as battlefields are concerned, gunpowder weapons did not end the continued prevalence of melee weapons before the nineteenth century.[44]

In a similar way, overseas travellers brought all kinds of new plants to the Meuse Region from the sixteenth century onwards, but very few of them spread beyond (bot-

**41** The boundaries of the counties of Champagne and Rethel as well as other components of the kingdom of France are not illustrated because they did not constitute frontiers, as defined in this study. For the same reason the lordships of Breda and Briey have been given the same colour as respectively the duchy of Brabant and the county of Bar.

**42** Hall, *Weapons and Warfare*, 41–45; Partington, *A History*.

**43** "busa ferrea ad sagittandum tonitrum": see Laurent, *Aachener Stadtrechnungen*, 182.

**44** For a general overview see McNeill, *The Pursuit of Power*.

anic) gardens. The cultivation of tobacco, for instance, became quite common during the seventeenth century, but this plant requires a relatively intensive garden-like cultivation. The same applies to the potato, which was only widely adopted at the end of the eighteenth and the beginning of the nineteenth century. The number of neophytes, plants that were introduced after 1500 and could survive independently of human aid, was negligible before major changes in transportation during the nineteenth century, especially if compared to the large number of archaeophytes; plants that were introduced and established themselves before the Columbian exchange (e.g., good king henry, wormwood, common snapdragon). It is often very difficult to distinguish these from actual "native" plants.[45] A comparison of animal introductions is also revealing: archaeozoological research and fiscal accounts indicate that turkeys ("Indian peafowl") lived in a handful of prestigious lordships during the sixteenth century (such as the castles of Breda, Eindhoven, and Pietersheim), but this handful of animals seem barely relevant in light of the medieval introductions of the rabbit and domesticated carp (see chap. 5).[46]

The fundamentals of army–ecosystem interactions were only transformed during the nineteenth century. Some of these changes were technological: railways (1830s), ironclad warships (1860s), the general adoption of breech loaders (1840–1870), the machine gun (1860s), the construction of detached fortifications made of concrete and steel rather than stone and wood, and barbed wire (1870–1890). It is also during the nineteenth century that the first large-scale attempts were made to channel the Meuse River itself.[47] Others were of a more social nature, such as the militarizing of armies and the adoption of personal military service (see chap. 4). Major developments in the iron industry and coalmines altered landscapes in the middle of the Meuse basin, from Charleroi to Liège. It is also at this time that agricultural practices lost their medieval roots, with the last elements of medieval practices disappearing one by one (such as the end of common land and small-scale ownership).[48]

The need for wider chronological limits is imperative given the "Military Revolution" paradigm, which became the subject of major debates in the 1990s, but still looms large within the field of military history. Research on military revolution(s) largely ignored the environmental aspects of armed forces, and emphasized the difference between medieval and early modern warfare.[49] This book studies continuity and change across a

**45** Preston, Pearman, and Hall, "Archaeophytes"; Schroeder, "Zur Klassifizierung"; Zeven et al., *De introductie*.

**46** Coenegrachts and van de Konijnenburg, "De kasteelsite van Oud-Rekem," 64–65; de Jong, "Huisdieren, jachtwild, vissen en weekdieren," 222–23; Lauwerier and Zeiler, "Wishful Thinking"; Marchal, *Inventaire*, 174; Nagels, Kerklaan, and van Kaam, *Kasteel van Breda*, 16, 52.

**47** This applies to the Meuse River as a whole. Human interventions at the most local level, notably dike building, altered the course of the Meuse significantly and repeatedly during the Middle Ages and Early Modern period (see also chaps. 1 and 2). Breuer, *Die Maas*, 95–123; Guillery, *La Meuse*; McNeill, *The Pursuit of Power*, chap. seven.

**48** Dejongh and Thoen, "Arable Productivity"; Lebrun et al., *Essai sur la révolution industrielle*; Parmentier, *Pays de Charleroi*.

**49** Rogers, ed., *The Military Revolution Debate*.

period during which several of these transformative changes supposedly took place, and in a region which Geoffrey Parker identified as part of a core zone in which his "Military Revolution" first came about.[50]

Making interactions between armies and ecological systems the subject of this argument means bringing different rates of historical time to the fore again and provide an alternative framework for understanding military change during the *longue durée*.[51] Because of the general emphasis on long-term impacts political events and individual rulers occupy a far less prominent place in this analysis than in most works concerned with military history. The book rather assesses the ecological aspects of state formation, as well as the agency of common soldiers, their families, animals, plants, and the Meuse River itself; actors that historians have often neglected or taken for granted.

Studying the reciprocal impacts of armies and ecosystems in a timeframe of six hundred years and a multilingual context creates evident challenges. The continuous strategic importance of the Meuse Region has also had the unfortunate result that warfare related damage caused a considerable loss of archival material. In 1940, for instance, most of the medieval and early modern archives kept in Mons and Mézières went up in flames.[52] Chronological and geographical differences are an integral part of the argument, and will be given due attention, but constantly referring to distinctions within the basin of the Meuse even when this is of limited relevance to the argument would have turned this study into a work the size of Braudel's magnum opus. The text instead focuses on a select number of examples, which can thus be properly contextualized. Further references are provided in the footnotes to avoid the impression that one example represents the whole Meuse Region.

The main argument, which is 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 ecological systems, will be demonstrated through five chapters: frontiers, fortifications, disturbances, policing, and army health. These themes represent the three levels encompassed within the ecosystem concept and, as argued before, constitute a more practical framework than ecosystem. The chapters follow logically as the analysis starts with the largest ecological level and follows up with lower levels. At the same time, they all refer to and need each other as a basis.

The first two chapters, frontiers and fortifications, represent the landscape level. The chapter about frontiers connects the ecological impacts of military domains, which constitute such an important part of current military forces' discourse, to much older practices of security against external threats. It examines how significant military training practices were within larger processes of frontier management, and whether medieval perceptions of frontiers continued to influence armies' actions in later centuries. The next chapter, fortifications, analyzes the current emphasis on abandoned defences

**50** Parker, *The Military Revolution*, xvi-xvii.

**51** Braudel, *La Méditerranée*, 13–14 (*préface*); Kinser, "Annaliste Paradigm"; Latham, "Warfare Transformed."

**52** Collin, *Guide*, 31, 71–72.

as safe havens for endangered plants and animals. Ruined buildings overgrown with plants might fit well a romantic idea of nature, but say little about to what extent present biodiversity levels are based on historical management practices. Discussions about former fortifications as cultural heritage or ecological sites would benefit from a more thorough understanding of the ecological value of these structures when armed forces still managed them.

The third and fourth chapters, on disturbances and policing, examine biotic communities, or fauna and flora. They embody two seemingly antagonistic influences: damage and protection, both of which figure prominently in recent debates about the "environmental footprint" of military forces. The chapter about disturbances investigates whether the most obvious or spectacular devastations, such as sieges or other large-scale interventions, were also the most meaningful in a long-term perspective. Warfare obviously involved the killing of humans, animals, and plants, but one should keep in mind that ecosystems consist of transfers of energy. Theoretically, for every species negatively affected, there could be another taking advantage. Furthermore, armed forces might have exerted lesser-known impacts that were far more destructive in the long run. The policing chapter places the current depiction of modern military forces as "nature's army" in a broader historical context. Soldiers have a vital role in the protection of endangered animals such as elephants or rhinos, but this behaviour might not be as progressive, or modern, as is often claimed. These are conflicts over control of natural resources, and the socio-economic value that they represent. Given that armies act as agents of both order and disorder, the use of armed force could very well have become a necessity because of soldiers' own actions.

The fifth chapter, on army health, focuses on the lowest level within the ecosystem concept: pathogens. Histories of military medicine traditionally construct a narrative of gradual progress, from medieval armies as epidemic hazards, over early modern attempts to impose basic hygiene, to the spread of modern medical theories in the nineteenth century. The last chapter questions this teleological paradigm by drawing attention to prophylactic health measures, or disease prevention, rather than the well-known emphasis on hospitals, surgeons, and wound treatment. It also considers historical examples of biological warfare, or deliberate attempts to spread disease, a major ethical problem that eventually started the debate on the ecological impacts of the military.

Drawing these together, the conclusion returns to the book's main argument, and emphasizes the significant role of historical armed forces in the protection and conservation of ecological systems. It also determines the main characteristics of army–ecosystem interactions in the Meuse Region from the thirteenth to the nineteenth century, and makes some final remarks about the relevance of these findings for current ecological conservation and future research.