WEAPONIZED NATURE: HOW THE ENVIRONMENT SAVED THE ALLIES
AT BASTOGNE, DECEMBER 16-23, 1944
Darrell Ray Reader, BA, JD

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APPROVED:
Geoffrey Wawro, Committee Chair
Michael Wise, Committee Member
Graham Cox, Committee Member
Harold Tanner, Chair of the Department of History
David Holdeman, Dean of the College of Liberal Arts and Social Sciences
Victor Prybutok, Dean of the Toulouse Graduate School
Many histories written by professional historians discuss the Battle of the Bulge; however, none of them incorporate the growing field of environmental history as a lens of analysis. This paper aims to address that hole in the scholarship by evaluating the impact that environmental factors exerted on the American army’s ability to fight in and around Bastogne and St. Vith, Belgium during the first week of the battle. Had it not been for the environmental factors and the Americans’ ability to make better use of the natural and manmade conditions than the Germans, the Allies would not have been able to achieve eventual victory.

In the historiography of the battle, weather conditions are usually referenced only as the setting in which the fighting occurred. This paper goes further than simply using the environment and climate as a stage set. By looking at the way environmental conditions impacted strategic, operational, and tactical issues, a new perspective is opened up. The role that these environmental factors played is emphasized and shows that they had a greater effect on the outcome than scholars have previously credited.

This paper uses first person accounts from participants, from the command level to the soldier in his foxhole, as well as unit histories, oral histories, and the vast amount of secondary sources to focus on and synthesize the effects that the environment had. Without exploiting the environmental factors that existed in the Ardennes, the American army would not have been able to hold off the German offensive.
ACKNOWLEDGEMENTS

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Figure 5 - Teams Cherry, Desobry, and O'Hara, December 19, 1944. Courtesy of Rick Britton and John McManus.
By the fall of 1944, the cataclysm of World War II that engulfed the world beginning in September of 1939 looked as if it was finally coming to an end. The Allied powers of the United States, Great Britain, and the Soviet Union appeared to be on the brink of defeating the remaining Axis powers of Germany and Japan.\footnote{The third Axis power of Italy had capitulated in 1943 and was no longer fighting. However, the German Wehrmacht continued to use the Italian peninsula as a defense against the invading Allies.} In the Pacific the Americans and their allies were slowly pushing the Empire of Japan back to its original territory with aggressive naval and Marine Corps operations. In Europe, the Soviet Union had been paying an extremely heavy price in blood but was still able to push Germany back on the Eastern Front. Since the 6 June 1944 invasion of France, the Allies had been steadily pushing German troops across Europe towards their homeland’s original western borders. At the time, the situation looked so positive that the rumor running rampant among the soldiers was one commonly heard at such times in many wars; “the war would be over by Christmas.” Optimism was so high in Washington that the War Department was cancelling military contracts and the focus of the leadership was shifting its thinking to how to defeat the Japanese.\footnote{Anthony Beevor, \textit{Ardennes 1944: The Battle of the Bulge}, (New York: Penguin, 2016), 5.} Eisenhower had bet British Field Marshall Montgomery £5 that the war would be over by Christmas
1944.³ Troops on the front lines thought that they would “just go right in [to Germany], and it wouldn’t be long before the war was over.”⁴ As usually happens with similar hopes, this one was destined for failure.

In the fall of 1944, when the Allies arrived on the doorstep of Germany, the time and effort spent securing a foothold on the continent, chasing the Germans across France, and fighting to remove them from Belgium and the Netherlands had worn out the men and equipment. As a result of exhaustion and the Allies’ stretched supply lines, Allied command took the opportunity to rest and refit their men. The British and American armies maintained a line of resistance on a roughly north-south axis that essentially ran along the German-Belgium border. The British 21st Army Group, under the command of British Field Marshall Montgomery, was responsible for the northern sector and the American 12th U.S Army Group, under the command of General Omar Bradley, the south. To the leaders in Supreme Headquarters Allied Expeditionary Force (SHAEF) this area and time looked like a good disposition of the troops and a solid opportunity to repair equipment, replace troops in depleted units, and give hard fought units a chance to rest and recover. Commanders viewed the southern portion of the line as an especially safe area. They thought it an unlikely place for a German offensive because of the heavily wooded Ardennes Forest. However, the axiom that “in war the enemy gets a vote” was soon to prove to be applicable.


⁴ Henry A. Thompson, interview with Ronald Marcello, April 18, 1973, interview (number is missing), transcript, North Texas State University Oral History Collection, North Texas University, Denton, TX., 13.
During the fall of 1944, Hitler devised a plan that he believed would turn the tide in the war and allow Germany to retake the initiative against the Allied forces. His idea was that his army would secretly mass and attack through the Ardennes, catching the Allies off-guard. In an all-out sprint and after the Germans crossed the Meuse, the attack would turn to the north and seize the vital port at Antwerp, the Allies’ primary source of resupply. The objective of the operation was not only to seize the port, but to sever the Allies’ already significantly stretched supply lines. Hitler ordered the commencement of the campaign for 16 December. He called it Wacht am Rhein (Operation: Watch on the Rhine). Americans know it as the Battle of the Bulge.

At the beginning of the Band of Brothers episode about Bastogne, the Steven Spielberg and Tom Hanks produced series about World War II, the filmmakers interviewed a number of the soldiers involved in the battle. One of them discusses the horrendous weather conditions that he experienced while fighting there. He explains that since he returned home from the war, any time that he goes to bed on a really cold night he tells his wife, “I’m glad I’m not in Bastogne.” Another veteran of the fighting said that he was never more miserable than when he was in the Ardennes. He said that even being a prisoner of war was not as bad as his time in the Bulge. In fact, the cold

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5 Ironically, for a battle that was impacted so much by environmental factors, the operational name was later changed to Herbstnebel, German for “Autumn Fog.” See Robert Merriam, Dark December: The Full Account of the Battle of the Bulge, (Chicago: Ziff-Davis Publishing, 1947), 225.

6 Mary Richards et al., Band of Brothers, Episode 6, “Bastogne,” directed by David Leland, written by Bruce C. McKenna, HBO Home Entertainment, 2001.

7 Gen. Alexander Bolling, Jr. (USAF - Ret), interview with Ronald E. Marcella and Peter B. Lane, July 15, 1998, Interview 1255, transcript, University of North Texas Oral History Collection, University of North Texas, Denton, TX., 46.
was so bad that when replacement troops arrived, the experienced soldiers took their
tent poles and then burned them for heat.8

His story presents the most common perception and understanding of the Battle of the Bulge and what the American army endured. The Bulge is known to most people as a combat story told against the backdrop of miserably cold weather and inhospitable conditions, and it was certainly all of that. However, the weather was not the only factor nor was it simply the backdrop for the drama that unfolded during that month of combat.

There are innumerable works written concerning the war by scholars and non-academics alike from equally innumerable perspectives. Authors have written voluminously about the events of World War II since the war came to an end. The initial works that were published in the years immediately following the war were memoirs of soldiers on the front lines or high-level commanders. Human nature being what it is, some of these were obviously somewhat self-serving to justify actions and decisions that they made during the war. Also, soon after the war, the differing military branches of combatant countries and units within those branches began to issue their official histories. Some, like the US Army’s “green books,” The U. S. Army in World War II, number eighty some odd volumes and discuss in detail issues such as ground combat, operations, strategic decisions, pre-war plans, medical department, and so on.

There are a number of historians who have produced excellent works that attempt to cover the actions of a military during whole of the war within one volume. Charles MacDonald’s approach falls in to this category. He was a rifle company

8 William M. Haugh, Interview with Ronald E. Marcello, January 12, 1999, Interview 1290, transcript, University of North Texas Oral History Collection, University of North Texas, Denton, TX., 48.
commander during the war and led men in action at the Hürtgen Forest and in the Battle of the Bulge. He wrote *The Mighty Endeavor* in which he studies the actions of leadership, Division and above, in the US Army in Europe.⁹ His evaluation starts before the war began and covers the causes of the war and through the entire conflict. He looks at the decisions that led to the war and the decisions made during the major campaigns of the war. This includes a chapter on the Bulge. The chapter title is “Out of the Fog, Night, and Snow” but, as is generally found, the conditions only explain the setting in which the fighting took place. MacDonald describes the weather on 16 December when the Germans launched their offensive. “It was bitter cold in the Ardennes that morning, the atmosphere thick with the wet breath of winter. Six inches of snow covered the ground.”¹⁰ His focus is strictly on the soldiers who fought and the decisions of the generals.

Geoffrey Perret’s *There’s a War to Be Won*, is another excellent example.¹¹ Perret limits his study to the American Army and provides an excellent review of the actions of commanders and officers at all levels of command throughout the war. He does not attempt to portray the war experiences of the grunt on the front line or the everyday soldier. In his evaluation he includes analysis of the Battle of the Bulge but, again, he looks at the higher echelons of the service. While he mentions some terrain features and the snow, he does not consider any of the environmental factors that came in to play during the battle.

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Donald Miller, on the other hand, takes the reverse approach and looks at the opposite end of the spectrum. His book, *The Story of World War II*, is an update of Henry Steele Commager’s work of the same title that was published in 1945. Miller’s update made use of the large volume of additional sources and records that governments have made available in the decades since Commager original wrote. Unlike Perret, Miller’s focus is down in the dirt with the soldiers and non-commissioned officers on the front lines. As Miller states, he writes from the perspective of the “American fighting man primarily, because it is the on-the-spot account of these men that were available to [him] and because [he is] an American interested in the character and conduct of my countrymen.” While he covers the Battle of the Bulge, like so many others the extent of the discussion about the environment is limited to the soldiers fighting “in swirling snow and zero degree temperatures.” He does not go any further on the possible impact that the conditions had on the battle. He quotes English writer Alan Moorehead for his conclusion regarding why the Americans won the battle is that it “was this desperate resistance by isolated Americans...this and nothing else, which saved Belgium and Holland from being overrun.” As so many others have concluded, the battle was won solely because of the fighting ability and elan of the American soldier.

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14 Miller, 343.

15 Miller, 345.
Like Miller, Gerald Linderman also focuses on the men that were down range doing the actual fighting. In *The World Within War*, he takes a broader view than Miller did and includes in his history not only army soldiers but also the experiences of Marines. Consequently, he also brings in the fighting in the Pacific. Linderman is interested in not only what the men did, but how the men were affected by their combat experiences. His history is more of a psychological and anthropologic study of the events in that he is interested in how combat experiences affected the men and society. He does reference the fighting in the Ardennes. Coincidentally, in his assessment of why the Americans won the battle Linderman references the same quote that Miller does.

Sir Basil Liddell Hart spent decades researching, interviewing, and writing about the Second World War. Shortly after his death, his book, *History of the Second World War*, was published. As his title clearly attests, he addresses the entire war, not just the ground fighting in Europe or a particular force. He looks at the Pacific theater, the Eastern and Western Fronts in Europe, North Africa, and so on. His work is incredibly thorough and focused on the actual fighting; his history is strictly a military history. He includes a chapter on the German breakthrough in the Ardennes in which he says that “mud and fuel shortages had been important brakes on the advance” and notes that the “foggy weather of the opening days had favoured [sic] the German infiltration by keeping the Allied air forces on the ground.”

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the issue and instead argues that the cause of the victory were military decisions and mistakes by German high command.20

John Keegan’s *The Second World War* also takes a global approach to the conflict.21 However, rather than follow Liddell Hart and look strictly at the military side of the war, Keegan “divides the story of the war into four topics – narrative, strategic analysis, battle piece, and ‘theme of war.’”22 He then divides the time of the war into six subparts and applies his topics to each. The result is a shorter and more manageable text for most readers, especially non-academics or simply those interested in the war. Keegan mentions the fact that Hitler counted on “night, fog, and snow” in his planning to ground Allied aircraft.23 He also says that “Generals January and February…fought on the German side” in 1945.24 He does not go in to any depth to discuss how environmental factors affected the battle beyond making the combatants uncomfortable.

Williamson Murray and Allan Millet teamed up to produce another more recent global study on the war but one not in as much detail as Weinberg. As with Weinberg, their study examines all the theaters of fighting that were involved in the war. However, in their work, *A War to Be Won*, Murray and Williamson are primarily interested in “the conduct of operations by the military organizations that waged the war… [W]hat interested us most are issues of military effectiveness.”25 They look at the decision

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23 Keegan, 440.
24 Keegan, 447.
makers and the people who led the war. In their discussion of the fighting in and around Bastogne, “[i]t was a soldier’s victory” resulting from the courageous stand of the men doing the fighting.26

Arguably the most thorough book produced on the entirety of the war is Gerhard Weinberg’s *A World at Arms*.27 As his subtitle clearly indicates, he is providing a “global” history of the war. His work encompasses the causes and events of the war in all theaters. Weinberg’s goal is to illuminate the war in all its major aspects and theaters, with particular attention to the major decisions and choices made by the participants.”28 At nearly 1200 pages it is thoroughly researched and written. However, because of his larger focus, “there has been little room for the details of combat.”29 True to his word, his discussion of the Battle of the Bulge totals roughly six pages. Nevertheless, his conclusion is in line with the other authors, “success at Elsenborn ridge and Bastogne had shown that determined and well-led American soldiers could face Germans with tanks better than their own and hold.”30 In other words, the reason for victory was solely the American soldier’s valiant efforts, with no mention of the environmental components of the battlefield and their effects.

Works focusing on specific battles contribute to the historiography as well, and the Bulge is no exception. Robert Merriam’s *Dark December* is the first attempt to place

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29 Weinberg, 3.
30 Weinberg, 769.
all of the events and fighting within a single framework of understanding.31 Prior to its publication the story of the Battle of the Bulge was understood only from an individual or a single unit’s perspective, what they did and where they were. Merriam painted the complete picture of the German attack and American response and puts to rest a number of myths surrounding the battle that had gained traction with the populace. In the end, he attributes the victory to the fighting spirit and dedication of the men at the front and the decisions of the commanders.

John Toland also took this approach with his book in which he focuses exclusively on the fighting in December and January, 1945.32 He interviewed over one thousand participants of the battle from privates in foxholes to rear echelon brass and traveled extensively, examining the battlefields and locations where the events took place. He concludes that the battle “was won by the GI, by his ineffable qualities. The things that made him a poor garrison soldier – independence, cockiness, love of luxury – made him finally a deadly fighter.”33 In the course of the book he mentions different conditions and weather but as with other texts, he does not analyze their impact.

Charles MacDonald also wrote a monograph on the Bulge. While he was involved in the battle as a soldier, A Time for Trumpets is not a memoir, but a history of the battle.34 As a commander of a rifle company in the Ardennes he has a unique perspective on the decisions and actions taken at the time by commanders at the company level and above. His post military employment as an historian makes him

31 Merriam, Dark December.
33 Toland, Battle, 379.
even more qualified to recount the battle. Yet again, the author has a different focus and is not interested in studying environmental factors. “It was cold. A damp, penetrating cold, typical for the Grand Duchy of Luxembourg in the second week of December” is typical of the references to environment. MacDonald’s is an excellent study of the battle, though his interest is more in the missed intelligence prior to the commencement of the attack and the decisions that commanders had to make during the battle. The focus of this and other works is on issues other than the way the environment may have affected the battle.

In 2014 Peter Caddick-Adams published *Snow and Steel*, a new history of the engagement. Like MacDonald’s work, Caddick-Adams’ is very in-depth and begins with the planning of the operation and carries through to the end of the war. He determines that Hitler’s attempt to turn the tide of the war was destined to fail and that, in the end, it shortened the war. Unlike, the works above, Caddick-Adams does address the weather in the Ardennes during the Bulge. He states that the rain and mud along with the snow affected the fighting. However, most of his references to the weather concern the temperatures at differing locations and during differing times on the battlefield. Once again, there is no examination of the role that the conditions played.

The environment, the terrain, and the manmade conditions were much more critical and served a more important role than most historians have previously allowed. When books or movies discuss or reference the Bulge, the weather that the men fought

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in at the time is one of the first things that they bring up. The winter of 1944/1945 was unusually harsh and cold. However, these sorts of comments about the weather, how cold and snowy it was at the time, are about as far as the discussion regarding environmental factors goes. In none of the studies or scholarship on the Battle of the Bulge does the environment take a prominent place in the outcome. This study looks to rectify that by bringing the environment to the forefront of a study of the fight. The environment was a vitally important factor and a central reason for the Allies’ success against the German operation.

The intersection of warfare and the environment are not new in the course or study of history. Thousands of years ago in The Art of War Sun Tzu drew many analogies to different aspects of the environment such as advising that an army should flow like water or when he advised military leaders that they should take the high ground. The Jewish rebels fighting imperial Rome in Judea understood this principle when they withdrew to the clifftop sanctuary of Masada in 73 A.D. Napoleon said, “Ah my God! Perhaps the rain of 17 June had more influence than is thought in the loss at Waterloo.” Even he tacitly realized the importance of environmental factors, albeit in hindsight, when he was discussing his final defeat years after the fact.

Rather than look at the environmental impacts of war, this thesis looks at the environmental impact on war. Admittedly, it is a subtle difference of only a single letter but the change from “of” to “on” makes a huge difference in meaning. Assume that a maritime shipper purchases an insurance policy for freight that he is transporting; it would make all the difference if he insured against “hazards of the sea” versus “hazards
on the sea.” If he attempts to transit his vessel through the Gulf of Aden and pirates take it then the first policy would not protect against the loss while the second one would. Piracy is clearly a risk that vessels encounter when shipping goods “on the sea.” The first policy might cover risks such as storms, unseen sandbars or rocks for instance, but not a loss associated with thieves and terrorists. The difference is only a change from an “f” to an “n” but as a result the meaning is drastically different. Similarly, there is a drastic difference between fighting “on” water and fighting “in” water. The change is admittedly minuscule, strictly one vowel, but again it wholly changes the meaning, as is studying the environmental impacts on war versus the environmental impacts of war.

In approximately the last thirty years, the field of environmental history has developed and become a growing field of historical scholarship. Within the last couple of decades, especially following the environmental disasters at the end of the Gulf War in 1991, studies of environmental history and its significance in warfare began to appear. Over this time, more scholars have written articles on the environmental issues related to World War II. However, there are relatively few specific environmental histories of World War II, especially in light of the impact that World War II had on the twentieth century and the volume of research that scholars have done on the war. Some writers have taken a very narrow, geographic perspective, while other scholars have a similarly narrow focus but on a given topic of study. There are not many comprehensive studies of World War II as a whole, especially including a focus on the environment. Regardless, in all of these publications, they only mention military history in passing. The topic is prime for such an analysis.
Originally, studies of war and the environment, even of World War II, generally presented the issues tangentially in other works. Gerald Nash, a history professor at the University of New Mexico, has written two monographs on the effects the war had on the American Southwest and Southern California. He discusses the growth of heavy industry for building war equipment in the region, such as tanks and planes. The industrial growth led to consequential changes like increased population, infrastructure building, and energy production. However, while situated in World War II, his works are more interested in the economic and cultural transformations that occurred during this time rather than the war itself.

Nevertheless, in almost every book on warfare, including World War II, the environment and its impact on events makes an appearance. In *D-Day*, Steven Ambrose’s famous work on Operation: OVERLORD, the Allied invasion of Europe in June 1944, Ambrose devotes an entire chapter to the meeting of the commander, Gen. Eisenhower, and his subordinate commanders where they discuss and eventually make the decision to proceed with the scheduled invasion. At first blush this would seem to be simply a military decision. Though it was not his primary intent, Ambrose shows throughout the chapter that climatic conditions and the northwestern European weather pattern were the decisive issues that drove the decision to proceed.

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Planners of the invasion of Normandy, France originally planned for 5 June 1944. The troops and supplies were already on their assigned ships for the cross-Channel trip while other ships had already left their harbors. The Meteorologic Committee met and informed the generals of SHAEF that the weather had deteriorated to a point where it would significantly and adversely affect the operation. Eisenhower therefore made the decision to postpone for one day. The next day, the weather report was not much better, but it did include a small chance that things would improve and the invasion would be possible. As a result, Ike gave the order and the operation went forward.

Eisenhower’s decision was based more on environmental rather than combat or military factors. If the Allies had not proceeded on 6 June, the Army would have had to disembark the troops, re-fuel, and re-provision the boats with food. The next viable opportunity for a landing was dependent on the proper environmental conditions. The Allies needed a low tide and a full moon for visibility but the lunar cycle and tides would not coincide until later in the summer, not until August. A delay of that length would have allowed the Germans additional time to build up their forces and defenses. In that event an Allied landing would have been a much riskier endeavor.

At the same time that Eisenhower was making his decision, the German commander for Normandy’s defenses, Gen. Erwin Rommel, was evaluating the conditions as well. Like Eisenhower, he determined that the weather was bad enough that it prevented the Allies from invading. As a result of the weather, Rommel decided that he could take leave to see his wife for her birthday. The environment, namely the weather and geography, were central to the decisions of where to invade and whether to proceed with the invasion.
At the Battle of the Bulge, in December 1944, the unusually snowy weather, in addition to the forested terrain, had another equally important effect on the fight. Men that fought in the Ardennes in that engagement uniformly all mention the environmental conditions that they endured and the role that those conditions played. Nevertheless, none of the books or memoirs are environmental histories; they only reference environmental factors in passing.

Other scholarly works and memoirs of World War II are replete with unexamined examples of the critical impact that the environment had on operations. Those who fought in the Pacific Theater often mention the stifling heat and humidity or the fear they experienced by the lack of visibility in the dense jungle. There was also the difficult fighting on the Italian peninsula. The Allies were fighting their way to Rome in the winter and spring of 1944 when they reached the mouth of the Liri Valley. The main highway leading to Rome lay on the valley floor and was the best route to the city, the strategic objective. The troops nearby at the Anzio beachhead had what looked to be a direct line to Rome but it was through mosquito infested marshes and not feasible. Monte Cassino and the surrounding hills controlled the entrance to the valley, and the highway that it contained. Monte Cassino “dominated, both physically and psychologically, the approaches to the Liri valley.”41 The Germans had anchored this section of their Gustave defensive line on Monte Cassino. In order to gain the use of the highway, the Allies needed to remove the Germans from the hills of Monte Cassino and its vicinity.

Because of the terrain features in the Liri Valley and near the Anzio beachhead, the fighting became protracted and bloody for the Allies.

Works that directly study war and the environment, including recently published ones, are also narrowly focused, generally geographically or topically, or are compilations from many authors. The first works that came out on the topic of the environment and history of warfare concerned the effects on urban environments from combat, bombing and warfare, in general. Often, authors in other seemingly unrelated fields such as geography, archeology, architecture, or general military studies wrote them and not historians.

Recent scholarship over the last few decades has increasingly focused on war and environment. Much of this work, however, focuses on how warfare impacts the environment. Articles examine the many diverse ways that conflict affects the environment, whether it is the “natural environment” or the “built environment” of urban areas and manmade structures. However, few works by professional historians examine the ways that environmental factors interplay with the conduct of war. Most authors seemingly underemphasize or overlook such factors.

In the current state of the scholarship, authors look at war broadly, using many different conflicts. Jurgen Brauer’s War and Nature is a broad evaluation of many issues.42 Brauer looks at war in the general sense and the Vietnam War and Persian Gulf War, specifically. He covers diverse issues such as nuclear weapons and waste, civil wars and borderlands issues, as well as war and nature in the globalized world. He

also includes studies on archeology, architecture, and warfare that touch on environmental issues. John Schofield, in *Aftermath*, studies archeological issues related to war and conflict.\(^{43}\) In the process of doing so, in Chapter 11, Schofield discusses the local effects on the environment in England as the Allies prepared for the invasion of Europe.\(^{44}\)

More recent scholarship focuses on changes to the urban environment caused by warfare. Jens Lachmund ties her study, “Exploring the City of Rubble,” to World War II.\(^{45}\) Her work is more of a history of science and the development of botanical knowledge but also involves historical environmental issues. She studies the changes to the urban environment due to the aerial bombing during the war and the rubble that the bombs left behind. The rubble and places of destruction often remained intact after the war and developed their own unique flora and fauna in the following years. Lachmund looks at how scientists and regular citizens fought to preserve these unique areas that they viewed as natural laboratories for research and areas for relaxation.

In their article “It’s War and Everyone Can Do as They Please,” Rauno Lahtinen and Timo Vuorisalo look narrowly at environmental consequences of World Wars I and II on the small Finnish town of Turku.\(^{46}\) They note the rise in “urban agriculture” in which city dwellers produced their own food, the effect of the scarcity of raw materials, 


\(^{44}\) Schofield, 151-157.


and the impact on the local environment from wartime production practices.\textsuperscript{47} The journal article, “Shadows of Dresden” by Karen J. Weitze, is a study of the built environment of the urban area.\textsuperscript{48} Hers is primarily an architectural study of bombing targets and their destruction from air raids in Europe and Japan. However, she crosses over into an environmental study and, like Hewitt and Lachmund, discusses the destruction of the city area. When discussing the development of efficient weapons and the best way to put those weapons on target, she also writes about the changes to rural areas in England and the United States as scientists and military engineers built enormous scale model targets for destruction by test bombs.\textsuperscript{49} In a similar vein, Judith Bennett’s work focuses on the environmental changes brought about by the war to the areas in the Pacific Theater where fighting occurred.\textsuperscript{50}

A second and much more obvious area that many scholars have written about concerns the environmental effects of warfare. Many people, including professional scholars, have written during the past century concerning the use of chemical and biological weapons in World War I. The Cold War also led many individuals to be concerned with the propriety, use, safety, and development of nuclear, chemical, and biological weapons. Advocacy groups wrote some studies while governmental organizations produced others. A great deal of them concern the Cold War issue of nuclear proliferation and testing.

\begin{flushright}\textsuperscript{47} Lahtinen, p 680.
\textsuperscript{48} Karen J. Weitze, “In the Shadows of Dresden Modernism and the War Landscape,” \textit{Journal of the Society of Architectural Historians} 72, no. 3 (September 2013): 322-357.
\textsuperscript{49} Some of these targets covered acres of terrain. Scientists built models of German and Japanese factories and residential areas. Weitze includes many photos of these targets. Weitze, \textit{passim}.
\textsuperscript{50} Judith A. Bennett, \textit{Natives and Exotics: World War II and the Environment in the Southern Pacific}, (Honolulu, HI: University of Hawai‘i Press): 2009.\end{flushright}
The Second World War has also received its fair share of attention in this area. Even limiting searches to “Hiroshima” produces an unwieldy number of sources.⁵¹ Many of the works on weapons of mass destruction are of a general nature and use the multitudinous examples of warfare and violent state action that occurred throughout the twentieth century as a lens through which to study the issue. While they may have some useful information that readers may glean from them, such as with architectural or geographic scholarship, none are environmental histories or military histories in a true sense.

In 1995, Ferenc M. Szasz’s work more closely tied environmental issues to warfare. He published a narrowly focused study concerning the development, testing, and production of weapons of mass destruction. In “The Impact of World War II on the Land,” Szasz provides a legitimate environmental history stemming from the war; his work is not from another field of study that has crossover interest.⁵² He looks at two locations, Trinity Site, New Mexico in the United States and Gruinard Island, Scotland in the United Kingdom. In both locations developed or manufactured chemical, biological, or radioactive weapons. Scientists developed the atomic bomb and tested it at Trinity while they used Gruinard Island for testing militarized anthrax. His article notes the permanent changes to the areas involved and the impact that the waste and residue has caused to the local residents and ecology of these two areas.

⁵¹ An Amazon.com search in the fall of 2017 for “Hiroshima” produced almost 3,700 separate books.

Andrew Jenks links his article, “Model City, USA” to World War II. He shows that military during the war transformed William Love’s dreamed of turn-of-the-century “ideal” city into a weapons production center. He notes how Hooker Chemical used some of the land for a chemical waste dump while the United States government took over other portions of the land to manufacture TNT and later as an area for the dumping of radiological waste. Later in the twentieth century the area became the Love Canal Superfund site, the poster child for environmental harm caused by reckless government and wartime policies. However, as in so many of the published works that already examined, Jenks’s article is not an environmental or military history, per se. It discusses the issue of environmental harm resulting from the war, but a significant aspect of his focus is on the governmental policies, diplomacy, and local politics that overcame issues of safety and concern for the local ecology.

Other works regarding war and the environment discuss certain raw materials and resources and how wartime affected their use. Sarah Witter Connor takes this approach in her study of the use of Wisconsin’s lumber for the war effort during World War II. Connor shows how builders used these trees in the manufacturing of the de Havilland “Mosquito” fighter for use by the Allied air forces. She has an extremely narrow focus and strictly limits her study to a single commodity in a limited geographic area.


54 Jenks, 553.

Nevertheless, there are other ways that reflect the importance of resources. World War II was unique at the time because of the number of amphibious operations that required due to the locations where the military had to fight. Prior wars had been mainly land-based and as a result they relied on different means of sending troops to the battlefield. Naval and marine troops had attempted some amphibious beach landings in World War I, with catastrophic results, but not nearly to the extent that the war roughly twenty years later demanded. However, in World War II the geography required the development of a much more reliable boat, able to transport troops from ship to shore quickly in a combat ready condition. This was true in the Pacific Theater and the European Theater since the Axis powers had secured the ports and harbors where Allies could more easily put troops ashore. While D-Day was the biggest amphibious landing in history, the entire Pacific island campaign required a new landing boat design as well.

A boat builder and inventor in New Orleans, Andrew Higgins, designed a number of boats that could reliably place men, equipment, and machines of all sizes on a beachhead for an invasion. His Landing Craft Vehicle Personnel (LCVP) is the iconic craft seen in war footage where the front ramp drops and men run onto the beach. Like the builder of the Mosquito fighter in Wisconsin, Higgins used plywood for his boats. Doing so made the boats lighter, cheaper, and saved steel. Peter Neushul wrote an article about Higgins and the development and building of his landing craft. Like many

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56 The British and Anzac landing at Gallipoli is probably the best example.
57 Here, again, it is clear that environmental issues are instrumental in how the Army must fight the war.
other histories that touch on the subject, it is not necessarily a military or environmental history, specifically, but clearly shows the close relationship between the two.

Tracing the local and regional effects of the use and manufacture of the plywood for Higgins’ boats and/or the changes to the local rural and urban environment due to the increased population or a new factory are certainly areas where military history and environmental issues intersect with one another. Such a model for scholarship would be applicable in any number of wartime locales and industries. However, it is still a more enviro-centric perspective rather than a military one.

In “Aluminum, Commodity Chains, and the Environmental History of the Second World War,” Matthew Evenden traces the production of aluminum during the War.\textsuperscript{59} He takes a broader view of the environmental impact of the war by looking at the acquisition of the raw materials, their transport to production sites, and their conversion into aluminum to provide a larger geographic view. His approach is a unique and significant change in the approach to warfare and the environment in that he did not limit his focus to one geographic locale as most of the preceding publications had done. Regardless, Evenden limits his study to the narrow issue of one item during the war.

Recently, Richard Tucker and Edmund Russell have tried to take an even broader look at the effect that war has on the world and its environment. In their book \textit{Natural Enemy, Natural Ally}, they look at the environmental history of war beyond simply what occurred on the battlefield or weapon development and use.\textsuperscript{60} They


noticed that environmental history and military history often intersected with one another. Their goal was to begin to synthesize some of the work that scholars had done and draw together the issues involved in the research of environmental history and military history that the two disparate groups had created.

Tucker and Russell compiled several essays from various scholars. Contributions discuss such broad timelines and divergent episodes as warfare in Central India from the sixteenth to the nineteenth century, the American Civil War, and pre and postcolonial war in Africa. The environmental issues that relate to these events are equally diverse. Authors discuss how the two world wars, the environmental history of wartime Japan, and insects and disease in the Pacific Theater of World War II affected timber cutting. While these are interesting and helpful additions to the field, the studies still narrowly focus on topical and/or geographical issues.

In the last year, Simo Laakkonen, Richard P. Tucker and Timo Vuorisalo attempted to compile and publish a more global approach to the environmental issues of World War II. Their work, The Long Shadows is a collection of essays from a wide range of scholars who evaluate the myriad environmental aspects of World War II. In addition to an introductory section, the editors include a section on the social and environmental impacts of the war and a section on resource needs. While their work has a wider scope than others have, nevertheless, the individual contributions are still geographically and thematically narrow. As in most environmental studies of war,

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62 Examples of chapter topics include: "Flood and Famine in China"; "Hawaii Before and After Pearl Harbor", "Food Disruption and Agricultural Policy in Tanganyika"; and "Opening the Circumpolar World".
including those concerning World War II, the chapters primarily focus on how war (viz. human actions) affected and changed the environment and transformed nature. But they overlook the other view, the effect that the environment has on warfare.

There are some works that integrate environmental issues into an actual military history of war. In 2018 Martin Clemis published *The Control War*. He looked at the Vietnam War from an environmental perspective and argued that the war was actually a fight for control of the countryside and the resources it contained. In 2018, David Petriello published *Tide of War*. In his work, he studies how weather specifically has impacted warfare throughout history. He looks at events such as comets, rain, fog, snow and hail and points to events in history where these factors have played a role in warfare. His approach is very general and broad; he does not provide much in the way of analysis. For example, he mentions the fact that the rain at Agincourt helped Henry V but, again, does not really discuss how or provide any real analysis. Petriello only devotes a single paragraph to the event. Similarly, he refers to the fog at the Battle of the Bulge but it, too, is a single paragraph in which he says that the fog had an impact.

Military historians rarely acknowledge it, but one can make a strong case that the natural environment is the single most significant factor in any instance of combat and warfare at any time in history. This was never more so than in the Second World War. First nature, or the natural environment, generally has a greater impact than second nature, or man’s built environment of industry, urbanized areas, or production facilities.

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In order to fight any war, an army needs supplies and provisions. Napoleon famously said that an army marches on its stomach. This was his paean to his logisticians’ abilities to maintain his force in the field, specifically by feeding them, regardless of the length of the supply lines or distance from ports and supply caches. The same was true in the early 1940s but it was no longer just food that was a priority. In the age of industrialized and mechanized warfare that the twentieth century ushered in, other materials became equally important to a nation’s ability to fight.

Petroleum was a central resource that planners had to account for prior to engaging the enemy. The same planning was necessary for the minerals needed for the manufacturing of aluminum, steel, and other critical materials necessary to prosecuting a modern war. Few countries are autarkic or resource rich enough in these areas to proceed independently. To secure the requisite resources, most nations must seek to acquire them either from their allies or militarily conquer other locales where they naturally occur. As a result of such requirements, basic necessity dictates to combatants on both sides of a conflict where they will fight the war. In other words, the natural world often dictates the strategic decisions that countries must make in order to prosecute a war or successfully defend against an aggressor. In one unique example, Lizzie Collingham, in her book *The Taste of War*, points out that one of the causes of World War II was Germany and Japan’s need for additional areas to grow sufficient amounts of food for their burgeoning populations.

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66 This quotation is also in the works of Thomas Carlyle who attributed it to Frederick the Great.

In World War II, these decisions presented themselves vis-à-vis the fighting in the Middle East, Romania, and the North of Africa, to name only a couple. Germany is not self-sufficient in oil reserves or production and the same was true during the time of World War II. Therefore, to make up for the deficit in resources, Hitler sought to gain control of Romania’s oil fields and the vast oil reserves in the Middle East.\footnote{For a thorough discussion on the strategic importance of the oil reserves in the Middle East, particularly Saudi Arabia, see Geoffrey Wawro, \textit{Quicksand: American’s Pursuit of Power in the Middle East}, (New York: Penguin Books, 2010), 49-85.} While these countries and regions were not original participants in the conflict nor did they have substantial ties to the issues at the base of the war, the primary combatants brought them in to the middle of the conflict because of the natural resources that the environment of their particular country contained and that another belligerent needed. Additionally, the Allies were well aware of Germany’s deficiency concerning their ability to fuel their war effort and knew that the most logical location for Hitler to attempt to fill that void would be in those areas.

Environmental factors often significantly influence, if not outright dictate, strategic decisions. Such issues arose throughout the war when commanders and policymakers had to decide on the best location to land forces in Europe, the best means of re-taking the Philippines (via MacArthur’s “Island Hopping” campaign in the Southwestern Pacific), or how to place forces on the ground in Italy. The availability of sufficient beaches, the presence of mountains or other natural obstacles, locations to place airfields to base subsequent aircraft, and the ability to resupply are all directly affected by the terrain and natural world. For example, one of the factors in the Allies decision to land troops in Normandy was the geographic and environmental conditions. The
reasonable and anticipated landing area was Pas-de-Calais, the nearest location to England. However, the beaches were heavily defended and protected by the Germans. The Allies needed an alternative landing spot that met certain environmental conditions. The beaches still needed to be in close geographic proximity to England so that troops could easily reach them with a reasonably short boat ride and also needed to be wide with good tides and sand that could accommodate the weight of tanks or other heavy vehicles. Finally, they needed to be close to Germany and not so completely defended by the Germans to make them virtually impenetrable to invasion, such as the beaches in Pas-de-Calais. Sufficient beaches might have existed in the Loire or in Brittany, but these would have required troops to ride in the boats for a lengthy period, were not close to Germany, and would have required the Allies to fight across the whole of France.

Nature and the environment also equally affect Tactical issues. One can draw countless examples from any of the operational theaters around the world at the time. The fighting men of the different military branches had to modify their way of fighting depending on whether they were engaged in combat in the jungles of the South Pacific, the deserts of North Africa, or the Apennines in Italy. The soldiers had to decide which weapons system and rounds were most effective in a given setting and how best to employ them. For example, a flame thrower might have worked well in the jungle or multiple cave complexes and bunkers that were in use but would not be as useful in the desert. Conversely, in the desert the tank proved to be an ideal weapon for the wide-
open space and the sandy environment but would not have worked as well in the jungle.  

Soldiers on both sides of the fight and in all terrain and climates undertook similar adaptations to conditions throughout the war by. Bastogne not only evinces how the environment, either first or second nature, affects warfare, but also the neutrality of nature in war. While the term is well worn in academia it is still applicable to this issue; the environment has agency. This is definitely true in the case of war, but that does not mean that nature chooses a side. During the Battle of the Bulge in the middle of December 1944, the Germans and the Americans both sought to use nature to their benefit, in this case either as a weapon or a shield. Combatants have always taken advantage of the specific, unique features that exist where they are fighting. Commanders, as well, take environmental, geographic, and climatic conditions into account when making strategic decisions. By doing so they utilize nature’s agency in warfare.

Nevertheless, military historians often overlook the issue of nature’s role in warfare. Environmental history scholars generally limit their focus to the impact that war has or had on nature while military scholars only reference environmental factors as stage setting. Military writers have not sufficiently covered the idea that nature has an important voice in the conduct of war and that it is an important area to investigate.

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69 Bulge veteran Travis Womack makes this point in regards to the Ardennes. He said in that region, because of the thick forests, tanks were not a good option because they needed room to shoot, had limited visibility, and could not move well. He said that tanks “were just great in the desert.” Travis Womack, Jr., interview with William J. Alexander, May 10, 2002, interview 1474, transcript, University of North Texas Oral History Collection, University of North Texas, Denton, TX., 121.

While some scholars have tried to meld military history with environmental, they
generally have not put much emphasis on the military side of the equation. Military and
environmental scholars could both benefit from a more military-centric view that
emphasizes strategic, operational, and tactical understandings of the intersection of war
and the environment.

Robert E. Merriam, in his history of the Battle of the Bulge, represents a good
example of military historians acknowledging environmental factors but not engaging
them in any depth. Merriam was the military historian that was assigned to the Ninth
Army and spent a significant amount of his time with the 7th Armored Div. He was with
the division when the Germans launched their assault and Ninth Army headquarters
during the battle. As part of his duties, Merriam had free range to interview anyone he
chose during the events, attend any meetings or briefings he could, and after the war
even interviewed the Germans commanders. In *Dark December* he recounts the
reasons the Germans generally attributed for their defeat in the Ardennes. They
blamed: 1) shortage of men and materials as a result of the long war; 2) lack of qualified
leaders; 3) improper use of the Sixth Panzer Army; 4) Allied air power; 5) bad roads; 6)
bad weather; 7) Allied reaction to the attack; and 8) isolated defenses at unexpected
points.71 Points five, six, and eight all deal with environmental factors and will be
addressed further in this thesis. However, even though Merriam makes mention of
them, there is no analysis of the issues. He is even careful to point out that “Operation
Hindsight” (as he labels it) is more of an exercise on behalf of German commanders to
explain what happened so that they can claim they were not defeated by the

71 Merriam, 215.
Americans. “Hitler’s Ardennes offensive should be remembered as a notable example of the courage and resourcefulness of American soldiers.” American historians are more prone to argue that victory was the result of brave actions of the American fighting men.

By focusing on the environmental effects on the Battle of the Bulge, a more complete and thorough picture of the events that occurred in the Ardennes during December of 1944 comes in to focus and consequently presents a better understanding. Focusing on such factors makes it clear that the American army, at all levels, made better use of the environmental factors than did their enemies. Without the presence of these environmental benefits and correctly putting them to use in the face of such a large-scale offensive while woefully unprepared at the same time the Americans would not have been able to hold off the Germans.

At the Battle of the Bulge the unusually snowy weather in addition to the forested terrain had another equally important effect on the soldiers involved in the fight. Men that fought in the Ardennes in that engagement uniformly all mention the environmental conditions that they endured and the role that those conditions played. “There was snow, ice, and cold weather. It was brutally cold” is a typical quote from a veteran that fought in the battle. Nevertheless, none of the books or memoirs are environmental

72 Merriam, 217.


74 John D. Sefcik, Interview with Peter B. Lane, July 1, 1999, Interview 1407, transcript, University of North Texas Oral History Collection, University of North Texas, Denton, TX., 85.
histories and the issue goes no further; the only references are to environmental factors in passing.

This thesis seeks to fill this gap in the scholarship. It synthesizes information found in numerous memoirs, articles, oral histories of combatants, and official histories in the Ardennes at all levels of rank. When these men tell their stories, they make many references to environmental factors, but those factors are never the focus. By pulling these references out and putting them front and center, it is possible develop a clearer understanding of the way the environmental factors worked in the Battle of the Bulge.

The objective is to highlight the role of the environment and its myriad effects on the American forces engaged in the battle, primarily in the Bastogne and St. Vith areas.75 The second chapter looks at the strategic implications and the ways in which environmental factors impacted command decisions strategically. Chapter three evaluates the ways the environment affected operational matters and decisions. Finally, chapter four looks at the environmental effects at the tactical level and its impact on the men fighting.

The Battle of the Bulge serves as a good time and place to study the ways that the environment intersects with combat. The battle is known, in part, for the weather conditions that the men fought in and for the forested region. This study limits analysis to the American army during the first week of the German Offensive, 16-23 December. During this period, the Americans were clearly on the defensive before the weather cleared and they could once again perform close air support and conduct aerial

75 The fighting in the Hürtgen Forest throughout the fall of 1944 would also be ideal for a study of this type. This thesis does not address simply due to space concerns. A larger, more detailed work would certainly include it.
resupply missions. A little over a day later, on Christmas, Patton’s Third Army arrived in Bastogne and the Americans were finally able to begin changing the momentum on the battlefield.

In the first week of Hitler’s desperate attack through the Ardennes Forest in the winter of 1944, his troops surrounded the American troops at the town of Bastogne, Belgium and nearly so at St. Vith. Bastogne and St. Vith, and their surrounding areas, were critical strategically. Additionally, because of the network of roads that intersected in both towns, they also serve as good examples of the built environment dictating action. If the Germans gained control of those towns in the first week, they would have had an easier time moving and supplying their troops and, hence, a better chance at succeeding in their plan. If the Americans held, the German attack would stall and fail.

The snowy and overcast weather also had a critical effect on the battle and almost caused the loss of Bastogne along with the American personnel engaged there. The American forces were reliant on-air support for reinforcements and resupply. The low cloud cover caused frequent inability of the Army Air Corps to attempt supply drops; consequently, the men fighting ran low on food and ammunition. Even if a slight break in the clouds appeared, it was still difficult to drop supplies accurately. As a result, the needed items often landed out of reach of the Americans or, worse yet, within that of the Germans.

The men fighting had to adapt to the conditions that existed. They had to endure and protect themselves from an unusually cold and snowy winter as well as the Germans’ guns and artillery. Many of the areas where the Americans were located were wooded places on the outside of town. The trees in these areas provided them
some protection from German small arms fire. However, the trees also created additional hazards such as when the German artillery fired air burst shells that exploded in the trees, sending pieces of trees down on the men like shrapnel. In a turn of fortune, the soldiers on the receiving end of the bombardment used the fallen limbs and debris as cover for their foxholes, creating additional protection from artillery and also from snowfall. As a result, soldiers stayed warmer and were more combat effective.

A number of scholarly works overlook the importance of the environment in the study of warfare. Many of them, whether they are journal articles or full monographs, claim the most basic reason for the American victory in the Battle of the Bulge was the fact that there were brave men doing brave things. In essence, the American soldiers would not have been successful had it not been for the small groups of men willing to fight and die, if necessary, to stop the Germans from advancing. Alex Kershaw makes this argument when he writes about the northern shoulder of the bulge while John C, McManus makes a similar point when he writes about the southern shoulder.76

Not to diminish the sacrifice and service of those men in any way, but such a conclusion oversimplifies the situation. It is undoubtedly true that there were many, many men in the Ardennes that were willing to sacrifice and do things that most people would not consider in order to try and stop the Germans from running over them and possibly turning the tide of the war. However, without the natural benefits and advantages that the region provided, the same American soldiers would not have had one iota of a chance of slowing the Germans, much less defeating them. Had the exact

same men, with the exact same equipment fought this battle in the deserts of North Africa or on the steppes and plains of Ukraine, the outcome would have undoubtedly been catastrophic. The American troops could have acted in the same brave manner and engaged in any number of courageous feats, but the German armor, superior numbers, and vast amount of equipment would have surely defeated them quickly.

Fortunately, this was not the case. The Germans did attack in a region covered with dense forests, narrow roads, many ridges, rivers and bad weather. The American soldiers put the environmental advantages to much better use and used them against the Germans. The environmental factors existing in the Ardennes allowed for the eventual failure of Wacht am Rhein in January 1945 and the eventual defeat of the Third Reich.
CHAPTER II
ENVIRONMENTAL ISSUES AND STRATEGIC CHOICES

The History of Strategy and Strategic Theory

Theories of what constitutes strategy and the best approaches to strategy date back thousands of years. Merriam-Webster defines strategy as “the science and art of military command exercised to meet the enemy in combat under advantageous conditions.” The Prussian military theorist, Carl von Clausewitz, in his seminal work, On War defined both tactics and strategy simply. He said that “tactics teaches the use of armed forces in the engagement; strategy, the use of engagements for the object of the war.” (emphasis in original). Clausewitz went on the say that “[s]trategy...confers a special significance on that outcome and thereby on the engagement: it assigns a particular aim to it.” (emphasis in original). In other words, strategy provides the objective goal that the military must achieve.

One of the central arguments in Colin Gray’s book, Explorations in Strategy is what he calls the “ubiquity of strategy.” His point was that strategy is interrelated with almost all levels of war and conflict, that a clean division and demarcation between strategy and operations or strategy and tactics is not feasible nor accurate. Instead, operational plans and decisions, as well as tactical actions and approaches, will have a strategic effect that soldiers should consider. “Troops and equipment wasted in the

77 Scholars use the term strategy in a variety of ways when discussing states’ search for security and pursuit of national interests. For the purposes of this paper, it only discusses the concept of strategy as it relates to the use of military force.
79 Clausewitz, On War, 143.
expensive pursuit of unworthy tactical or operational objectives...still have an effect upon the course and outcome of the war."81 Allan R. Millett and Williamson Murray were even more direct when discussing the centrality and importance of strategic decisions and choices. They wrote that “it is more important to make correct decisions at the political and strategic level than it is at the operations and tactical level. Mistakes in operations and tactics can be corrected, but political and strategic mistakes live forever."82

In a similar line of reasoning, Gray discusses that strategists and policymakers must understand the importance and centrality of operations and tactics in their planning. They may have a legitimate strategic and policy objective; however, if they do not understand how the operational and tactical side can achieve that goal, then the policy will fail. In this regard, Gray draws in the environmental importance of strategic planning especially in a joint force situation where multiple branches (e.g. Army and Air Force) are coordinating in a single theater or operation. As Gray wrote, a “strategist must understand what is tactically and operationally possible in all geographical environments; what success or failure in each environment contributes to the performance in the other environments; what that all means for military performance writ large.”83

Military commanders and policy makers in modern democracies must decide what the overall objective of the war is to be. In World War II, the Allies made the

81 Gray, Explorations, xiv.
83 Gray, Explorations, 8.
decision that they must prevent Germany from taking control of Europe and must return to its traditional borders. Once the they identified the objective, the military commanders can decide where and how to fight in the general sense. The military leader “will draft the plan of the war, and the aim will determine the series of actions intended to achieve it.” For Clausewitz, this was the basic essence of strategy.

In *Strategy*, Liddell Hart disagreed with what he saw as Clausewitz’s overly simplistic and narrow definition of strategy. Liddell Hart argued that it should not be military leaders but civilian, executive branch policy makers that decide issues of strategy. He also argued that Clausewitz limited his definition to include battle as the only means to achieve strategic success. The objections that he presents are of a semantic nature, along the lines of policy differences; Liddell Hart is discussing grand strategy and not simply military strategy. While valid, his contentions are more theoretical in nature and broader than the strategic military analysis with which this study is concerned. One aspect of strategy contains a political component without a doubt, but the present examination of the Battle of the Bulge is only concerned with the military side and as a result focuses there. As far as his concept that strategy concerns purely military matters, Liddell Hart defines it as “the art of distributing and applying military means to fulfill the ends of policy.” Additionally, Liddell Hart said that strategic

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84 Clausewitz, 177.
86 Grand strategy involves the policy decisions made at the political level and not simply military matters.
success depends on “a sound calculation and co-ordination of the end and the means.”88 (emphasis in original).

The aim of strategy is the dislocation of the enemy and not necessarily battle, according to Liddell Hart, and leads to the “enemy’s dissolution or an easier disruption in battle”.89 Dislocation is identifiable by four fundamental effects, all of which have a spatial, or environmental, essence to them. The first is that the enemies’ dispositions are upset and the action has dislocated the distribution and organization of his forces.90 The second is a separation of his forces. The third is identifiable by the risk of his supplies being captured. The fourth is harassment of the route or routes by which he could retreat and re-establish his base. Without identifying them explicitly, during the Battle of the Bulge the Americans pursued all these effects at one point of another.

Clausewitz, in his formulation, stated that there are five types of elements in strategy. He listed them as the following: moral, physical, mathematical, geographical, and statistical.”91 The second, third, and fourth elements he listed all contain aspects of environmental influence. The “physical” element will not be as important in a strategic analysis of the Battle of the Bulge since it deals primarily with “the size of the armed forces, their composition, armament and so forth.”92 The third and fourth will be much more central to an environmental evaluation of the fighting in Belgium in the winter of 1944. As Clausewitz wrote, “the third includes the angles of lines of operation, the

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88 Liddell Hart, Strategy, 322.
89 Liddell Hart, Strategy, 325
90 The following list and description of effects is from Liddell Hart, Strategy, 326.
91 Clausewitz, 183.
92 Clausewitz, 183. Chapter III evaluates these issues.
convergent and divergent movements” while “the fourth comprises the influence of
terrain, such as commanding positions, mountains, rivers, woods, and roads.”

J. F. C. Fuller, in *The Second World War*, cites Hans Delbrück’s discussion of
strategy that he set forth in *History of the Art of War within the Framework of Political
History (Geschichte der Kriegskunst im Rahmen der politischen Geschichte)*. Delbrück
expanded on Clausewitz’s discussion of types of conflict. He concluded that if there are
limited wars and unlimited wars then there must also be two types of strategy. He
called these the strategy of annihilation (in the case of unlimited war) and the strategy of
exhaustion (in the case of limited war). “Whereas in the first the aim is the decisive
battle, in the second battle is but one of several means, such as maneuver, economic
attack, political persuasion and propaganda, whereby the political end is attained.”
Application of the second is easily recognized in the Vietnam War through the approach
taken by the United States Army as well as in the asymmetric, counterinsurgency fights
that the United States has been in involved in during the first decades of the twenty-first
century. These definitions and distinctions, especially in the case of limited war, all
possess environmental factors and importance.

The United States Air Force uses the term strategic attack, meaning “offensive
action specifically selected to achieve national strategic objectives.” As is the case in
Delbrück’s work, strategic attack looks at the entirety of the enemy’s ability to conduct
warfare. Specifically, it “examines the full spectrum of that system: [inter alia] political,

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93 Clausewitz, 183.
military, economic, infrastructure, and information.”96 These targets, in their own way, all have specific geographic locations and environmental conditions that strategists must take into account. Are they in the middle of a large urban area that makes attack difficult due to the built environment? Political, military, and informational targets may be in a geographic position that makes attack, much less destruction, difficult. A prime example in the United States is the Cheyenne Mountain Complex outside of Colorado Springs that houses NORAD. Informational and infrastructural targets obviously present issues of the built environment.

In their approach to strategic attack the Air Force expands on Clausewitz’s concept of centers of gravity. An enemy’s center of gravity can include things like operational necessities such as electrical or petroleum; infrastructure like railroads or bridges; or fielded military forces.97 Attacking these aspects of the built environment “create significantly more change than would be achieved by affecting parts of the system that are not centers of gravity.”98 This sort of thinking reinforces Colin Gray’s assessment that attacking other parts of that system may have tactical and even operational impact but not have any meaningful strategic effect that leads to overall success or achievement of the country’s overall political or military objectives.

Alexander the Great understood the concept almost 2,500 years ago. During his Balkans campaign, when the Triballians sought refuge on an island in the middle of the Danube River, he would not engage in a direct attack on them as he generally preferred to do. He also understood the difficulties that the environmental situation presented. He

96 US Air Force, Strategic Attack, 2.
97 US Air Force, Strategic Attack, 2.
knew that before he attacked he would have to lead his forces in a successful, yet risky, amphibious assault. As a good example of Alexander’s ability to assess and understand the situation and environment, he sought to defeat the Triballians indirectly. Rather than sending his military against the enemy, he deprived the enemy of the necessary resources for resisting or conducting war. Alexander ordered his troops to destroy all of the enemy’s crops. In modern warfare such an action is tantamount to destroying the fuel capabilities or communications abilities an opponent might have.99

Fuller also addresses the environmental nature of warfare although he does not explore it in any significance. In The Second World War he discusses Germany’s strategic failure in WWII and how technology changes war noting that previously cavalry changed war from infantry fighting. 100 Armies had to be able to maintain their horses in the field. If they were unable to do so, then they were at a serious disadvantage. Similarly, in WWII, armies needed gasoline and industrial centers to maintain their capacity to wage war. Germany, and Hitler in particular, failed to fully appreciate this. In the Battle of the Bulge, their lack of fuel to run their mechanized equipment was a significant contributing factor in their defeat. A large part of the concerns that Lt. Col. Joachim Peiper, commander of the Kampfegruppe Peiper of the 1st SS Panzer Division, had were not simply achieving his military objectives, but the desperate need to secure fuel supplies for his tanks so that he could pursue those aims.

Concerning the discussion of strategies of annihilation and strategies of

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99 David J. Lonsdale, “Alexander the Great and the Art of Adaptation,” The Journal of Military History 77 (July 2013): 817-835, discusses this operation and others that Alexander engaged in and show his ability to use the environment to his best advantage.

100 Fuller, The Second World War, 35.
exhaustion, Fuller again obliquely references environmental concerns. He argues that when a vital area (as he calls it) is distant it requires a strategy of exhaustion. 101 A strategy of annihilation is used when the vital area is near. However, when it is more distant, as was the case in the Germans’ pursuit of the port of Antwerp, a strategy of annihilation leaves the attackers in a precarious situation. They will quickly outrun their supply lines and exhaust their ability to proceed, to say nothing of their men. An enemy that retreating and defends, and can maintain unit cohesion at the same time, will be able to re-group and counter attack while the exhausted, original attackers wear themselves out. The ability to dig in and defend in a coordinated manner becomes paramount.102 In the Ardennes this pattern presented itself rather straightforwardly.

Carl von Clausewitz was a firm proponent of the benefits of strategic defense. In On War he wrote that “defense is simply the more effective form of war: a means to win a victory that enables one to take the offensive after superiority has been gained.”103 During the Battle of the Bulge, the Americans applied this very same strategic approach and dug in against the advancing Germans. Once the Americans sufficiently slowed the German attack, they switched to the offensive in order to push them back. “A sudden powerful transition to the offensive – the flashing sword of vengeance – is the greatest moment for the defense.”104

101 Fuller, 36.

102 Fuller states that the failure to understand the strategical relationship between speed and space was the fundamental cause which led to German ruin.” Fuller, 36.

103 Clausewitz, 370.

104 Clausewitz, 370. The American army switched to the offensive after the arrival of Patton’s Third Army in Bastogne on 24 December.
Elsenborn Ridge and Other Terrain Features

Kampfegruppe Peiper had the new Tiger II tank, also known as the King Tiger (Königstiger). The Tiger II was almost twelve and a half feet wide and weighed seventy-five and a half tons. Although its seven inches of plate armor made it almost impervious to American firepower, its size and mass caused it problems in the Ardennes.

In the original German planning for Wacht am Rhein Lt. Col. Peiper was to take his tanks and race to the west, proceeding through Hüningen, Belgium and then passing only a couple of miles to the south of the Elsenborn Ridge on his way on to the village of Trois-Ponts. The timing of the plan said that he would be at the River Meuse within twenty-four hours. When it came down to it, Peiper focused on speed rather than security. He decided not to secure the high ground of the Elsenborn Ridge, deciding instead to race towards Stavelot, a location that German Intelligence believed held a large, American fuel depot.105

If Peiper had placed some of his men on the Elsenborn Ridge, he would have made it incredibly difficult for the Americans to control the ridge and secure such a solid defensive position. As it was, the Americans’ ability to fire from the elevated positions on the ridge slowed the German attack significantly in the northern shoulder of their offensive. By taking the dominant terrain feature in the area, that overlooked one of the primary German lines of advance, the Americans effectively eliminated three of the routes that the Sixth Panzer Army planned on utilizing. The additional side effect of denying these routes was that it forced the Sixth Panzer Army to the south (a longer

105 German intelligence failed Peiper. In reality, the fuel dumps were ten miles to the north of Stavelot. Perret, There’s a War to Be Won, 401.
route which required more time and which was not available) and clogged the roads that Manteuffel was already using for other troops in the Losheim Gap.\footnote{Roger Cirillo, “Ardennes-Alsace,” The U.S. Army Campaigns of World War II, U. S. Army Center of Military History, (US Government Printing Office, 2004), 22.}

It would be wrong to think that Hitler and his commanders did not take into consideration any of the environmental conditions in their planning. They did consider different environmental criteria and included them in their reasoning for conducting Wacht am Rhein as well as his justification for the location and timing of the attack. For one, the departure point for his troops in the Ardennes and Schnee Eifel regions was close to his overall strategic objective, the capture of the port at Antwerp. Hitler believed that his army would be able to cover the distance quickly as they had done in the early days of the war, in 1940. Because of the dense trees in some areas, the Ardennes had limited room for maneuvering large vehicles, much less large formations of men. As a result, there was no need for a large number of troops that his depleted forces could not have supplied at any rate. Hitler also counted on the thick trees to conceal the formation of his divisions in preparation for jumping off. The trees restricted visibility and observation on the ground by patrols and their dense canopies also protected against reconnaissance aircraft from spotting them from the air. In the same vein, he counted on the low cloud cover and fog that is prevalent during November and December in the area to prevent additional observation from Allied troops and aircraft. The low ceilings and fog would also prevent the Americans and British from taking advantage of their air superiority. The inclement weather would prevent them from
flying. Even if they were able to take off, spotting targets on the ground would be extremely difficult, if not impossible, through the fog and the low ceilings.

Hitler, however, counted too much on receiving the benefit of these conditions and on the fact that they would be present continuously; he miscalculated the effects of the natural and built environments. The fog that he relied on to obscure his divisions’ formations and movement from view was not consistent. As will become evident, the fog was sporadic and intermittent. It appeared and disappeared erratically, at times leaving his men exposed.

The region also traditionally receives its heaviest rains in November and December. That cloud cover was certainly helpful to Hitler’s plan and helped to negate the Allies’ significant advantage in airpower and support by air. But Hitler did not consider the effect that the rains would have on the ground, however. With the heavy rains, the ground became saturated while the soil in the area is heavily clay based. Consequently, when it is wet, it becomes a thick, sticky, and slick mess.\textsuperscript{107} It is almost impassable to vehicles (tracked or wheeled) much less to men trying to walk through it. Vehicles slide off the roads and the men’s boots and clothing become inundated with and weighted down by the mud.

Similarly, the roads themselves, through their design and routing, caused even more delays. The roads are narrow and, in many areas, wind up and down ridges and hills, often with switchbacks and steep grades. The drivers who navigated these routes

\textsuperscript{107} Mortarman Jack Ramsey encountered problems with the mud when he relieved men of the 7\textsuperscript{th} Div. The other mortar crews’ baseplate had been driven so deep into the mud and snow that it could not be removed. Ramsey and his crew decided to simply secure their mortar tube to the plate that was interned in the mud. Ramsey, Jack. Interview with William Alexander. June 11, 2001. Interview 1429, transcript, University of North Texas Oral History Collection. University of North Texas, Denton, TX, 24.
had to slow to a crawl in order to stay on the road but in doing so left them to the mercy of the enemy guns.

At first blush, Hitler’s inclusion of these factors in his strategic reasoning seems sound and rational. Further examination and analysis, though, shows that it was actually shortsighted and not fully thought through. The end result was repeated delays and traffic jams that slowed down the forward progress of an operation that was based on speed and movement.

Forests and Trees

In addition to the weather and other terrain features that exist in the Ardennes and Eifel regions of Belgium, these areas are notoriously heavily wooded in large patches as well. There are some open areas that over the centuries people have cleared for farming and agricultural use. Many of the forests are for commercial use and were so during the war. As a result, they have repeatedly harvested the trees and replanted them in thick groves that made observation and visibility difficult.\(^{108}\) The forests provided strategic advantages to the combatants, especially the German army during its stealthy buildup of forces prior to kicking off their operation. Just as Hitler had anticipated, the density of the trees helped to prevent the Allies, whether through patrols on the ground or from the air, from seeing the build-up of his divisions. Feldmarschall Walter Model, commander-in-chief of the Western Front, said that during the Battle of the Bulge the “terrain of wooded country slowed the advance of the German infantry

\(^{108}\) The forests were so thick that they would block out light. One American sergeant, crawling through the forest looking for his men, felt like someone had blindfolded him because it was so dark. See McManus, *Alamo in the Ardennes*, 51.
and made it very hard for his artillery to identify its targets.”\textsuperscript{109} The same forests also provided difficulties to the Germans as well once the operation commenced.

The terrain and geography also played important roles in the decisions made by Allied command. As the Allies made their way across France, after the break out in Normandy and quick progress across France, the generals started to change their thinking and planning regarding the best way to move into Germany once they reached the border. At the time, Field Marshall Montgomery was the overall ground commander and the commander of the northern forces. Gen. Omar Bradley was in charge of the forces that were on the southern end of the advance. A debate ensued between the British and American commanders regarding where the emphasis should be, either in the north or south as they attacked the Reich on its own territory with ground forces. Eisenhower proposed a two-pronged approach, the primary force proceeding in the north and the other, subsidiary force, in the south. The northern push would be in to the Ruhr river valley and the southern one would be towards Frankfurt.

Montgomery wanted the focus on the northern portion of the line, the portion of the battlefield containing the troops that he commanded. He argued that moving forward on a narrower front would be best. The plan that he proposed was to use his 21\textsuperscript{st} Army Group and Bradley’s 12\textsuperscript{th} Army Group to attack towards the Ruhr, a region that was very environmentally important to Germany. Located in the western German state of North Rhine-Westphalia, the Ruhr region was a critical industrial center for the German war machine. Due to the prominent rivers in the area (the Rhine, the Ruhr, the Lippe, and the Emscher along with their tributaries) transport of manufacturers was

\textsuperscript{109} Beevor, \textit{Ardennes 1944}, 121.
significantly easier. The Germans had to rely more on the rivers for transportation rather than the road and rail infrastructure because of the damage done by aerial bombing and targeting. Montgomery argued that securing this region and the transportation arteries would greatly weaken the Germans, possibly even lead to their surrender.

Montgomery also planned to use the geography in his area of responsibility to his benefit. As his armies attacked the Ruhr valley, he would anchor the southern flank of his forces on the Ardennes area. His thinking was that the dense woods and forests of the regions precluded his ability to attack through them. At the same time, he thought, the forests would also prevent the Germans from attacking his flank. Attacking in this region would also put the Allies on a straight, and shorter path, to Berlin. His centered and hinged his plan, in the most basic analysis, on the environmental and geographic features available to him.

Generals Bradley and Patton had a different proposal altogether from either Eisenhower or Montgomery. This plan, which Patton in his confident way called “the sure thing,” was also based on the geography and terrain; however, this time the focus was in the southern area of operations, where Patton’s Third Army was located. Patton wanted to take advantage of what the “Lorraine gateway.” This “gateway” was used historically by Europeans to move between France and Germany. It is a natural pathway in the southern German state of Saarland that lies between the Vosges

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mountains and the western German mountains. As was the case with Montgomery’s plan, attacking Germany there would give the Allies control of a primary industrial area used to supply the German war machine. In the Saar, as in the Ruhr area to the north, one of the important environmental components for the Germans was the availability of the rivers for transport. The Allies could easily deny them the ability to transport men, equipment, and materiel by gaining control of the vital waterways.

The Use and Effects of Roads

The roads were another critical transportation route that both sides needed to control for strategic reasons. On 17 December when SHAEF commanders were deciding where to send their reserve troops, the 101st and 82nd Abn. Divs., Maj. Gen. Whitely, SHAEF’s G-3, and Lt. Gen. Smith, Eisenhower’s Chief of Staff, both agreed that Bastogne was the most logical location. Their reasoning was based on the radial network of roads that existed in the town.

The commander of VIII Corps, Maj. Gen. Troy Middleton, was responsible for roughly eighty-eight miles of the Ardennes front, what would be the southern part of the Allies’ line. He had positioned the 106th Infantry Division in the northern section near St. Vith, the 28th Infantry Division in the middle between Houffalize and Weiler, the 9th Armored Division around Echternacht, further to the south, and his southernmost unit was the 4th Infantry Division. Unknowingly, arrayed against him were approximately twenty divisions of the Wehrmacht.

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Middleton’s primary objective was to hold strong in his area of responsibility. Slowing the attack any way possible was the only chance that they would have for there to be enough time for necessary reinforcements to arrive in the area. His overwhelmed force would have to take advantage of every opportunity and every beneficial environmental factor, however minute, to be successful.

Upon reviewing the situation and the map, Middleton realized that the only chance that his outnumbered men would have for any success against the Germans would be by controlling the road network in the area. If the small American forces could control the key road junctions, they might have a chance at slowing (though probably not stopping) the advance.

There were two critical towns that both sides immediately recognized as being strategically important. One was in the northern section of the German advance and the other was in the south, both within the VIII Corps’ sector. Bastogne is the most well-known town that was involved in the fighting during the Battle of the Bulge because of the heroic defense of the 101st Airborne Division. During a conference of commanders and planners he said prophetically, “Bastogne must be captured. Otherwise it will be an abscess on our lines of communication.” However, St. Vith, located to the northeast of Bastogne, was equally critical strategically. Both armies needed to control the individual towns in order to be triumphant. The German Fifth Army commander, General Baron Heinrich von Leuttwitz, emphasized the importance of Bastogne, specifically.

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Located in the middle of each of the two towns was a junction of major roadways that ran through the countryside. If the Germans took both towns, then their northern and southern thrusts would be able to move quickly on the highways, maintain the requisite pace of the plan, and consequently have a much better chance to achieve their strategic objective of gaining control of Antwerp. On the other hand, if the Americans could prevent the Germans from securing these crossroads, they could greatly impede the German advance by throwing off their vital timeline. Conceivably, if the Americans held on to the crossroads, they could even prevent the German advance. Given the element of surprise, the larger numbers of troops, and heavier guns the Germans had, that was rather unlikely. Nevertheless, if the Americans were at least able to slow the advance, that would be enough for them to buy time for additional reinforcements to arrive. Much of the fighting centered around these areas and the related roadways.

It was, however, not only the roads and intersections at Bastogne that were critically important to both sides. Some of the minor towns and road networks outside of town were critical for the defense of Bastogne. Gen. Middletown quickly assessed and understood the situation; if his units were going to maintain control of Bastogne then they needed first to have control of the smaller road junctions outside of the town. Therefore, Middleton split up Combat Command B (CCB) and sent the subparts to defend three crucial nodes that allowed for control of the access points to Bastogne from the north, east, and south. Securing and holding these intersections provided points where the Americans could slow down the German’s advance on Bastogne.
Later historians, such as S. L. A. Marshall, credited Middleton’s decision as the reason that the army saved Bastogne.\textsuperscript{114}

In the Ardennes, “this constricted road network also converted each tiny hamlet and village into a rallying point for the American defenders.”\textsuperscript{115} Intuitively, it seems that these smaller road junctions would not be worth expending the energy and resources necessary to defend them given that the Americans were so greatly outnumbered and outgunned. In the end, the use of the manpower and equipment proved worthwhile.

\begin{figure}[h]
    \centering
    \includegraphics[width=\textwidth]{map.png}
    \caption{Map showing location and route between Bastogne and St Vith. https://www.google.com/}
\end{figure}

The 2\textsuperscript{nd} Panzer Division planned on making use of what they thought were the undefended towns and roads. The Division left the main Bastogne highway at

\textsuperscript{114} McManus, 154; citing S. L. A. Marshall, \textit{Bastogne: The Story of the First Eight Days In Which the 101\textsuperscript{st} Airborne Division Was Closed Within the Ring of German Forces}, (Washington, DC: Infantry Journal Press, 1946), 12-18.

Chifontaine and proceeded to Noville and Bourcy, two villages located on the main road eight miles north of Bastogne. The Division commander, Maj. Gen. Meinrad von Lauchert, was hoping to avoid a large engagement in the urban area of Bastogne which he knew would likely cost him men, equipment, and most importantly, time. Rather than take that risk, he hoped that he could take a shortcut to Noville and capture it. Possession of the town would give him the option of turning north to the Meuse or, if necessary, turning south and fighting in Bastogne.116 Just as the American military commanders recognized the strategic importance of controlling the road networks and junctions, so did General von Lauchert.

Sometimes the choice of which road to take and the actual method of construction of the road became a critical factor. At Niederwampach, Luxembourg the commander of the Panzer Lehr Division, Lt. Gen. Fritz Bayerlein, had a choice of taking a paved highway to Bastogne or taking a dirt farm road that was smaller than the highway yet provided a more direct approach to Bastogne. After consulting with the locals (they told him that the road was in fine condition) he decided to take the more direct dirt route.117 However, he failed to consider the recent weather and road conditions, especially concerning the seasonally heavy rains. The dirt farm road was muddy and heavily rutted as a result of the amount of rain that fell earlier that month. His tanks and trucks obviously did nothing to improve the condition of the road. Some of them became stuck in the sludge. The soldiers could not free them and so they simply abandoned some of the tanks. Other tanks took time but the Germans were able

116 McManus, 161.
117 Rapport Rendezvous with Destiny, 572.
to exhume them from the muck and mire. The result was the loss of men and equipment immediately available for the fight and, more importantly, the crucial element of time. The decision to use the poorly constructed roads and unpaved roads in the area cost the Germans severely in their push for the Meuse and Antwerp.

Approximately thirty-two miles to the north-northeast is Lanzerath. It is roughly five miles directly northeast outside of St. Vith, Belgium. As so many of the towns in the region, it is only a small village. Even today it is little more than a smattering of houses and buildings. Yet, in the early hours of the German advance, it was a strategically critical node due to the road ran that through it. The main road bisects the town on a north-south axis. To the north the road led to the rest area for the 99th Infantry Division in Honsfield. Additionally, the entire area was thinly manned by the Americans and ideal for tank operations. If the Germans gained control of the town and the roads, then they would be able to pass easily through the American defenders in the area.

A single Intelligence and Reconnaissance platoon from the 394th Infantry Regiment of the 99th Inf Div. had the task of defending Lanzerath from the approaching Germans.118 Members of the platoon occupied foxholes that were big enough for two men at a time and looked down on the road and the town from the side of a small hill. They initially had the support of four three-inch guns manned by a platoon from the 820th Tank Destroyer Battalion.119 The I&R platoon was to hold their position at all costs because of the critical importance of the road through Lanzerath. The orders for

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118 See Kershaw, *The Longest Winter* which tells the entire story of the platoon’s actions.

the lieutenant in charge said he and his men were “the eyes and ears of the regiment, the division, and the corps.”\textsuperscript{120} Although the platoon could not stop the Germans from advancing and eventually passing through the village, they were able to slow them enough to be effective. This one seemingly insignificant town and its roads was important enough to controlling the area that it was worth risking the loss of all of the men sent to defend it.

Bridges

Rivers present a unique situation on the battlefield and are often a natural barrier or defense against invasion since they frequently form the natural borders of a state. For centuries, large rivers such as the Rhine in Germany have served as a territorial border and a protective defense against outside enemies. The fast flow of the water in addition to substantial size (the Rhine in Germany averages 1,300 feet in width) poses significant challenges even to twenty-first century armies that seek to cross them. Building a temporary bridge that is sufficient to move men and equipment across takes time and leaves the engineers and construction crews exposed to enemy attack and fire. The troops that must cross the bridge are at significant risk, whether the bridge is already in place or built at the time. With any bridge, as with narrow roads, if the enemy can disable one vehicle on the bridge then all of the following vehicles are unable to proceed and become easy targets for enemy fire; the vehicle would choke the bridge and it would become impassable. Napoleon, when he was talking about his crossing of the 1,600 foot wide Po River in Piacenza, Italy said that “crossing rivers of this size is

\textsuperscript{120} Neill, \textit{Infantry Soldier}, 191.
the most critical operation in war.”121 It is risky and dangerous, therefore, being on the proper side of a river and maintaining control of the bridges is vital in an area such as the Ardennes that has a number of rivers and streams flowing through it.

In the small village of Ouren, Belgium, Gen. Norman Cota, commander of the 28th Infantry Division, assigned his 112th Infantry Regiment to guard the bridges that crossed the River Our. These bridges were strategically and operationally important for the German offensive, and not simply because they allowed the Germans to advance; some of the old, stone bridges could handle the weight of the German armor of the oncoming 116th Panzer Division. Furthermore, if the advancing Germans controlled and utilized these bridges, then they would be able to maintain the rapid pace upon which Hitler had premised the operation.

The Germans outnumbered and outgunned the 112th without a doubt. Nevertheless, the Americans were able to hold off the much larger and much stronger German division for a couple of days. The regiment dug in on the ridges and hills that are located outside of Ouren.122 This position allowed them to concentrate fire down on the Germans and the bridges. Additionally, the bridges were narrow, one or two-lanes wide which limited the number of men and/or equipment that could cross at any one time. By targeting the bridges where the mechanized units were trying to cross and the lead vehicles, the Americans could clog up the bridges and significantly delay the enemies’ ability to use them.

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121 Quoted in Colson, Napoleon: On War, 317.
122 McManus, 61 and 62.
For two days the 112th was able to hold off the advancing Germans. Obviously, they could have slowed the Germans by simply blowing up the bridges that crossed the river. However, this was not a viable alternative at the time. As McManus noted, the American units on the east side of the river, beyond the 112th, would need the bridges to retreat to the relative safety of the west side.\(^{123}\) By controlling the bridges over the river, the Americans forced the Germans to divert to the south in order to cross the Our. This, again, not only cost them critical time, but also precluded them from using a key route to Bastogne and the Meuse.\(^{124}\) After Gen. Cota eventually ordered the 112th to fall back, the men of the regiment destroyed the river bridges as they crossed them to prevent the Germans permanently from using them to move up any support or in any future additional attacks.

Kampfegruppe Peiper also encountered issues with bridges that caused him additional delays beyond those he experienced earlier and cost him more precious time that was so strategically vital. His tanks headed toward the town of Trois Ponts, French for “three bridges” and named for three bridges that crossed the River Ambleve. Two of these bridges were strong enough to bear the weight of Peiper’s tanks and presented an ideal route to access the Belgium highway that would allow his tanks to move to the River Meuse quickly. Consequently, the two stronger bridges had great strategic value to Peiper and the whole of the German offensive.

When his tanks came into view of Trois Ponts they came under American fire from American antitank guns. The fire disabled Peiper’s lead tank but it still able to

\(^{123}\) McManus, 98.

\(^{124}\) McManus, 98.
return fire. As his troops exchanged these shots with the Americans, it forced his column to a complete stop. At that point, Peiper heard an explosion followed by the sound of debris splashing into the river. Then he heard a second blast and instantly realized that the American engineers had blown up the bridges that his unit absolutely needed so they could move forward.

The loss of the route through Trois Ponts, forced Peiper again to find an alternate route. He knew that the problem would delay his progress because he had to determine what route he would take but additionally because the route through Trois Ponts was the quickest and most direct way toward his objective. His next best option was the town of La Gleize almost four miles north of Trois Ponts. La Gleize had one bridge and it was not initially clear to Peiper if it was even capable of holding the weight of a tank. Peiper and his unit had to confront the fact that the rivers, along with the built environment including the roads and bridges, had a direct impact on the strategic planning and success for Germany.

The German planners failed to appreciate the issues that their troops would encounter as a result of the rivers and the bridges, as they had with other environmental factors. First, they underestimated the effect that the recent, heavy rains had on the rivers and waterways, just as they had underestimated its effect on the road conditions. The higher volume of precipitation caused the rivers to be deeper and to run faster than they typically would run at that time of year. Secondly, the Germans did not suitably estimate how long it would take their engineers to reinforce some of the bridges so that they could bear the weight of the tanks and trucks of the mechanized divisions. Both errors combined to throw off the timetable that was the basis for the entire plan. This
error resulted in a massive strategic mistake and provided the Americans a sufficient amount of time to move reinforcements into the threatened towns and areas.

Strategists certainly have a complex and difficult job, of that there is no doubt. They have to marry the goals of the policy makers and politicians to the capability of the military assets available so that they can achieve the desired political objectives. It is not always an easy or obvious connection between means and ends. Nevertheless, in their strategic planning, it is necessary to consider not only the proper choice of units and weapon systems that are available, it is also incumbent upon them to take into full consideration the environmental factors that will be in play. Environmental factors do not refer only to the natural state or terrain where the troops will deploy but also the second nature or man-made environment that exists. Hitler himself considered some of the environmental factors and somewhat reasonably calculated that they would redound to his benefit. He at least made a logical argument that they would. Yet, he failed to analyze objectively them and appreciate the hazards that they could present to his army, especially as far as they jeopardized the speed of his advance.

Earlier in their strategic assessments while planning their ultimate movement into Germany, the Allies also miscalculated. The decision to attack into the country with the northern and the southern portions of their lines simultaneously was reasonable. But just as Hitler overemphasized the benefit that the Ardennes region would provide his troops, the Allies, both British and American, overemphasized the protection that it would provide them as well. They believed that the Germans were incapable of attacking through there, mindless of the fact that they had done it three times in the century before, even as recently as 1940. Montgomery, in his plan, wanted to use the
Ardennes to protect his southern flank while the Americans used it as a rest, recovery, and resupply area.

Neither side took into consideration the weather, its effects, the roads or their composition, bridges, the terrain, or numerous other environmental factors that significantly impacted the battle. While both sides put some thought into these issues during their planning, neither fully appreciated them. Once the battle began, the Americans, like a good football coach, made better adjustments to the situation and used the Germans' miscalculations against them.
CHAPTER III

OPERATIONAL ISSUES AND IMPACT

The Nature and History of Operational Art

Strategy and tactics are the two most common levels of warfare that people are familiar with and the easiest for most to understand. Examined in Chapter II, at its most basic level, strategy involves bigger issues such as the overall objective of the war, i.e. to establish a foothold in German occupied France, how to proceed across France towards Germany and defeat the Third Reich. Tactical considerations, on the other hand, concern how the actual soldier fights and engages the enemy, the ground level view. The next chapter will consider this in more detail. Operations exists in between these two poles as another level of warfare that has taken on a greater importance and focus in the modern military. Most importantly, “[t]he requirement for organic unity between high-level strategy and the most minor of minor tactics contains an imperative for the mid-level direction of war to keep the two poles in consonance with one another.”

Put another way, the operational level ties and synchronizes the strategic with the tactical and ensures that they operate smoothly to achieve the desired goals of policymakers and commanders.

Dr. Robert Citino, of the National World War II Museum, has done a great deal of research and provided solid scholarship on the history of operations, particularly concerning the German and Prussian armies of roughly the last 350 years. Citino says

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126 Winton, *Corps Commanders of the Bulge*, 337.
that operations “exists in a conceptual space between tactics…and strategy.”

He goes on to state that the “operational level involves the movement and command of large units: armies, corps, and divisions…to strike the enemy a sharp, even annihilating blow as rapidly as possible.” While Citino was primarily focused on German operational art, his overall approach is still applicable to studies of the Allies’ operations in World War II; operations during the war were still focused on the movement of large units in order that they would be in the right place, with the proper equipment, to strike a decisive blow against the enemy. Studying warfare at this level “might be described as the analysis of the campaign (rather than the battle or the war).”

While not an officially recognized category for the War Department during World War II, nevertheless the concept of operations was present and critically important. During the interwar years the United States military seriously began to consider the practical requirements and necessities needed to deploy troops. The War Department began to develop plans and procedures for organizing military expeditions. The leadership “started with strategic objectives and then detailed the military resources and operations necessary to achieve them.” Planners would repeatedly put to the test and consequently modify these theories and ideas throughout the course of World War II.

Operations was not historically a concern nor a recognized, defined category to

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130 Matheny, *Carrying the War to the Enemy*, 261.
military theorists or commanders. Even so, when studying past military events, even in
the ancient world, it is possible to discern operational issues and choices in the actions
of commanders and warriors. However, in the last two centuries with the growth of
armies, the size of areas of combat, and advances in technology it became necessary
for armies to coordinate and organize their men and materiel to ensure success on the
battlefield. This eventually led to the development of operations theory, originally in an
informal manner and later more formally.

Essentially, operations or the operational art is how military organizations
maneuver troops, supplies, and equipment to and around the battlefield in order to
achieve strategic objectives and allow the troops to tactically engage the enemy. With
the modern military’s emphasis on joint strike capability and combined arms actions, the
mobility and timing of the myriad forces and equipment involved is without doubt
extremely critical. While militaries did not fight the Second World War using the same
ideas and theories that Cold War and twenty-first century planners employ, even after a
cursory examination of events during the war the necessity for successful operations
becomes readily apparent.

Almost a century and a half before World War II, Napoleon recognized how
important operations were to martial success, although he referred to Grand Tactics
rather than using the term operations. He included deception as a one of the goals of
operations. For Napoleon, “the manoeuvre [sic] was first of all synonymous with

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131 A good example of this is David Lonsdale’s article in which he discusses Alexander the Great’s
flexibility in how he fought his campaigns. Lonsdale points out that while Alexander never would have
thought of a distinct “operational” approach as modern scholars understand it, he would understand the

132 Matheny, 3.
marches and major movements. It involved the idea of fooling the enemy as to the true point of attack.” In the winter of 1944, Hitler’s battleplan included the same belief in his own operational approach. Not only did he envision positioning his troops so that they could strike a decisive blow against the Allies, he designed his campaign to strike from the Ardennes so that his troops would have the element of surprise on their side.

Even though the idea of operational art exists in the history of warfare over the last few hundred years, it was not until 1982 that the “United States Army officially designated the third level of war as the operational level.” In Army Doctrine Reference Publication No. 3-0: Operations (ADRP 3-0) the United States Army provides the following definition of operational art and indicates how operations links strategy and tactics. “Operational art is the pursuit of strategic objectives, in whole or in part, through the arrangement of tactical actions in time, space, and purpose.” (emphasis added). The US Army’s Field Manual on Operations provides a more thorough definition. It defines operational art as “the cognitive approach by commanders and staffs – supported by their skill, knowledge, experience, creativity, and judgment – to develop strategies, campaigns, and operations to organize and employ military forces by integrating ways, means, and ends.” The Army goes on in ADRP 3-0 to list ten essential elements of operations. Only six are relevant to the environmental factors

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133 Colson, 327.
134 Matheny, 13.
135 United States Army, Army Doctrine Reference Publication (ADRP) No. 3-0: Operations, (Headquarters, Department of the Army, 11 November 2016), 2-1; emphasis added.
136 United States Army, Field Manual 3-0: Operations, (Headquarters, Department of the Army, October 2017), 1-20.
137 ADRP 3-0, 2-4.
that are the purposes and scope of this paper. They are the following: 1) Center of
gravity; 2) Decisive points; 3) Lines of Operations; 4) Tempo; 5) Operational Reach; and
6) Basing. All of these elements relate in one way or another to environmental factors.

The first element is an obvious reference to the thinking propounded by Carl von
Clausewitz in *On War*. The US Army defines center of gravity as “the source of power
that provides moral or physical strength, freedom of action, or will to act.”138 While the
center of gravity has a clear moral aspect, one that Clausewitz himself acknowledged
and stressed, there is doubtless also the geographic and physical aspect as well. Even
the moral side of center of gravity has a physical presence or locality related to it.

“Everyone knows the moral effects of an ambush or an attack in flank or rear,”
Clausewitz wrote.139 Surprise attacks have a definite impact on the morale of those on
the receiving end but the surprise and concomitant effect on morale is a result of the
location from which the attacks comes, in this case in the flank or from the rear as
Clausewitz said. Alexander’s surprise, vertical attack on the Sogdian Rock is a prime
example from the classical world of an attack having an effect on the morale of the
defending troops because of the direction from which the attack emanates.140

In the Ardennes there were numerous centers of gravity. The modern United
States military indicate their understanding of this idea when they say, “Thoroughly
understanding an operational environment helps commanders identify and target enemy
centers of gravity.”141 In the Battle of the Bulge some centers of gravity were strategic

138 ADRP 3-0, 2-5.
139 Clausewitz, 137.
140 In Alexander’s case, he demoralized his enemies to such an extent that they surrendered despite
outnumbering the Macedonians one hundred to one.
141 ADRP 3-0, 2-5.
and some tactical, large and small. The determining factor was the objective and size of the units involved. For examples, the XII Corps had a significantly different, and larger, center of gravity than a squad or platoon operating from a house in Noville.

Decisive Point, the next element from the Army’s list, is most certainly relevant to the issue of how environmental and geographic factors impact warfare. A Decisive Point is “a geographic place, a specific key event, critical factor, or function that, when acted upon, allows commanders to gain a marked advantage over an enemy or contribute materially to achieving success.”142 (emphasis added). Geographic places “can include port facilities, distribution networks and nodes, and bases of operations.”143 This aspect of operations relates to the first, the center of gravity. By understanding the proper center of gravity, it becomes possible to identify the decisive points more particularly. “A common characteristic of Decisive Points is their importance to a center of gravity.”144 It is so important to defend it that the enemy must commit a significant amount of its resources to protect it and prevent an attack on the center of gravity. A decisive point is a weak point that, if defeated, could expose the center of gravity to the enemy. In the Ardennes, the smaller road junctions and towns were the decisive points that protected potential centers of gravity like Bastogne.

Another element that the Army addresses and is relevant to an analysis of the Battle of the Bulge concerns the Lines of Operations and Lines of Effort. The former aligns the troops on the battlefield. It is a “line that defines the directional orientation of the force in time and space in relation to the enemy and links the force to its base of

142 ADRP 3-0, 2-5.
143 ADRP 3-0, 2-5.
144 ADRP 3-0, 2-5.
operations and objectives.” Lines of operations, depending on the objective and structure of the combat plan, can be either interior or exterior, again a reference to their geographic location and spatial orientation. “Interior lines are lines on which a force operates when its operations diverge from a central point” while exterior lines “are lines on which a force operates when its operations converge on the enemy.”

Tempo, another central element in the operational art, is “the relative speed and rhythm of military operations over time with respect to the enemy;” it is a critical factor when it comes to controlling the battlespace. A military force always wants to move quicker and more efficiently than its opponent. If the force is successful in this effort, it can “control events and deny the enemy positions of advantage.” It is of paramount importance to control the terrain and movement within the geographic boundaries of the specific area of operations. An army that controls the ground not only denies its use to the enemy but, generally, is more efficient as it regards the use and expenditure of energy and materiel thereby allowing it to have a net advantage against the enemy. This concept was central to the Wehrmacht’s Blitzkrieg operations earlier in the war and what Hitler attempted to reprise in the Bulge.

Operational reach, the fifth element that the US Army outlines, has an environmental aspect to it that will be relevant to an environmental evaluation of the Ardennes fighting. The US Army says that operational reach “balances the natural

145 ADRP 3-0, 2-6.
146 ADRP 3-0, pg. 2-6. The Army also discusses lines of effort, “a line that links multiple tasks using the logic of purpose rather than geographical reference to focus efforts toward establishing a desired end state.” However, lines of effort are based on “logical linkages” and not geographic ones. Ibid.
147 ADRP 3-0, 2-7.
148 ADRP 3-0, 2-7.
tension among endurance, momentum, and protection;” it is a “tether.” Endurance is not simply the physical stamina of the particular soldiers. It also relates to the ability to maintain units in the field so that they can project combat power effectively. Endurance “stems from the ability to organize, protect, and sustain a force, regardless of the distance from its base and the austerity of the environment.” (emphasis added). If an army cannot secure food and fuel from the location where it is fighting, then it must supply those items. This creates another burden for a commander and another weak spot that his troops must defend. In the Battle of the Bulge, the Germans encountered this issue repeatedly from the beginning of their offensive.

The final element that is germane to an environmental perspective of operations is the idea of basing. Where to establish a base is certainly an issue that encompasses environmental concerns since a base is “a locality from which operations are projected or supported.” While branches of the modern United States military maintain permanent bases around the country and around the world, temporary bases are also necessary in combat zones and have been for centuries. The Army uses base camps and staging bases. A base camp “supports the military operations of a deployed unit and provides the necessary support and services for sustained operations.” A staging base is a “location used for staging forces, sustainment and/or extraction into and out of an operational area.” Both of these localities are generally temporary but

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149 ADRP 3-0, 2-8.
150 ADRP 3-0, 2-8.
151 ADRP 3-0, 2-8.
152 ADRP 3-0, 2-9.
153 ADRP 3-0, 2-9.
can be permanent if the commander decides it is necessary.

The position of staging bases on the battlefield is of immense importance. Clausewitz, said that “the value of the base of operations depends less on its geometric forms than on the nature off the roads and terrain through which they run.”\textsuperscript{154} Furthermore, a base should not be too close to the reach of enemy arms that it is put at risk nor can it be so far away from the troops it supports that it cannot provide the necessary support in a timely and efficient manner.

One of the central issues regarding campaigns is the movement and supply of provisions for the men fighting. Matheny correctly notes that “logistics is critical to success at the operational level…Logistics determines the art of the possible.”\textsuperscript{155} Dr. Citino’s work as well reflects that a central requirement of operations is planning and logistics. A “campaign plan links tactics to strategy by determining where, when, how, and, most importantly, to what purpose military forces will engage the enemy.”\textsuperscript{156} The issue, at heart, is how will the troops get where they need to go and with the materiel that they need? It almost goes without saying that the soldiers in the field need to have the right equipment in place and the support necessary to conduct continued operations. Support includes food, ammunition, fuel for mechanized units, medical equipment and supplies, and communication equipment. The men and all of these items must transit to the front via a logistical chain of some sort, whether it is aerial or ground based. Regardless, each mode of transport entails its own logistical and environmental concerns and those fighting in December 1944 encountered them.

\textsuperscript{154} Clausewitz, 183.
\textsuperscript{155} Matheny, 257.
\textsuperscript{156} Matheny, xviii.
Altitude, cloud cover, visibility, wind speed, presence of open ground for suitable drop zones, and other uncontrollable variables limit aerial operations whether using helicopters (as is commonplace today) or fixed wing aircraft (as in World War II). In an urban or suburban area, the presence of buildings, houses, radio towers, power lines, and other manmade, second nature factors becomes problematic and can affect air resupply.

Ground transport also has unique issues that commanders must bear in mind. Are there adequate roads for the specific vehicles to use; can the roads and bridges support the weight of the vehicles; is there a sufficient amount of fuel or fuel depots en route; and are there natural choke points that create a concern for ambush or will cause severe slowdowns and traffic jams? The US Army refers obliquely to some of these issues in a listing of operational variables and subvariables.\textsuperscript{157} Many of these issues and factors came in to play during the Battle of the Bulge on both sides of the battle lines and show how the failure to plan for and utilize them can either secure success or prevent it.\textsuperscript{158}

The issue of how to move the men around the battlespace can be an even bigger concern. In the twenty-first century military units can ride in trucks, have organic, mechanized units attached to them, or can move via helicopters or the V-22 Osprey. In WWII, these were obviously not options. Consequently, as in the case of supply, the ability of the troops to get to the locations where they can confront the enemy was primarily a matter of the existence of proper and sufficient roads. The men either

\textsuperscript{157} ADRP 5-0, 1-7 and 1-8.

\textsuperscript{158} While this paper's primary focus is solely on the American Army's experience in the Bulge, reference is at times made to the Wehrmacht for comparative purposes.
walked or rode with other units, usually in deuce-and-a-half trucks. Occasionally, rail networks were available to transport men or materiel in “forty-and-eights.”159 Once at the front and engaged, the men needed some flexibility to move and, if necessary, fall back to safer locations that provided better protection or advantages to them. In order for operations to be successful, commanders must be able to balance all of the “ends, ways, and means” so that their troops are able to fight effectively.160 Both sides in the Battle of the Bulge encountered circumstances and conditions that significantly hindered their ability to operate.

Matheny states that the “central functions of operational art [are] maneuver, logistics, intelligence, and command and control.”161 All of these elements are subject to the environmental realities and exigencies that exist in the theater where armies are conducting operations. The size of the roads, the manner of building construction and the primary materials used in construction, the nature of the terrain whether it is hilly, flat or otherwise, the type and composition of the soil, the prevailing weather patterns and any number of other elements have an impact on the ability of commanders to conduct operations. As will be evident, all of these elements played an important role and had a significant impact on operations in the Battle of the Bulge.

Roughly fourteen miles north-northeast of St. Vith is the small Belgium town of Elsenborn. On the southeastern outskirts of this little village lies a prominent terrain

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159 Forty-and-eights were French railroad cars that could carry either forty soldiers or eight horses.
160 Matheny, 258.
161 Matheny, 258.
feature that overlooks the entire area, the Elsenborn Ridge.\textsuperscript{162} With its elevation of approximately 2,000 feet and the corresponding views of the surrounding area, Elsenborn Ridge allowed any military unit that controlled it to command the roadways that ran to below. The road network that the ridge overlooked was strategically important as part of the primary route for the 1\textsuperscript{st} and 12\textsuperscript{th} SS Panzer Divisions of the German I Panzer Corps, Sixth SS Panzer Army.

The first German troops to come through the area were Kampfgruppe Peiper of the 1\textsuperscript{st} SS Panzer Division, led by Col. Joachim Peiper. The American and Allied resistance delayed him, and poor decision making of some of the German volksgrenadier commanders in the early fighting of the attack slowed him even further,

\textsuperscript{162} For a good description of the ridge, see MacDonald, \textit{A Time for Trumpets}, 371.
Peiper’s tanks were in desperate need of fuel. There was additional pressure, beyond just the material necessity, due to the fact that the delays had thrown off the Führer’s timeline for the battle by this point. As a result of these factors and the need to move forward as quickly as possible, when Col. Peiper and his troops first arrived in the Elsenborn area he decided to try to make up for the lost time and did not ensure that Elsenborn Ridge was securely in German hands. His failure to place units on that key piece of ground became a huge impediment when the Germans following behind his division attempted to cross through the area on the roads south of the ridge.

Major General Leonard Gerow was the commanding general of the United States’ V Corps whose area of operations included the Elsenborn Ridge and its surroundings. He had watched his soldiers take a beating and incur heavy losses in the early fighting of the German onslaught. He decided to have his units who were trying to slow down the Germans from positions out front pull back to the ridge. Since the Germans left the ridge unoccupied and it had such obvious benefit to whomever controlled it, Gerow turned the ridge into “an elevated artillery park, ringed by infantry, tanks, tank destroyers, and engineers.”¹⁶³ He ordered men and artillery of the 1st, 2nd and the 99th Infantry Divisions to dig in there.

When the 12th SS Panzer Division arrived, the Americans were heavily ensconced above the roads on Elsenborn Ridge, looking down on the Germans with artillery pre-sighted and targeted on the roads the Germans needed to cross. The Americans’ presence on the ridge and their ability to place accurate fire on the enemy prevented the Germans from being able to advance with any semblance of speed.

¹⁶³ Winton, 127.
However, an additional benefit of the Americans’ dug in position and firepower was that it made it extremely difficult and costly for the Germans to extricate them from the ridge. The position was so influential, so difficult to attack, and could dominate the area to such an extent that it has been referred to by some historians as the “Little Round Top of the Battle of the Bulge,” a reference to the fighting at Gettysburg in 1863 during the American Civil War. Other soldiers who fought on the northern shoulder of the Bulge claim that the fighting at Elsenborn was the main fighting in the battle.

The confluence of two central features of the area impeded the Wehrmacht’s ability to secure their route and continue to the Meuse as per the operational plan: 1) Elsenborn Ridge; and 2) the roads. These two factors allowed the Americans to slow the Germans’ advance even more and throw off the timetable that Hitler had written in to Wacht am Rhein. The Americans’ position allowed them to place artillery and indirect fire on anyone or any vehicle that attempted to move through the area. The area became a target rich environment as the Germans tried to feed large units into the battle on the narrow, constricted roads. The difficulty of the Germans increased because of the large tanks, trucks, and other vehicles that were trying to navigate and move on the small roads. The result was traffic congestion, slow movement, and at times the outright stalling of convoys which left them at the mercy of the Americans’ guns. Additionally, it greatly slowed the Germans’ ability to reinforce advancing troops and move the desperately needed supplies, ammunition, and fuel to the front, a circumstance that cost the Germans in the long run.

165 Harry A. Thompson, transcript, 16.
General Gerow’s recognition of the critical value (as well as the continued availability) of Elsenborn Ridge helped to create a situation in which the American soldiers were able to maximize their combat effectiveness even against the numerical superiority and firepower that the Germans possessed. Gen. Gerow was able to use the terrain features available to him as a force multiplier which as a result gave his men a much better chance at success in slowing or fending off the attack.

Gerow also understood that if his men controlled the Elsenborn Ridge, they could greatly inhibit the Germans’ ability in all aspects of operational art. The Germans obviously had a difficult time maneuvering their troops and equipment on the roads over which the American artillery were able to rain firepower down on them from the heights. Relatedly the Panzer Divisions would also find it difficult to provide support to any of their troops that might have been successful in getting through. This included the inability to send food, medical supplies, ammunition, or fuel to the front. Even if the Americans were unable to stop completely the movement of these operational necessities to the front, simply slowing them down was central to disrupting an operation premised on speed of movement and timing.

Impact of the Road Network

The Ardennes is an area consisting primarily of agricultural activity. While it has some large open spaces for farm animals and crops it is largely a heavily, but not completely, wooded area. The forests consist primarily of pine trees that growers had
periodically harvested for commercial purposes and then replanted in rows for future lumber production.\textsuperscript{166}

During the interwar years the area was a popular tourist locale for people of the region. As a result, the road network is somewhat extensive and consists of a number of different, small roads that wind through the dense stands of trees. The roads are narrower than those that exist in larger towns and cities. Some of the roads are little more than single country lanes that have developed organically over the centuries as the populace grew and farmers moved their produce and goods between towns or to market.

A number of the roads in the area are paved, primarily the main roads; however, many of the remaining ones were simply dirt roads. During the first half of December 1944 the area had received a great deal of rainfall. The rain made the condition of the dirt roads so bad that Gen. Patton requested that his chaplain compose a special prayer asking God to stop the rain. Patton had 250,000 copies printed and distributed to his troops to maximize the prayer’s effectiveness.\textsuperscript{167} The rain did abate but the resulting problem of the roads did not.

The roads adversely affected the Germans particularly since they had predicated their plan on speed and movement. The muddy roads were so bad that many of their artillery units could not move their pieces. Similarly, the tanks and trucks had difficulty moving through the thick, clayey mud. Don Houseman fought with the D Company, 1\textsuperscript{st} Battalion, 423\textsuperscript{rd} Regiment, 106\textsuperscript{th} Inf. Div. and recalled how bad the situation was for the

\textsuperscript{166} The foregoing description of the road network is largely based on Winton’s excellent and succinct description. Winton, 95.

\textsuperscript{167} Beevor, \textit{Ardennes}, 101.
Germans on the roads. After the Germans captured him and he became a prisoner of war the Germans were moving him and the rest of those they had captured to the rear. As they marched past German troops attempting to advance, he noticed the torn-up roads and tanks that had slid off into the ditch. He said that the men were cussing in German as they struggled to move the vehicles and to march with mud covered boots and trousers.\(^{168}\) When the ground froze in the harsh winter weather the muddy roads became passable.

The Germans’ hampered mobility resulted in additional, significant traffic jams on the already crowded roads and left the Germans and their equipment exposed to enemy direct and indirect fire. Additional features of the roads in the area exacerbated their exposure. Because of the ridges and hilly terrain of the region, the roads often “twisted and turned down steep grades into deep ravines.”\(^{169}\) As a result, the grade coupled with the turning nature of the roads seriously slowed the German units down, again making them easy targets for American firepower.

The small one and two-lane roads in that part of Europe presented certain operational and other benefits for the Americans. (See Fig. 8, below) They were easier for a small, outnumbered force to maneuver and defend against a larger force. The roads also allowed the American soldiers a chance to stop, or at least slow, the German advance. At the same time, they presented what became major obstacles for the Germans that they apparently had not taken into consideration or given proper

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\(^{168}\) Don Houseman, Interview with Ronald E. Marcello, November 20, 2002, Interview 1479, transcript, University of North Texas Oral History Collection, University of North Texas, Denton, TX., 52.

credence to during their operational planning. As Winton notes, and a simple view of the area on Google maps shows, the primary direction of the roads is on a heading from southwest to northeast. Given the German objective of Antwerp, the roads are squarely perpendicular and lie across the ideal line of advance upon which the Germans sought to move.

The Germans were also attempting to move a considerable number of tanks, armor, trucks, and other large vehicles via these roads. It is one thing to use the roads to drive a horse and wagon carrying goods to market, it is quite another to drive a twenty-eight ton, nine-and-a-half-foot wide Panzer Mark IV or other primary transportation vehicle through a winding country lane. Consequently, any mechanical problem, disability, or destroyed vehicle would completely stop the progress of the advance. If a vehicle became disabled, then another problem arose; what were the men supposed to do with the inoperable vehicle? Due to the narrowness of the roads and the presence of the dense trees so close to the edge of the roadways, pushing it out of the way was not always a viable or speedy option.

Figure 8 - Picture of a typical country lane in Elsenborn, Belgium. https://goo.gl/maps/8YBPLrH7gnP2.
At times, however, the roads were also a hinderance to the Americans. A prime example occurred on the road between Longvilly and Magaret in Belgium. The inadequate road became congested with Americans, potentially trapping them in a massive kill or capture zone. American units from the 9th Infantry Division’s Combat Command Reserve (CCR) were retreating along the same roads that Team Cherry, led by Lt. Col. Henry Cherry and part of the 10th Armored Division’s Combat Command B (CCB), were using to go to Longvilly to try and secure it. The road could accommodate a well-organized and well led retreat. But that was hardly the case with the men of the CCR at the time.

Colonel Joseph Gilbreth, commander of CCR had ordered his men to displace and retreat from Longvilly westward to Bastogne. At that point in the fight, the men of CCR and the 28th Infantry Division who had been fighting the Wehrmacht simply wanted to bolt for the perceived security of the rear and were willing to get on any vehicle and
head west immediately. The fact that the Americans were attempting to complete such a maneuver at night only made the situation more difficult. As a result, Col. Gilbreth had a difficult time controlling the orderly operation and movement of his men. The resulting confusion and mayhem clogged the narrow road.

Meanwhile, Col. Roberts, commander of CCB, sent Team Cherry to Longvilly to secure the roads in an effort to slow down the forward progress of the Germans and buy time for the 101st Airborne Division to arrive in Bastogne and establish their defenses of the vital crossroads.\textsuperscript{170} The arrival in the Longvilly area of Team Cherry, with its tanks and trucks attempting to move against the tide of the retreating troops, only worsened the situation to the point that Lt. Col. Cherry ordered a halt until daylight to prevent the situation from deteriorating further and placing more of the men at risk. Once the sun rose and the Germans could spot the Americans and resumed firing on the trapped, disorganized vehicles and troops the situation would have become a complete disaster.

The state of the roads also continued to disrupt Col. Peiper’s ability to achieve his objectives and make up for lost time while concurrently providing the Americans advantages. Ligneuville is nine miles in a direct line southwest of the village of Elsenborn. As Peiper’s tanks approached, another American tank unit that was located in the town confronted them. The Americans slowed Peiper’s advance but did not stop it. As Peiper continued, he came to the town of Stavelot, approximately seven miles from Ligneuville. The daylight was quickly fading as dusk settled so he decided to bring his column to a stop outside of town.

The lay of the land to the east of Stavelot forced Peiper’s hand to a certain

\textsuperscript{170} Rapport, 440.
extent. On the eastern edge of the town, the direction from which Peiper approached, there is a steep hillside that is a little over three hundred feet high. The steep grade meant that his tanks must stay on the roads which consequently greatly limited their mobility since the road also presented its own problems.

Shortly before the road enters Stavelot there is a sharp turn which required Peiper’s tanks to slow down to a virtual crawl in order to navigate the tight turn in the narrow road. The situation allowed the American forces to target their firepower at that specific location. By hitting the first vehicle, the entire column came to a stop and was then at the mercy of the American artillery, tanks, and tank destroyers. Peiper sent some of his tanks to use another road in an attempt to bypass Stavelot and proceed on to Trois Ponts. This wound up being a loss as well because the Americans were easily able to shift some of their firepower to the south edge of town and fire into the flanks of the Germans who were trying to pass by. A much smaller and weaker force once again slowed down Peiper even though he had superior numbers and firepower. Peiper sent in panzergrenadiers on foot after failing in his attempt to subdue the town with indirect fire. As darkness settled, the Germans could see the Americans in the distance leaving the town to the west. But they had already caused Kampfegruppe Peiper to waste additional time.

Conversely, the roads to the west of the battle area were much more useful, especially to the Americans. Travis Womack, an engineer with the 82nd Abn. Div., was on R&R just outside of Rheims, France with the entire division after a long fall of hard fighting when the Germans came through the Ardennes. The men would usually be transported on a standard two-and-a-half-ton truck which is familiar to most people as
the canvas covered, six wheeled truck commonly seen in movies hauling soldiers. However, the need in December of 1944 was more desperate so Womack and his companions were sent to the front in ten-ton trucks. The truck was a standard tractor trailer set up that was used to carry basic supplies but in this case, since they could carry more men at a time, they were put to use as unit transport.\footnote{Womack, transcript, 117.} Fortunately for the Americans, the roads that they had to cover were able to handle the larger size and weight of the trucks.

The Environment and Logistics

Logistics is a central and integrally related aspect of military operations. While the precise definition of logistics may vary among countries and militaries, as NATO has stated, in short it is “having the right thing, at the right place, at the right time.”\footnote{https://www.nato.int/cps/ua/natohq/topics_61741.htm, accessed November 16, 2018.} Logistics has also been defined as the “[p]lanning and executing the movement and support of forces.”\footnote{United States Department of Defense, \textit{DoD Dictionary of Military and Associated Terms}, as of September 2018.} The United States Department of Defense Joint Chiefs of Staff (JCS) uses a more precise definition. “Logistics concerns the integration of strategic, operational, and tactical support efforts within the theater, while scheduling the mobilization and movement of forces and materiel to support” operations.\footnote{United States Joint Chiefs of Staff, \textit{Joint Publication 4-0: Joint Logistics}, 16 October 2013, I-1.} The JCS went on and listed the following items among some of the central functions of logistics: supply, maintenance, deployment and distribution, health services, and engineering.\footnote{JP 4-0, I-2.}
Before fighting in World War II, the US military had a relatively rudimentary view of logistics. However, by the time that the war ended a much deeper understanding had developed. The 1949 version of US Army’s Field Manual 100–10, “defined logistics as ‘that branch of administration which embraces the management and provision of supply, evacuation and hospitalization, transportation, and services.’”\textsuperscript{176} All of these definitions intrinsically intersect with and reflect the importance of environmental issues, whether climatic, geographic, atmospheric, or manmade that had an impact on combat. The fighting in the Bulge was no exception.

One of the primary difficulties that the Germans encountered was the challenge of supplying their men with food, ammunition and, possibly most importantly, fuel. Germany was notoriously low on petroleum and was not a country that possessed its own reserves. British intelligence analysts had even stated that Germany’s dearth of oil was the biggest impediment to its ability to continue to resist effectively.\textsuperscript{177} Hitler even ordered a delay to the beginning of the attack because of Germans were unable to move sufficient ammunition and fuel to the front in support of the operation. Even if the Luftwaffe had enough fuel for air resupply operations that could at least have provided ammunition to the front, the consistently bad weather that Hitler already counted on to stop the Allies’ planes from flying would have stymied those sorts of plans.

Logistically, on the other side of the battlefield, the amount of supplies and materiel that the Allied forces needed was truly staggering, even if looking only at Gen. Bradley’s First and Third Army in his 12\textsuperscript{th} Army Group during their drive across France.


\textsuperscript{177} Beevor, \textit{Ardennes}, 103.
The US First Army estimated that it needed 5,500 tons per day to continue combat operations.\textsuperscript{178} Meanwhile, the Third Army estimated that it required 6,600 per day for it to stay in the fight and be effective. The total need of Bradley’s soldiers was 12,100 tons per day. As a result of the difficulties encountered moving supplies to the front (whether because of the poor conditions of the roads, the damaged infrastructure of the ports and railroads, or the bad weather) logistical units were only able to provide 7,000 tons per day. As the supply lines lengthened and the distance from usable ports increased, the situation only worsened.

On the northern shoulder of the German salient, Gen. “Lightning” Joe Collins, commander of the Americans’ VII Corps, wanted to take his Corps and attack towards St. Vith in order to secure the vital road network that existed in the town. He and XVIII Airborne Corps commander, Gen. Matthew Ridgway, argued the case to British Field Marshall Bernard Montgomery, who was the overall commander for that area of responsibility. Monty disagreed with the American generals, primarily based on the logistical difficulties that Collins’ men would incur as a result of an entire Corps attacking in one small area. In this instance, his notorious caution served him well as he wisely recognized that it would be impossible to support such a large force using only the single road that was available. There would be no way to move sufficient amounts of fuel and supplies to the men in need at the front.

The main way that the Army accomplished resupply during the Battle of the Bulge was through the air. C-47 cargo planes flew supplies from Britain to the men at the front and then parachute dropped them in a designated area. However, the weather

\textsuperscript{178} Supply figures taken from Alan J. Levine, \textit{From the Normandy Beaches to the Baltic Sea}, 98.
during the first week of the German assault prevented any flight operations from happening. The low cloud cover, rains, heavy fog, and snow storms that occurred made it impossible for the cargo pilots to see where to drop their loads.\footnote{It was not just low clouds that caused problems. The pilots in the air had to deal with multiple layers of clouds from the ground to 10,000 feet which made their task even more difficult. Robert V. Brul\-le, \textit{Angles Zero: Close Air Support in Europe}, (Washington: Smithsonian Institution Press, 2000), 101.}

All of that changed on 23 December with the arrival of a high-pressure system from Russia, the Siberian High. The front brought extremely cold temperatures, but it also brought extremely clear skies with unlimited visibility. In England, air bases all over the island began to sortie aircraft for missions over the continent. The Air Corps sent P-47 fighter bombers to attack tanks. They also sent flights of B-17 bombers on bombing missions over German cities.\footnote{Raymond Schneider was a B-17 pilot in the 710\textsuperscript{th} Bomb Squadron, 447\textsuperscript{th} Bomb Group, 8\textsuperscript{th} Air Force. His crew was sortied when aerial missions resumed on Christmas Eve. He discussed the frustration at the weather preventing the Air Corps from flying missions in support of the Bulge. He notes that they flew directly over the troops fighting on the ground so that they could see and hear the aircraft and boost the troops' morale. Raymond Schneider, Interview with Ronald E. Marcello, December 8, 2000, Interview 1389, transcript, University of North Texas Oral History Collection, University of North Texas, Denton, TX., 89.} But most importantly to the men fighting on the ground in Belgium were the C-47 Dakotas that flew the vital materiel that they needed to continue fighting. Some of the men and artillery units were down to literally only a handful of rounds. The 241 Dakotas carried 334 tons of badly needed ammunition, fuel, food, and medical supplies.\footnote{Beevor, \textit{Ardennes}, 253.}

The terrain around Bastogne also favored the Americans when the Dakotas were finally able to make their way to the battle. Just outside the west edge of the town are “large, clear fields on a gentle hillside, close to where the 101\textsuperscript{st} had its command post.”\footnote{Rapport, 529.} This area made a perfect drop zone for the bundles of supplies that were
being brought in. Possibly ninety-five percent of the loads that the Air Corps parachuted in landed within this drop zone.¹⁸³

The Americans’ long supply lines and related inability to resupply almost cost them dearly in the first week of the Bulge. Charles Hake was an artillery artificer with the 104th Inf. Div. during December 1944. He recounts that his entire battery had expended nearly all of their ammunition but seventeen rounds in support of the infantry. The gunners kept the remaining rounds for their own use in case they were overrun. If that should happen then their final choice of action was that they would depress their barrels as much as possible and engage in direct fire on the enemy.¹⁸⁴ Machine gunner Vincent Speranza noted that the 101st Abn. Div. troops were in a similar, dire situation. He said that their artillery was down to two shells per day per gun and, personally, he only had one eight round magazine left for his M1 rifle and none for his machine gun.¹⁸⁵

After the air drop to the American troops the weather further betrayed the Germans. The skies remained clear which allowed P-47s to come in and hunt for tanks and other ground targets. It was not only the bright, sunlit sky but also the snow that helped deliver them over to the Allied pilots. The Germans’ tanks, trucks, and artillery sought cover and protection but the pilots only needed to follow the tracks that the tanks left in the snow to find them.¹⁸⁶ Overall, the 23rd was a bad day for the Wehrmacht; the weather that they had counted on to protect them was gone.

¹⁸⁴ Charles K. Hake, Interview with Ronald E. Marcello, August 9, 2000, Interview 1361, transcript, University of North Texas Oral History Collection, University of North Texas, Denton, TX., 51.
¹⁸⁵ Speranza, Nuts, 51. For a broader discussion of 101st supply issues see Rapport, 527-532.
¹⁸⁶ Rapport, 537.
The Corps commanders and American military leadership in the Ardennes recognized more acutely the benefits that were available by properly exploiting the environment that was available. By utilizing these factors, a much smaller force was able to thwart the Germans’ plan and slow down their attack. Conversely, the German commanders wholly mistook those same environmental considerations in their planning. A prime example is the decision to use the small roads through the dense forests of the Ardennes region through which to move an extremely large, mechanized force. The narrow roads were not built with the idea that immense tanks and heavy trucks would be using them. The situation would be difficult in and of itself, but the Americans presence made things worse as a result of their attempts to disable the lead vehicles and use them to block the others. Although Hitler was initially successful in his plan as far as achieving the element of surprise went, it appears that he did not think much further beyond that point in the planning to comprehend the problems that his troops would confront as a direct effect of the environment where he chose to have his army attack.
CHAPTER IV
USING THE ENVIRONMENT IN TACTICAL SITUATIONS

Tactics in General

Out of strategy, operations and tactics, the latter is the most familiar to the general reader and the most understandable as well. Napoleon said that tactics “were the art of getting a large number of armed individuals to act simultaneously to the greatest advantage, as quickly and obediently as possible.”\textsuperscript{187} In warfare, tactics are concerned with events in the near view, those that are happening at the tip of the proverbial spear where combatants meet one another on the battlefield. Whereas strategy takes into consideration the overall objectives of the war, tactics is how the soldiers on the battlefield actually fight the war.

Fuller, in \textit{The Second World War}, discusses the different tactical considerations that armies need to consider. He analogizes an army to an organism that has three main parts: 1) a body, the combat arms; 2) the stomach, the administrative section; and 3) the brain, the command element.\textsuperscript{188} Fuller explains that as a result of this basic structure, an army has two main areas of focus for tactical attack and defense, the rear where the command and administrative elements are and the front where the combat troops are located.\textsuperscript{189} Each of these parts of “the organism” will subsequently modify their tactics to fit their needs and situation in the best way possible.

Matheny correctly notes that, along with operational art, tactics are very

\textsuperscript{187} Quoted by Colson, 81.
\textsuperscript{188} Fuller, 36.
\textsuperscript{189} Fuller, 36. For this thesis, Fuller’s first part, the body, will be the primary focus.
Amenable to changes based on technological advances. Furthermore, as discussed in Chapter II, tactics relate to and can be influential on strategic decisions. As Andre Beaufre stated, "It is absolutely clear that advancement in techniques and tactics gives a great advantage to the one who achieved it, because it provides a strategy with additional and more effective measures." It is in the tactical area that scholars can most easily evaluate soldiers’ interaction with environmental factors in combat.

Snow, Fog and Other Climatic Factors

In Lanzerath, Belgium the American I&R platoon from the 394th Inf. Reg. of the 99th Inf. Div., was manning positions overlooking the critical road and the multiple road junction in the town. They were opposing an oncoming German division. Platoon members knew that the Germans very clearly outnumbered and outgunned them, regardless they took the best positions that they could find. While they were waiting in their foxholes, they had their first experience of the weather intervening in their favor. A heavy snow started to fall. It “fell in large, fluffy flakes, soon blanketing the platoon’s dugouts with the perfect camouflage.” This saved the men the time and expenditure of energy it would take for them to do so on their own. Because of the black soil in the area, whenever soldiers dug foxholes the dark soil lying on top of the snow alerted the enemy to the soldiers’ positions. Generally, when they dug foxholes, they would cover

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190 Matheny, 15.
192 Kershaw, The Longest Winter, 65.
the dirt with the snow to conceal them.\textsuperscript{193}

Snow worked in concert at times with the built environment to benefit the American soldiers. A couple of feet of snow had fallen on the area at the time.\textsuperscript{194} The drifts were obviously deeper. As a result, the snow hid hazards unknown to the advancing Germans. Vincent Speranza was a machine gunner with H Company of the 501 Parachute Infantry Regiment (PIR), 101\textsuperscript{st} Abn. Div. His unit was set up on a sloping hill and looked across four hundred yards of snow covered, open ground across which the Germans attacked.\textsuperscript{195} The first wave of German infantry ran into an unseen barbed wire fence that the snow concealed. The second wave tried to help the men of the first wave who were entangled on the fence. “When the third wave of German troops came up to the fence, you now had knots of men tangled in the snow and barbed wire fence.”\textsuperscript{196} At that point, the company opened fire on the German troops and turned the snow red.\textsuperscript{197}

One of the things that the men of the I&R platoon had working in their favor were the foxholes that they were using. When they arrived in Lanzerath there were no other American troops there; but there had been before. The 2\textsuperscript{nd} Division originally manned the position, but they pulled out earlier when the Germans launched their offensive. The men of 2\textsuperscript{nd} Div. dug the foxholes that the I&R platoon used. They had wisely

\textsuperscript{193} Ralph Manley of the 501\textsuperscript{st} PIR, 101\textsuperscript{st} Abn. Div. quoted in Michael Collins and Martin King, \textit{Voices of the Bulge: Untold Stories from Veterans of the Battle of the Bulge}, (Minneapolis, MN: Zenith Press, 2011), 75
\textsuperscript{194} Jack Browder, Interview with Ronald E. Marcello, October 30, 2007, Interview 1216, transcript, University of North Texas Oral History Collection, University of North Texas, Denton, TX, 56.
\textsuperscript{195} Speranza, 45.
\textsuperscript{196} Speranza, 45.
\textsuperscript{197} Speranza, 129. See also Rapport, 478-479.
located them in prime positions on a sloping pasture looking down into the town. The earlier troops also dispersed them across the field so that they did not present a single, ideal target for artillery. Another benefit of the foxholes was that when the previous soldiers dug them the weather was much warmer which allowed the men to dig the holes deep enough so that two men could stand up in them. When the fighting started on the 16th of December, the foxholes were excellent protection and allowed the Americans to survive and fight following a nearly two and half hour artillery barrage.198

Many soldiers encountered circumstances where digging in was not so easily achieved. When William Haugh made it to the front his unit was ordered to dig foxholes. The pick axe that the supply office issued to him had been taken by veteran soldiers as soon as he reached the theater because of the difficulty they had digging holes in the frozen ground.199 Alexander Bolling said that sometimes the ground was frozen so solid that a soldier could not dig at all. In that case, if it was possible, the soldier would use a grenade to blow a hole in the ground. If that was not an option, a soldier would dig a hole that he hoped would allow him to at least lie down below the surface of the ground.200 Don Houseman also found it impossible to make any significant depth in the solid, hard ground. He compared the difficulty of the task with trying to dig a hole in a tile floor.201 Meanwhile, on the frozen Elsenborn Ridge, the men

198 Neill, 192.
199 Haugh, transcript, 55.
200 Bolling, transcript, 38. A soldier might not want to use a grenade if enemy soldiers are relatively nearby and the sound could give away his position.
201 Houseman, transcript, 41.
had to use “mess kits, mess knives, bayonets and helmets to dig in.” If the I&R platoon had to dig their own foxholes, they would not have been as fortunate as they actually were. When they arrived, the ground was frozen and as a result the holes would have been much shallower (as happened with later troops). The inability to dig deep enough foxholes would have negated any advantage that the platoon had. Later that night, the arrival of a dense fog concealed the foxholes even more.

As the Battle of the Bulge started, the fog was immediately an issue for soldiers, both for good and bad. A thick fog covered the entire area east of Bastogne. Staff Sergeant William Meller was engaged with the Germans east of the small village of Weiler in Luxembourg. As he went from foxhole to foxhole to check on his men and ensure that they were prepared for the coming assault, one of his soldiers complained about the lack of visibility in the thick fog. Meller had been involved in the brutal fighting in the Hürtgen Forest earlier in the fall and as a result he was wise enough to understand the small advantage that the conditions provided. He told one concerned private not to “fire unless you see something. They aren’t sure where we are…they might be right out there in front of you.” He was instructing his men, in other words, to use the fog as additional concealment and do not unnecessarily give yourself away.

Obviously, as in Meller’s situation, the men on both sides of the fight used the fog as cover. Sometimes even the mechanized and motorized units took advantage of the foggy conditions. At the small town of Wiltz, also in Luxembourg, the Americans manning the positions were waiting for the German tanks that they knew were

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203 Quoted in McManus, 49.
approaching. The fog obscured their visibility down the road where the soldiers expected the tanks to approach. Then, to make a tense situation even worse, they heard the approaching sound of the tanks. Hearing but not actually being able to see the tanks only made the men more nervous and set them on edge.\textsuperscript{204} After the tanks appeared and the battle commenced, bazooka teams that had concealed themselves in the fog and stealthily approached the Germans and knocked out some of the tanks.\textsuperscript{205}

North of the tank battle, the Americans from Team Cherry were in the traffic jam near Magaret as the men tried to move back west to Bastogne. The men and their trucks were in a kill box and taking severe losses from German artillery, mortars, and small arms fire. During the engagement, one sergeant wisely took advantage of the thick fog that blanketed the area and was able to conceal his truck in the fog.

The presence of the thick fog is a common element, much like “cold” or “snow,” that people mention when discussing the Battle of the Bulge. Artillery battery commander John Hancock had to contend with the fog constantly. Wisely, he had placed ropes leading from the building where the men slept to the gun positions. Originally, the rope was to lead the men at night safely to the gun line through a gauntlet of bomb and artillery craters.\textsuperscript{206} When the fog settled in the ropes proved invaluable for the men to find their way to the guns. After realizing how helpful the rope was, they also installed ropes leading from one gun to another.\textsuperscript{207} Fog was so troublesome to him and

\textsuperscript{204} Maj. Desobry discusses how disturbing it can be when one can hear but not see tanks. See Astor, \textit{A Blood Dimmed Tide}, 223-224.

\textsuperscript{205} McManus, 149.

\textsuperscript{206} John L. Hancock, “Third Reich Finale: As Witnessed by John L. Hancock, 259th Field Artillery Battalion,” August 11, 2003, University of North Texas Oral History Collection, number 1494, University of North Texas, Denton, Texas, 1.

\textsuperscript{207} Hancock, “Third Reich Finale,” 5.
his men that when it lifted, he was so ecstatic he described having a feeling of euphoria.\textsuperscript{208}

One town in particular is a prime example of a town that benefited from the fog that is so prevalent in the region during that time of the year. The village of Noville is north of Bastogne on the main highway that runs into Bastogne from the north. As the main highway runs through Noville it intersects with two other critical roadways. (See Figure 10, below) Team Desobry, under the command of Major William “Bill” Desobry, from the 10\textsuperscript{th} Armored Division was part of Combat Command B (CCB). Col. Roberts, in charge of CCB, ordered Desobry to Noville and establish a defense of the town and its road intersections.\textsuperscript{209}

Team Desobry made it to Noville around ten in the evening of 18 December.

\textsuperscript{208} Hancock, 8.
\textsuperscript{209} Astor, \textit{A Blood Dimmed Tide}, 221.
The darkness of nighttime provided some concealment from any Germans that might have been watching the town or that were out on patrol and might have happened to see the Americans there. Shortly after their arrival, a heavy fog once again shrouded the town and hid Desobry and his men. Desobry stated that when they initially arrived in Noville that the weather actually “was delightful and warm.”\textsuperscript{210} They were able to establish their command post and defensive positions without the Germans observing them. The fog at the time was so thick that it was difficult to see more than ten or twenty yards.\textsuperscript{211} Desobry noted that the fog was so thick at times that fights took place at ranges as close as twenty-five to fifty meters.\textsuperscript{212}

The next morning the fog remained, blanketing the area. The observation posts, defended with Sherman tanks, that Desobry had his men set up on the roadways leading into town had each come into contact with German tanks and troops during the night and retreated back to Noville. The Americans knew that the Germans were nearby and that they were looking to attack Noville to rid it of the Americans. Fortunately, the fog was causing the Germans problems of their own. They had no more idea about the Americans’ locations than the Americans had of the German units and because of the fog that situation was not soon to change. Furthermore, the fog was so thick that it was difficult for the Germans to see where they were going or where send effective indirect fire into the town.

Col. Roberts, CCR’s commanding officer, asked that troops from the 506\textsuperscript{th} Parachute Infantry Regiment (PIR), part of the 101\textsuperscript{st} Airborne Division, be sent to Noville

\textsuperscript{210} Astor, \textit{A Blood Dimmed Tide}, 223.
\textsuperscript{211} McManus, 169.
\textsuperscript{212} Astor, \textit{A Blood Dimmed Tide}, 224.
to reinforce Team Desobry. The 506th sent its 1st Battalion to supplement the infantry that were already there. Roberts hoped that the addition of the paratroopers would allow the Americans to re-take the ridges outside of Noville. There was a risk that the Germans would spot the approach of the new American troops and attack them before they were able to link up with Desobry and his men. As it was, the weather intervened and concealed the men of the 506th under heavy fog as they approached Noville. The presence of the fog helped to protect them from accurate tank, artillery and small arms fire.

Once the paratroopers arrived in Noville, it was their task to take the ridges outside of town. This meant that they had to traverse the wide-open ground outside of town with the Germans above them watching. The Americans would be easy targets in the clear, flat ground. Initially, the fog and an artillery barrage sufficiently concealed them so that they made it to the ridges and started to clear the Germans. Unfortunately, at the same time, the Germans had decided to begin their own attack.\textsuperscript{213} Using their tanks, the Germans pushed the airborne fighters off the ridges and into the open fields where they raked them with tank and machine gun fire.

Later in the day of 19 December, the German tanks and infantry made their way down from the ridges towards Noville. Some of them made it all the way to the outskirts of the town itself. The Americans had no weapons and no answers for the tanks. All that they could do was try to hang on, but it seemed that it was futile. At this critical moment in the battle for Noville the fog began to thicken. It became such an issue that the German tanks and infantry could not coordinate their actions or tell who or where

\textsuperscript{213} Astor, \textit{A Blood Dimmed Tide}, 225.
the enemy was. Consequently, they retreated out of town and back to the ridges because of the difficulty of determining friend or foe. The Germans had all but taken the town from the American paratroopers but because of the fog they were unable to finish and had to abandon the task.

The fog was still present the next day; it remained just as thick as it had been.\textsuperscript{214} Just before dawn, when the Germans began shelling the town with artillery, the fog helped to make accurate fire difficult thus saving a number of the Americans who were taking shelter in the town’s buildings, basements, and cellars. When the Germans renewed their attack on the morning of the 20\textsuperscript{th}, the fog provided additional cover for bazooka men as they hunted the tanks. The American troops could hear the noise and clatter from the German tanks’ bogey wheels and suspension and were able to locate them by sound. The Americans approached the tanks undetected under the cover of the fog and had better, more reliable shots at disabling the tanks.

At times throughout the fighting in the Ardennes’, multiple environmental factors presented themselves simultaneously to provide a better tactical situation for the Americans. An example of the synergistic effect of factors occurred with Team Desobry in Noville. The built environment provided Major Desobry with an ideal location, with good cover from small arms fire, for his Command Post. He set up his CP in a schoolhouse that was situated at the intersection of the three roads that gave Noville its strategic importance. Desobry sent tanks out on each road to establish roadblocks. When necessary they would fall back to the town to pre-established defensive positions.

\textsuperscript{214} Some estimated that the fog was so thick that it limited visibility to ten or twenty yards. See McManus, 237. John Hancock commanded an artillery battery just outside of Aachen. He mentioned that at one time the fog was so thick that his gunners could barely see the numbers on their guns and that he could not see his hand at arm’s length. Hancock, 5.
The limited roads and their single point of intersection in the town made it feasible for Desobry to defend all of them rather than gamble and guess at what route the Germans may take. At the same time the schoolhouse allowed him to maintain better command and control of the fight with its proximity to the road junction.

It was not only the built environment that made Desobry’s location in Noville a good spot from which to defend. When he first arrived in the area, he spent time surveying and studying his position, walking around, and talking to his men. In doing so, he realized that the small village had some natural disadvantages, but it also possessed tactical advantages that he could use in his favor. Noville had some positive aspects for a defender but it also presented its own challenges. On the negative side of the ledger, it was situated in a low spot, an area of ground that was similar to a shallow bowl. Such a position was clearly not an ideal location, especially against indirect fire. Additionally, outside of town were two ridges, one to the north and one to the east. An enemy in possession of the ridges would have the advantage when attacking from this direction. To the east, southwest, and west are draws filled with trees that could also provide cover for an attacker.

On the positive side of the ledger, none of the negative features reached all the way to the edge of town. Desobry noted that open ground that extended for hundreds of yards surrounded the town. These clear fields of fire would be extremely difficult for an attacking enemy to advance across. It was across these fields that the paratroopers of the 506th PIR had to cross when they tried to re-take the ridgelines. Desobry’s tanks, machine gunners and riflemen would have ideal lanes of fire at the Germans as they approached.
Desobry’s situation is also demonstrative of how the same elements can have strategic and tactical application at the same time. Like so many of the small towns involved in the Battle of the Bulge, Noville was strategically important because of the roads that intersected there. Desobry’s men used the roads in a tactical way when they sent the tanks to establish blocking positions on them. This would slow the advance on Noville and would give Major Desobry an idea of the main axis of the Germans’ attack on the town. However, the roads were also strategically important to the German offensive and the Americans’ ability to stop it.

By the time that Gen. McAuliffe in Bastogne gave the order for the men defending Noville to withdraw, the fog had cleared. The road south, back to Bastogne and its relative sanctuary, is almost a perfectly straight highway that would leave the American soldiers easy targets for the Germans. In a repeat of George Washington’s retreat from Brooklyn in August of 1776, a fortunate, and rapid, change in weather saved the Americans in Belgium. Just as in Brooklyn, the Americans desperately needed something that would help conceal their retreat but had nothing at hand that they could use. Mother Nature decided to intervene in the fight at this point. For both armies, in their moment of need, a near miraculous bank of fog suddenly appeared and gave them the needed protection. Prior to the arrival of the fog, the weather and visibility had been clear all day.

The presence of the fog was not the be-all savior that the men had hoped for on their retreat, however. The small village of Foy is roughly one and a half miles down the highway from Noville, towards Bastogne. The fog was as thick in Foy as it had been in Noville. This time, it was the Germans who were able to take advantage of the
atmospheric condition, in addition to the built environment of the town, to attack the American soldiers as they withdrew from Noville, through Foy and down in to Bastogne. Unknown to the escaping Americans, the Germans had placed three tanks on the east side of the road at an intersection in town; the fog and the buildings obscured them from view. German infantry was on either side of the road to support the ambush. As the Sherman tanks that led the American convoy entered the intersection the German tanks opened fire and disabled them. Once again, the disabled tanks became a blockage to the rest of the column and the German tanks began firing on the following vehicles with their infantry firing from their positions also.

The fog was a neutral participant and could favor either side at any one time with its presence or with its quick disappearance. The lifting fog left the Germans at a disastrous disadvantage outside of Marnach, Luxembourg, leaving the attackers completely exposed in an open field and subject to devastating fire. An American platoon from the 110th Infantry Division opened up on the approximately 300 enemy soldiers who were attempting to overrun their position. Because the platoon dug in on the hillside, and the Germans were stuck in the open without any cover or concealment, the Americans had a field day picking off Germans. A soldier that was involved in the fight, Sgt. Stanley Showman, said that “None of ‘em ever got close to us.”

Roads and the Built Environment

The roads were a central issue at all levels of combat in the Ardennes: strategic, operational, and tactical. Both sides needed to consider the effects that the roads

\[215\] McManus, 64.
would have on their plans; however, it was not only the large junctions, in towns like Bastogne or St. Vith, that played important roles but also a number of smaller intersections as well.

Eleven miles northeast of Bastogne lies Antoniushaff. In order to get to Bastogne, the Germans had to control what seemed to be an otherwise useless piece of ground at the town, a road intersection. (see Figure 3) The primary road from the town of Clervaux came to a dead end here at the perpendicular roadway that led on to Bastogne. In order for the Germans to continue to Bastogne, it was imperative that they control this junction. It was also just as important for the Americans to maintain control of this intersection, along with the ones in nearby Allerborn, in order to slow down the Germans. The additional time that the Americans could buy would allow the reinforcements who were on their way to Bastogne time to set up defenses and dig in.

Unlike many other locations where the Americans set up defenses and fought, the terrain at the Antoniushaff intersection was not as conducive to defense. For instance, the town of Clervaux had a castle which was ideal for defense with its solid walls, perfect firing ports and positions, and an extensive basement area. Elsenborn had the ridge outside of town and other small towns such as Noville had the wide-open fields around the town that provided good fields of fire and unobstructed views that favored the defenders over the attackers. As McManus noted the ground at the crossroads in Antoniushaff had “very little cover there. The terrain was mostly flat, with intermittent woods.”

Consequently, the Germans were easily able to overrun the Americans and seize the intersection. The American troops fought valiantly, as other

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216 McManus, 150.
outnumbered units successfully had in many other locations. Yet at Antoniushaff, without the environmental factors being in the Americans’ favor and unable to use them more efficiently than the Germans, in this circumstance it was for naught.

The region’s open agricultural fields would seemingly allow the differing military units to avoid use of the roads should that be necessary. However, there were certain natural and built environmental conditions that precluded this possibility at times. The German tanks had wider treads which was particularly good for operating on the roads but on wet, soggy ground caused them problems with mobility. The standard German Panther and Tiger I had tread widths of 25.6 and 28.5 inches, respectively. The Tiger II had an even larger track measuring 31.5 inches. By comparison the M4 Sherman tank’s track width was only 16.6 inches.

The narrower track allowed the Sherman to outmaneuver the German tanks in open fields. As a result, they were able to fire into the side of the Germans tanks where the armor was thinner and the Sherman’s smaller gun could penetrate. In some of the tank fighting at Noville, two German tanks were stuck in the mud and American tanks, which had to shoot into the sides of the German tanks in order to penetrate their armor, killed them. The Americans’ Shermans had a much smaller main gun that could not penetrate the Germans’ frontal armor. As a result of the risk of being stuck in the muddy fields because of their limited mobility in open country, the German tanks had to stick to the roadways, and in particular those roads that builders had constructed of macadam or paved and did not leave them as dirt roads. Even this was not very beneficial for them because of the narrowness of the roads and resulting predictability of the Germans’ movement and destination. The Americans once again put the
environmental factors to work in their favor, in this case the built environment, allowing their smaller and weaker forces to slow and eventually defeat the larger and better armed German forces.

On the other hand, the Americans found the small roads beneficial at times, especially given the large size of the German tanks (Mark IV tanks were nine and a half feet wide, the Tiger IIs were twelve and a half feet wide). As two German tanks attacked down the road from the east, towards the American CP in Noville, a self-propelled gun disabled one tank while a Sherman tank immobilized the other. The German tanks were in flames in the middle of the road. Because of the massive size of the tanks and the narrow road, the two of them effectively created a significant roadblock that prevented other German mechanized units using the road to approach from that direction.

The number of disabled vehicles on the roads was of great assistance to the defenders in preventing the German tanks from accessing Noville. On 19 December, the Germans heavily shelled the town with artillery and tank rounds as the tanks maneuvered around the village trying to find a way in as they went. The Germans realized that they had a problem of their own making. The destruction from the shelling added to the numbers of disabled vehicles strewn across the roads and was only made worse by the debris from the bombing of the buildings. The continuing fog only worsened the Germans’ difficulties. As a result, all of the detritus of war left from the destruction of the built environment seriously impeded the Panzer’s attempts to take the town.

The built environment sometimes worked against the Americans. In Eschweiler,
Luxembourg, located a few miles due east of Bastogne, the Germans made good use of the convergence of the roads and the terrain. The remaining American troops in the town were leaving in six jeeps, attempting to escape the advancing Germans via a small road. The particular road ran downhill and around a curve which caused the vehicles to slow down. Unknown to the Americans, the Germans had already aimed mortars, tank fire, machine guns, and small arms at this curve. Given the narrowness of the road and predominance of trees on either side, there was nowhere for the vehicles to escape. Their only choice was to endure the enemy fire and try to speed through the kill zone. Due to the nature of the road, however, they were unable to accelerate enough to give themselves a chance at making it through. The firing knocked one private off of his jeep; he managed to make it to the safety of the woods, but the rest were not as lucky. Some of the vehicles made it through the gauntlet, only to run in to more tanks at the next intersection where the Germans captured them. The German fire caught most of the jeeps in the attack at the first bend in the road. Some of the men managed to escape to the woods but most were either killed or captured.

At other times, it was the manner of construction of the roads that worked against the Americans. Outside of Fischbach, near Marnach, a platoon came down a hill on a road that had steep shoulders.217 Again, the Germans opened fire on them and disabled the lead tank in the column and thus left the entire line of tanks unable to move forward. The Americans could not take cover nor turn around because of the configuration of the road and the shoulders. The Germans were able to hit and take out every American tank that was stuck there. It was shooting fish in the barrel.

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217 McManus, 90.
Roads were critical throughout the Bulge to all combatants. As discussed earlier, the Elsenborn Ridge commanded a vital stretch of the roads and road network in the area to the north of St. Vith. Col. Joachim Peiper and his tanks had already moved through the area but in his haste to proceed he failed to place any of his units on the ridge and secure it. Had he done so, the German troops would have had complete control of the roads below. But since he did not, American troops took possession of the heights and the German units that came after Peiper were at the mercy of the men and weapons that the Americans emplaced above them.

After the first Americans established themselves on Elsenborn Ridge, Gerow sent additional manpower to strengthen and reinforce the position, especially against counter-attack from the south. He instructed battalions from the 1st Division and the 26th Infantry’s 2nd Battalion to take up positions facing Bullingen, approximately four miles to the south-southeast. To the firepower from artillery on the ridge behind them, they added four tank destroyers. The longer that the Americans could hold the ridge the longer that they would be able to slow the Germans trying to advance on the road.

The roads through the woods and their narrow construction created ideal choke points which limited the larger vehicles’ maneuverability and allowed small American units, which had already dug in, to hold off their stronger, better armed adversaries. A platoon of men protected within a grove of trees at an intersection would not be able to hold off the Germans indefinitely, but they could slow down the advance enough to throw off the timing that was vital to Wacht am Rhein. At times they might even be able to deter further progress in an area and force the attackers to seek a different route to the one originally planned. Peiper encountered similar circumstances repeatedly in his
attempts to cross the Meuse.

Other aspects of the built environment played central roles in the fighting. Some of the buildings and houses were critical to the Americans chances of slowing the oncoming Germans. The old houses made of stone that comprised the towns provided excellent protection and cover for the soldiers. Because of their old construction, the stone walls were about a foot and a half thick. As a consequence, they would stop most small caliber rounds completely. The town of Clervaux, Luxembourg is indicative of a prime location that presented multiple examples of good roads and buildings that troops and American commanders used well.

Clervaux is approximately fourteen and a half miles directly northeast of Bastogne located on a piece of high ground formed by a “U” shaped bend in the River Clerve. Outside of Clervaux are higher ridges that have thick forests (see Figure 11). The ridges would correspond to the outer arms of the “U” bend of the river. Inside the town is the Clervaux Castle, also known as the Château de Clervaux (see Figure 12). The centuries old fortification is situated on top of a ridge located in between the two outer arms of the “U.”

There were other innate defensive benefits of Clervaux beyond the presence of the castle. The town is almost a mile and a half due west of Marnach. As the Germans advanced from Marnach, the little two-lane highway took them right to Clervaux. Since the town is on a ridge in the U-shaped bend in the river, the roads that lead to the town contain a number of switchbacks and sharp turns. These turns were not problematic for smaller, civilian vehicles but they were very difficult for tanks, armor, and large military

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218 Haugh, 60.
vehicles to negotiate. This caused the military drivers to slow down significantly and placed them at a higher risk of the enemy taking the vehicles out of action. As happened in many firefights in the Bulge, whenever an opponent could disable the lead vehicle, all of the following vehicles had to stop as well. Making use of this advantage, American tanks and tank destroyers were able to take on the better constructed and larger guns of the German tanks.

Figure 11 - Terrain map of Clervaux, Luxembourg, from google maps, accessed December 9, 2018.

Figure 12 - Clervaux Castle, Joachim Köhler at German Wikipedia. (Original text: de:Benutzer:Joachim Köhler)(https://commons.wikimedia.org/wiki/File:Clerf-Schlossburg-20060908-3.JPG), Clerf-Schlossburg-20060908-3, https://creativecommons.org/licenses/by-sa/3.0.
For almost 700 years the castle has been the primary defensive structure for the town. Originally built in the thirteenth century, as with most castles the previous owners modified and added new sections over time so that it has its current configuration. Even though builders originally completed the castle prior to the advent of gunpowder with its revolutionary effect on how countries fight wars, during the Battle of the Bulge and the use of large artillery it still proved useful to the Americans who defended the town against the Germans waiting on the ridges outside of town with their tanks and armor.

Inside the castle, soldiers from Headquarters Company of the 110th Infantry had taken shelter. John McManus provided the following description of the building. “The castle had multiple stories, with several watchtowers and a solid stone façade that curved around the whole structure. The façade was honeycombed with apertures that made ideal firing slits.” The Americans could see the Germans and their tanks and had a good view of the roads in town should the Germans decide to enter. As the American soldiers waited, they were on ground that was equal in height with the ridges where the Germans were located. Because of the position, the Americans easily shot many of them as they walked around smoking cigarettes and drinking coffee.

A couple of days later, the Germans began their attempt to enter Clervaux and run the Americans out of it. The Wehrmacht’s task was significantly more difficult as the Americans were still safely within the castle. The castle’s higher elevation, protected firing positions, and excellent views of the town’s streets below were ideal for slowing down or possibly preventing the enemy’s advance. The Germans attempted to dislodge the American troops from inside the castle using their tanks to fire at the thick walls, but

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219 McManus, 104.
to no avail. The men inside fended off each successive attack. The only way that the attackers had any success occurred after the Germans eventually brought up some 88mm, self-propelled guns. Even then, they knew that they could not fire through the curtain walls. Instead they set the castle alight by firing on the roof. Meanwhile, another tank drove to the main gate and forced its way inside. From there, the tank fired on the castle from point blank range inside the protective, outer wall of the castle.

Clervaux Castle served many purposes for the Americans. The castle not only provided firing positions but also gave the defenders cover from artillery and small arms fire. In addition, the castle had a basement that served many critical functions. The civilian population of the town took shelter there as the fighting raged rather than staying in their less secure homes or fleeing their town altogether. The American medics set up an aid station in the basement for the wounded and used another part to hold enemy prisoners of war. The existence, location and construction of the castle allowed the Americans to hold for days against the Germans even while the Wehrmacht took and controlled the rest of the town.

Other units also used buildings, but in a different way. A couple of miles southeast of Clervaux is Hosingen, a town that lies in the path of the German units that crossed the River Our. In Hosingen, the Mark IV’s and V’s that had crossed the river earlier, were now attacking. The 705th Tank Destroyer Battalion sent five Shermans there an hour prior to the attack.220 The Shermans could not stand up to the firepower of the Panzer tanks so the American tanks initially tried to fend off the attack from positions outside of the town. When this proved to be impossible, they took refuge in

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220 McManus, 75.
Hosingen itself. The tank commanders made use of the buildings within the town to hide from the Germans. The Shermans emerged from behind the cover of the buildings, fired at the Germans, and retreated back to safety.

The buildings in Hosingen not only provided shelter to the tankers, they also assisted the infantry soldiers who were on the ground. The machine gunners and other riflemen could shield themselves within the buildings and houses in the town. But the buildings did not have to be standing in order to serve as sources of cover for them. A destroyed building was equally useful. The debris and rubble of a blown-up building also allowed the Americans protection from German fire. Just as first nature is neutral, so is second nature. In addition to giving them protection, the debris and rocks also increased the deadliness of the artillery and mortar rounds fired by the Germans. Not only were shrapnel, explosive concussions, and shell fragments a threat to kill or wound the enemy, the rocks, bricks, and other parts of the buildings added to the mix as additional material that could cause significant harm to anyone in the blast radius. The addition of this material to an explosion was a risk to anyone taking shelter in a heavily damaged urban environment.

American tanks made use of destroyed and bombed out towns as well as the infantry. In the fighting for Marvie, the Panzer Lehr Division attacked again on 20 December. The Sherman tanks, with their small 37mm caliber main gun, that the Americans had available were woefully understrength either to attack the larger German Panzers or withstand their fire. Higher command eventually gave the order to allow the tankers to displace and withdraw so they could survive and fight another time. Obviously, the Shermans could not simply run away. If they tried to do so, the Germans
would slaughter them with their longer-range guns. The Americans decided to use the bombed-out town of Marvie and any remaining buildings within it as cover and concealment. The tanks eluded the Germans by hiding and moving amongst the destruction of the town.

   Along with Clervaux castle, Americans used many of the buildings for multiple reasons beyond providing a place to sleep or possible protection from German fire. Countless times units used houses as CPs, Observation Posts, or simply firing positions. Most of these houses had cellars. In virtually every account that mentions a house, soldiers use the cellars and basements as a shelter from heavy artillery shelling, mortars, and tank fire, command post, or as a first aid station, and sometimes both as it was Clervaux. Some of the towns even had cellars that were officially designated bomb shelters. Not only were they protected from incoming rounds, but they were generally warmer than if they had to bivouac outdoors. Some soldiers preferred the protection of cellars over basements. Since basements have windows, enemy soldiers could throw grenades in through them and there would be no where for the soldiers in the basements to take cover.

   The shelter from the shelling allowed the troops to endure the attacks much longer and thus allowed them to defend the towns, villages, and cities the Germans needed. Once again, by using the environmental advantages to their favor, the Americans seriously disrupted the Germans' battle plan and time table.

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221 Bolling said that every town had at least one cellar that was artillery proof. Bolling, 47.
222 Hancock, 1.
223 Frederick R. Freeman, Interview with Ronald E. Marcello, March 31, 2000, Interview 1338, transcript, University of North Texas Oral History Collection, University of North Texas, Denton, TX., 81.
224 Hake, transcript, 47.
Forests, Trees, and Woods

Trees served numerous purposes during the battle, whether in offensive or defensive ways. Both sides used the trees for cover, concealment, and shelter. American engineers placed charges on trees and blew them over on to roadways so that they blocked the road and acted as obstacles to slow the German advance. The troops even weaponized them by placing mines and booby-traps in order to inflict further physical damage on their enemies.

The forests of the Ardennes were a key component of the environment and were available to both combatants to use to their benefit. In the woods east of Weiler, a sergeant was making his way through the forest, looking for one of his squad’s foxholes. As with so many of the forests in the Ardennes, this area consisted of dense trees so thick that they restricted visibility for any decent distance. In fact, the trees were so dense that, like in Bavaria’s Black Forest, even daylight had a difficult time penetrating very well. Such was the sergeant’s situation as he sought out his troops.

While the trees provided some security to the American troops, the limited light and sheer number of trees made perfect conditions within which the Germans could conceal themselves and their equipment prior to the attack. This was one of the primary reasons that Hitler chose this area for his surprise offensive. Hitler was able to amass the men and supplies necessary for his offensive under the cover of the Ardennes. The forest was able to conceal the large accumulation of men and continued to hide the smaller units and individuals as the battle developed and was engaged.

One of the primary roads that leads in to Bastogne from Luxembourg, to the east,

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225 Winton, 69.
is the highway from Wiltz. Colonel William Roberts, commander of CCB, sent Team O'Hara, led by Lt. Col. Jim O'Hara, to defend and maintain control of this important highway that ran south of Wardin. Lt. Col. O'Hara and his men were unable to proceed very far to the east of Bastogne and initially set up a position at the intersection where the Wiltz highway intersected with a road that ran almost one mile north to another small village, Wardin.

![Figure 13 - Map showing Marvie and the area to the east of Bastogne.](image)

After the Germans advance overran Wardin, Lt. Col. O'Hara knew that he needed to find a better location to confront the Germans who were heading his way. He chose to displace a short distance back in the direction of Bastogne and establish a new defensive position, this time on the ridges around the town of Marvie. While the ridges were not as high as Elsenborn Ridge to the north, the elevation of the ridges around Marvie obviously provided a better vantage point from which his tanks and men could fire on the Germans. However, in another example of using the built environment in a defensive manner the Americans’ location close to Marvie also gave the commander and his troops a nearby area to fall back to and continue their defense. Some of the
men were even able to use the buildings of Marvie to conceal their position and their vehicles.

While the infantry dug foxholes, the tank drivers hid their Shermans behind hedges that villagers planted outside of the town, using them as concealment from the Germans. Team O’Hara also used the trees along the road in order to slow down the enemy. Engineers attached to the team placed explosive charges on the trees. They then blew them down and maneuvered them so that the trees interlaced across the road. The resulting version of large-scale pick-up sticks created as a significant road block. The fact that the timber interlaced made it much more difficult to remove as a result. To make the task of clearing the roadblock even more hazardous and time consuming for the Germans, the Americans planted mines and boobytraps in the fallen timber. The American soldiers then once again took advantage of the higher terrain and placed their machine guns so that they could fire down onto the Germans blocked by the impasse, in an effort to strengthen even further the roadblock.

Utilizing trees to create roadblocks was not the only way that the men fighting used the trees of the region. When the shooting started the soldiers would instinctively run to the cover of nearby groves or stands of trees. The dense nature of the forest and the thickness of the trees themselves provided the men laying behind a tree decent cover and concealment against small arms fire. Larger caliber weapons were more effective in situations against troops who had taken shelter in the woods. Consequently, they were heavily employed.

Initially, the combatants would conduct indirect fire from artillery and mortars using high explosive or white phosphorous (WP or “Willie Pete”), an incendiary round.
Ammunition rounds such as this blew trees over, possibly catch on fire, and also sent shrapnel and shell fragments flying. They were not significantly more dangerous or deadly to the men than indirect fire in other circumstances. Both the Americans and the Germans recognized the potential that existed if they could make their opponent fear the trees. If they could do that, then they could force the men hiding within the woods who survived the onslaught out in to the open and fired upon them.

Both armies had in their arsenals artillery shells that they could fit with timed fuzes. The benefit of a timed fuze was that it could be set to explode in the air, in the midst of the trees, rather than upon impact with the ground or some other hard target, as was the case with a contact fuze. Contact fuzes were not as dangerous for the men on the receiving end. War films have made familiar the image of someone yelling “incoming!” When another soldier yells “hit the deck!” everyone falls flat on the ground. By laying prostrate on the ground, the shells’ fragments and shrapnel fly over those who are targeted and do not inflict damage.226 As William Haugh put it, “You’re going to be hit much quicker standing up than you are being down.”227 The same principle explains why soldiers dig foxholes. Men were only at risk if they were too close to the initial blast or a direct hit from a shell, especially if in a dug in position. Even if a soldier was in a foot and a half deep slit trench, an artillery round would have to land almost directly on top of him to kill him.228

An airburst changed that situation a great deal. When a round exploded in the

226 This discussion concerns traditional artillery rounds and not high angle mortar or other fire. High angle rounds have an impact radius that runs along the ground.
227 Haugh, 62.
228 Bolling, transcript, 39.
air directly above an enemy position, the risk and damage that resulted increased. When the shell exploded in the air, the effective blast radius was larger and covered a larger area and, consequently, more of the men since it was focusing down on the men rather than up and away. Additionally, the shell fragments and shrapnel rained down on the men; it was irrelevant if they lay prone or concealed themselves in a foxhole.

However, timed fuzes are inexact. While they are frightening and dangerous when they work as designed, they do not always explode at the proper time or height above ground. For the fuze to function as desired, the artillerymen who fired them had to apply calculations and formulas to determine the proper settings for a given fire request. Variables such as distance to target, time in flight, and so on results in the need to change the settings. Ideally, an air burst would detonate approximately twenty yards above the target. Achieving this ideal was difficult.

Throughout the 1930s the Germans, and later on the British, were seeking a technical means to improve the accuracy of the timing of fuzes. Neither of them was successful in finding a workable solution. After the outbreak of the war, the Americans also began to look for a better fuze beginning in 1940 with the National Defense Research Committee (NDRC) in charge of development. The NDRC solved the puzzle and tested the first fuzes in August 1942. By November the War Department was sending them to surface naval vessels in the Pacific, but only for use in deep water.229 There was a concern that if the Army used the fuze over ground the enemy would find unexploded rounds and be able to copy the design.

229 The US Navy had made the request for the fuzes for use in AAA defense against aircraft. The Army later used the fuzes over ground in artillery and naval shore fire.
The fuze that NDRC eventually developed and put into use was the POZIT (proximity fuze), also known as the Variable Time (VT) fuze. Unlike early fuzes that used differing timing devices or means, the proximity fuze was unique in that it contained its own device to determine the proper time for detonation. Inside the fuze is a small radio transmitter and receiver that the fuze uses to determine distance from the target. When the round reaches the proper distance, the fuze sends a signal that detonates the round. This design was significantly more reliable than anything else that anyone had.

The first use of the fuzes in ground combat was during the Battle of the Bulge. Eisenhour thought that the situation was dire enough to justify the risk of the Germans acquiring one. The fuzes were very effective against infantry deployments, whether they dug in or not. However, where they absolutely proved their worth was in the wooded areas that are prominent in the region. All of the aerial burst fuzes were effective in the woods but the reliability and consistency of the American proximity fuze was monumental.

Repeatedly throughout the battle the trees served as defensive areas. It was instinctual for soldiers who came under fire to seek shelter within the nearest woods. The trees were effective cover against small arms fire. Against tank fire, the fire often blows trees down, but the remaining trees provided additional protection against shrapnel and shell fragments. When entire units, such as the 506th PIR in the Bois Jacques, sought shelter and dug foxholes in the forest, air burst was the fuze of choice

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231 Rapport, 604.
for the artillery. As a result, the trees, tree limbs, and splinters added to the risk of harm from the exploding shells for those present. At that point soldiers had to worry about entire limbs falling on top of them or the tree fragments and splinters hitting and wounding them. Not everyone thought that the new fuze was impressive, though. Maj. Gen. James Gavin, commander of the 82nd Airborne Div., thought that it was nothing but “an overvalued toy whose chief accomplishment was to strip the branches off trees.”

The soldiers on the ground disagreed. When an artillery barrage came, being in the trees was the worst place to be, they said.

Although the trees were something that those who endured the artillery attacks quickly learned to fear, they also quickly realized that they could turn the tables and use the same trees could for their own benefit. The large limbs that the Germans artillery fire knocked out of trees and the trunks of trees that the blasts blew down could become covers over the Americans’ foxholes. Soldiers dug at least a four-foot-deep hole and then placed the logs and limbs over the top of the foxholes. Then they placed a layer of dirt on top of that. The cover provided a couple of additional benefits. First and most importantly, it shielded the men from the shrapnel and debris that rained down on them when an air burst exploded above their position. Second, the covers helped to protect the men from the brutal weather and harsh winter conditions that affected the area at the time. This meant that their equipment was more reliable because it was warmer.

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233 Houseman, transcript, 40.
234 Edward L. Reisinger, Interview with Ronald E. Marcello, August 5, 1999, Interview 1312, transcript, University of North Texas Oral History Collection, University of North Texas, Denton, TX, transcript, 99.
Additionally, the men themselves were more combat effective because they were not as cold.

Once more in the combat in the Ardennes the environment proved to be a neutral party in the conflict and provided potential benefits to both participants. Just as the fog benefitted the Germans at one point and the Americans at another in Noville. The use of the trees by both sides also switched which side might have an advantage depending on who made better use of it.

At the tactical level, and perhaps most critically at the tactical level, the environment plays a critical and central role in combat. The presence of any environmental factors, whether natural or manmade, have an impact on the tactical aspects of warfare and effect the men and their equipment. In the Ardennes in December 1944, when people first think of the environment in which the fight occurred, the cold is the most commonly considered element. Yet, when one searches and culls the sources for evidence of how these factors played a role, it becomes clearer that it was more than the weather. The presence of the trees, the terrain, the nature of the roads and their construction, the fog, and numerous other factors effected the fighting.

It is also evident that the use of these elements impacted all participants’ actions and decisions. The extent to which they helped or hurt a particular side was dependent on who best made use of them; nature itself was neutral. The use of the fog and the trees best reflects this neutrality. Individual soldiers or small unit commanders often made the decisions about how best to proceed and handle the circumstances in which they found themselves. These decisions were frequently what determined tactical success or failure.
Adaptability is the law which governs survival in war as in life – war being but a concentrated form of the human struggle against the environment.

– Sir Basil Liddell Hart, *Strategy*

The German surprise thrust out of the Ardennes in December of 1944 forced the American army to adapt to the new situation. The Americans using the region as an area for rest and recovery of troops following a tough fall campaign were not prepared for the fierce action brought on by the Wehrmacht who was able to catch the Americans flat footed.\(^{235}\) Quickly, US commanders at all levels and soldiers on the front lines took stock of their circumstances and surroundings and were able to use the environment where the fighting occurred to their advantage. Their adaptability in this regard allowed them to eventually turn the tide and defeat the Third Reich’s last-ditch offensive. Napoleon said that “why and how are such useful questions that they cannot be posed too often.”\(^ {236}\) With that thought in mind, it is useful, therefore, to ask why and how the natural and manmade environmental factors affected the fighting during the Battle of the Bulge.

The Americans were able to secure the defeat of Hitler’s offensive because of the environment in which the Germans chose to attack; in the end it favored the defenders. “In strategy as well as in tactics, the defense enjoys the advantages of

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\(^{236}\) Quoted in Colson, 110.
terrain, while the attack has the advantage of the initiative.\textsuperscript{237} Without a doubt, the Germans certainly surprised the Americans on the morning of 16 December and caught them unprepared for the Offensive. In his planning and rationale for the campaign, Hitler had considered the environment and how he it could put it to use for the benefit of his troops. He planned on the cloud cover reducing the availability of Allied air support and reconnaissance and negating the Allies’ advantage in the air; he used the dense forests to obscure detection as he massed his forces; and, he counted on the fog to confuse the enemy and conceal his men as they advanced and maneuvered. However, after recovering from the surprise, the Americans quickly adjusted and started to use the terrain and environmental factors to their benefit. They secured positions so that their outnumbered troops could maximize effectiveness and minimize risk which allowed them to hold off the larger, better armed German units. Examples such as the road junction at Noville, the use of Clervaux Castle, and Elsenborn Ridge exemplify environmental elements that Americans used as force multipliers. In fact, the entire German 2\textsuperscript{nd} Panzer Division was delayed so long by a single company from the 327\textsuperscript{th} Glider Infantry at a crossroads in the small town of Tenneville that General Heinrich Freiherr von Lüttwitz, commander of XLVII Panzer Corps, wanted to charge Generalmajor von Lauchert with cowardice.\textsuperscript{238}

Strategic, operational, and tactical decisions were all affected in one way or another by environmental factors. As already mentioned, Hitler intended to use the Ardennes to further his strategic surprise and to conceal the preparations and forces

\textsuperscript{237} Clausewitz, 363.

\textsuperscript{238} Beevor, \textit{Ardennes}, 227.
gathering for the attack. The nature of the road networks greatly affected Operations of all combatants. The small roads and the paucity of paved roads were serious impediments to the Germans’ ability to advance and provided ample opportunities for small American units to delay the numerically superior Germans. Additionally, the roads and weather adversely affected resupply and logistics for both armies. At the tactical level myriad examples exist of men using the natural and manmade surroundings to their benefit. The way that they used the buildings and structures in villages such as Noville or the way they used the trees to increase the lethality of artillery salvos and subsequently as protection from rounds and weather reflects the adaptations of the men in battle.

The fighting in the Ardennes in the winter of 1944 and 1945 was brutal and deadly. The Battle of the Bulge was one of the bloodiest battles that the US Army has ever fought; only the Meuse-Argonne Offensive in World War I supersedes it. In order to slow the German offensive in December 1944, the United States Army incurred a total of 41,315 casualties. In January, the fight to regain the ground and positions that the Army lost resulted in an additional 39,672 casualties. Out of this total, 19,276 men died in action. While German casualty numbers are not exact, it estimates lie anywhere from 81,000 and 103,000.

The experiences of the men who faced the German attack and the sacrifices that they made are undoubtedly worth remembering and acknowledging. It is reasonable to consider that without their willingness and tenacity in the face of the overwhelming disparity in numbers, the war might have raged on longer and many more men might

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239 The numbers discussed in this paragraph are from Roger Cirillo, “Ardennes-Alsace,” 53.
have died. The soldiers that spent much of December and January in the winter of 1944-1945 in foxholes in the snow, mud, and cold deserve the plaudits and admiration they receive for their service.

Nevertheless, an honest evaluation compels scholars to consider the totality of the circumstances. In that regard, the environmental factors that existed in the Ardennes, both natural and manmade, were central to the US Army’s ability to achieve what at first blush seems to be a near impossibility, stopping a larger and better armed enemy who successfully launched a surprise offensive. The Americans were not prepared for the attack and the attack caught commanders unprepared to say the least. However, individual soldiers and commanders from the Corps level down made quick decisions and properly analyzed their particular situations. They, better than their counterparts in the Wehrmacht, made use of the terrain, the weather conditions, the roads, the buildings, and the many trees to survive and prevent the Germans from being able to stick to their timeline, thus inducing a failure of the offensive.

When the Germans initiated their attack they had a three to one advantage in manpower and two to one advantage in tanks (not to mention the qualitative advantage the German tanks had over the American Sherman).

The 28th Inf. Div.’s 110th Infantry (a regiment of approximately 3,000 men) were in Clervaux and the bullseye of the offensive. They held off two German divisions, the 2nd Panzer and Panzer Lehr (roughly 35,000 soldiers and armor) for two days.

Had it

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241 Perret, 404.
not been for the environmental elements and the Americans’ ability to use them to their advantage, all of the sacrifice and bravery of the men who served on the line at the time would have been for naught and the Battle of the Bulge would be an even bigger tragedy for the additional losses. In short, the United States Army was better at weaponizing the environment to serve their military interests and objectives, stopping and rolling back the German attack.
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