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Nature as Friction

Integrating Clausewitz into Environmental Histories of the Civil War

LISA M. BRADY

In late December 1862 Union general Ambrose Burnside developed plans to march across the Rappahannock and execute a massive turning movement against Confederate general Robert E. Lee's troops entrenched along the southern banks of the river. Burnside hoped to ring in the new year by trapping Lee and his Confederates against the river, capturing his army, and redeeming the recent Union defeat at Fredericksburg. In so doing, he would also establish a strong position for marching against Richmond, the ultimate Union goal. Under ideal conditions, Burnside's plan was viable, if risky. However, as often happens in war, conditions were nowhere near perfect.

On January 20, 1863, the day before Burnside planned to initiate the campaign, a winter wave cyclone passed into the area, bringing with it significant amounts of precipitation. "As soon as the general got his army in motion," historian James McPherson wrote, "the heavens opened, rain fell in torrents, and the Virginia roads turned to swamps."¹ As geographer Harold Winters has pointed out, the soils of the region are primarily ultisols—fine-grained, massive, heavily weathered soils that tend to form underlying clay layers that impede percolation of water once saturated. Excess moisture must then run off into streams or pool on the surface.² Despite worsening conditions, Burnside chose to push forward. Winters noted that the "churning action from moving men, horses, and equipment" turned the roads into "deep muddy tracks," and the end of the day on January 21 saw Burnside's nearly 75,000 men "bogged down and their equipment immobilized."³ The next day the humiliated Union troops, still on the northern banks of the Rappahannock, retreated to their

original base at Falmouth, haunted by jeers and taunts from their Confederate enemies. After Burnside's disaster, no Union general commenced a winter campaign in Virginia again.⁴

In analyzing why Burnside's so-called Mud March became such a colossal failure, several factors require attention. One element centers on Burnside's strategy and whether or not it was inherently flawed. By the standards of the day, his plan was neither brilliant nor incompetent, but it only had reluctant support from Burnside's fellow officers—a clear mark against it. However, had the rains not come and the roads stayed passable, the operation had a reasonable chance of success despite its critics. In the planning stages, Burnside had enjoyed fair weather and based his operations on the assumption that similar conditions would prevail. Another matter concerns whether or not the plan was effectively executed. The soldiers and the officers conducted themselves largely according to plan—as far as it was in their power to do so. A third issue is a question of leadership. Though the change in weather brought conditions that merited caution, Burnside's decision to press on was not unwarranted. Harold Winters noted, "As is common in military operations, the mission was paramount to all other factors. On that basis, and regardless of the weather," Burnside made his decision.⁵ In addition to strategic imperatives, there were political influences that impinged on Burnside's deliberations. The Union troops had suffered a demoralizing defeat only a month before. The northern populace was losing faith in the army and Lincoln was pressing for a clear and decisive victory. All of these external pressures weighed on Burnside when he resolved to proceed.

In the end, the problem lay not with planning or execution but in leadership. It was Burnside's decision, and his alone, that resulted in failure. He erred in thinking his troops and his plan could overcome the obstacles nature presented. Burnside's lapse in judgment was a classic example of leadership failure in the face of what the nineteenth-century Prussian military theorist Carl von Clausewitz called "friction" (Ger.: *Friktion*).

In his now-classic treatise, *On War*, first published in 1832, Clausewitz outlined a universal paradox of warfare. He noted, "Everything [in war] looks simple; the knowledge required does not look remarkable, the strategic options are so obvious that by comparison the simplest problem of higher mathematics has an impressive scientific dignity. Once war has actually been seen the difficulties become clear; but it is still extremely hard to describe the unseen, all-pervading element that brings about this change of perspective." Clausewitz identified the source for this percep-

tual shift as friction, which he described as “the only concept that more or less corresponds to the factors that distinguish real war from war on paper.” He explained, “The military machine—the army and everything related to it—is basically very simple and therefore seems easy to manage. But we should bear in mind that none of its components is of one piece: each part is composed of individuals, every one of whom retains his potential of friction.” To illustrate, Clausewitz described the ideal workings of a battalion in which experience, leadership, and discipline seamlessly guide the actions of all involved. Practice, however, is “very different” from theory, Clausewitz noted, because “every fault and exaggeration of the theory is instantly exposed in war. A battalion is made up of individuals, the least important of whom may chance to delay things or somehow make them go wrong.”⁶ As a point of friction (or, in other words, as an agent of historical change) the individual, no matter how insignificant his role, becomes the fulcrum upon which war pivots.

Clausewitz argued that overcoming friction is a primary task of any good commanding officer. “An understanding of friction is a large part of that much-admired sense of warfare which a good general is supposed to possess. To be sure, the best general is not the one who is most familiar with the idea of friction, and who takes it most to heart,” he explained. Instead “the good general must know friction in order to overcome it whenever possible, and in order not to expect a standard of achievement in his operations which this very friction makes impossible.”⁷ Here was where Burnside failed—he pressed forward without deviating from his original plan despite clear indicators that conditions were against him. Burnside’s decision, an obvious example of Clausewitzian friction, cost him the campaign and his career.

If Burnside’s choice demonstrates the element of human friction in war, the change in weather and resulting degradation of marching conditions illustrates another aspect of Clausewitz’s theory. Clausewitz argued that the friction of human agency—that is, the problem of individuals making decisions or acting independently—is compounded by additional elements of chance. The most visible example of this, perhaps, is weather, which Clausewitz singled out for explanatory purpose: “Fog can prevent the enemy from being seen in time, a gun from firing when it should, a report from reaching the commanding officer. Rain can prevent a battalion from arriving, make another late by keeping it not three but eight hours on the march, ruin a cavalry charge by bogging down the horses in mud, etc.” While he acknowledged that “it would take volumes to cover

all difficulties” and that he would “exhaust the reader” if he “really tried to deal with the whole range of minor troubles that must be faced in war,” Clausewitz’s choice of natural forces as the most illustrative case of chance is revealing and extremely useful.⁸

As Clausewitz pointed out, wars may be planned on paper but they are fought in nature, and environmental forces and conditions are therefore fundamental players in military engagements. This was not a revelation when *On War* was published, nor will it astonish anyone who has ever thought about war. It was certainly no surprise to Civil War combatants, regardless of rank, who contended with mud, disease, heat, and insects, among other environmental challenges, on a daily basis. However, we can draw deeper insight from the platitude if we recast nature away from existing only as an element of chance, as Clausewitz suggested it was, toward possessing agency, as environmental historians have argued it does. In doing so, Clausewitz’s notion of friction can provide a linguistic and conceptual bridge between military and environmental history, making mutually intelligible two fields that have a history of talking around each other.

What follows is not a new analysis of specific Civil War battles or strategies but rather an attempt to reveal confluences of analytical approaches between military and environmental history through the lens of a specific natural phenomenon—acoustic shadows. The outcome of several Civil War battles, and the careers of their commanding officers, hinged in part on this acoustical anomaly. Where they occurred, acoustic shadows created uncertainty, thereby causing the battle to diverge from plans and testing the leadership skills of the officers in charge. This uncertainty fits the definition of friction as well as the concept of nature’s agency, revealing that military and environmental historians share common ground after all.

Defining Nature as Friction

Carl von Clausewitz (1780–1831) wrote *On War* between about 1816 and 1831, after the end of the Napoleonic Wars and during the initial stages of the Industrial Revolution. Although his treatise occasionally compares armies to machines, it is unlikely that Clausewitz was adopting the language of industrialization to elucidate his ideas.⁹ Instead, he developed his theory of warfare based on his observations of human nature, the commonalities he saw in the history of warfare, and on his direct experiences with combat prior to 1815. His goal in writing *On War* was not to establish principles for conducting warfare—he was well aware that every

war, indeed every battle, was unique—but instead to present methods for learning how to respond to the exigencies of war.¹⁰ Among his most durable propositions is that war universally entails an element of uncertainty—that is, friction—that cannot be avoided. Great leaders might be able to overcome its challenges, but they cannot prepare for every chance occurrence.

Clausewitz scholars long have debated the meaning of friction as well as the continued applicability of his treatise as a whole to military affairs.¹¹ In recent years, some have turned to the social, behavioral, and natural sciences for models and insight. In 1993 Alan Beyerchen published “Clausewitz, Nonlinearity, and the Unpredictability of War,” in which he suggested that nonlinear science and chaos theory better approximate Clausewitz’s notions of friction and chance than any other interpretive framework. He argued that Clausewitz saw war as a “nonlinear phenomenon” that “is inherently unpredictable by analytical means.”¹² He further asserted that Clausewitz “perceived and articulated the nature of war as an energy-consuming phenomenon involving competing and interactive factors, attention to which reveals a messy mix of order and unpredictability.”¹³ Beyerchen noted that, for Clausewitz, friction encompassed “two different but related notions”: one was “the physical sense of resistance embodied in the word itself, which in Clausewitz’s time was being related to heat in ways that would lead ultimately to the Second Law of Thermodynamics and the concept of entropy”; the other is more analogous to information theory’s definition of “noise,” which describes the difficulty of extracting important information from a constant communication stream.¹⁴

Like Beyerchen, Barry D. Watts looked to science to make sense of Clausewitz’s notion of friction. Where Beyerchen hoped to elucidate the concept in light of Clausewitz’s general theory, Watts intended to analyze friction as it applied to modern and future war. He, too, concluded that nonlinear dynamics was the best model for understanding friction, but his chapter on evolutionary biology adds particular insight into the friction phenomenon. There, Watts examined the ways that human physiological and psychological capabilities limit soldiers’ abilities to perform during battle. “There are,” he argued, “finite limits, grounded in biology and evolution, to the capabilities of humans to receive sensory data, orient themselves by integrating that input with prior experience and information, reach plausible decisions about what to do next, and act upon those decisions.”¹⁵ Although his conclusions appear somewhat deterministic with

regard to human evolution, he acknowledged that technology might serve to reduce friction in war. However, Watts noted, “friction will probably manifest itself in other ways or in areas that we may not even be able to predict.”¹⁶ This led him to examine what nonlinear dynamics might reveal about friction. “Nonlinear dynamics arise from repeated iteration or feedback. A system, whether physical or mathematical, starts in some initial state. That initial state provides the input to a feedback mechanism which determines the new state of the system” and so on, creating a system that “can be more complex and less predictable than one might suppose.”¹⁷

Nonlinear dynamics and chaos theory are familiar to environmental historians, who often turn to the science of ecology for insight into the dynamic relationships human societies have developed with the nonhuman world.¹⁸ Current ecological models recognize that, like human organizations, natural forces and systems are not monolithic and do not tend toward stasis or order. They, too, have constituent parts that may act independently of one another in ways that may not be anticipated. That is, nature’s complexity is not always obvious, and elements of it may act in unexpected ways. For example, in a 2008 study, ecologists Becks and Arndt concluded, “In nature, environmental conditions may change on various time scales. Thus, transitions between different types of dynamic behavior may occur frequently. . . . This makes it likely that short bursts of chaos occur commonly but are often overlooked in the real world.”¹⁹ Nature’s mutable and potentially unpredictable character approximates the role of the individual in Clausewitz’s theory, demanding that humans adapt their actions and their decisions on changing environmental conditions. Thus, applying Clausewitz’s definition of friction to nature, as well as to the human individual, allows us to understand the history of war in promising new ways.

Nature as Friction: Acoustic Shadows

One particularly instructive example of nature as friction is the phenomenon of acoustic shadows, which are created by a variety of natural conditions that affect the transmission of sound, leading to problems with communication and, in at least three instances during the Civil War, challenges in leadership. Acoustic shadow is a phenomenon characterized by sound traveling in unexpected ways. Often generated by anomalous weather events or topographical conditions, acoustic shadows cause sound to either be stifled or amplified, depending on the peculiarities of

the situation. In an acoustic shadow, sounds such as cannon fire might be carried more than fifteen, perhaps as far as fifty, miles away, giving the impression that a battle is raging in a place it is not; or the same sound might fail to travel even two miles, thus preventing reinforcements from knowing an engagement is taking place. Physicist Charles Ross, who has written articles and a book about acoustic shadows during the Civil War, identified four potential causes for the occurrence of the phenomenon. The first two, wind direction and sound absorption, Ross suggested, are the “simplest and most common.” Individuals downwind from the source of sound hear it better than those upwind. “In the second instance – sound absorption – material [such as vegetation, dense fog, or terrain] between the sound source and the listener absorbs most of the original energy, rendering the sound inaudible.” A third reason for an acoustic shadow is air temperature change due to increases in altitude. Sound waves travel faster in warmer air, thus “the part of the sound wave nearer the ground travels faster than the upper part,” bending the entire wave upward and “making audibility at a distance worse than it would be if the air were all the same temperature.” Sometimes, however, temperature inversions, in which warmer air lays atop cooler air, cause sound to bend back toward earth, thus improving audibility. The fourth possibility is due to changing wind speed, also affected by altitude. “Winds generally move faster the farther they get from ground and its friction. As in a temperature inversion, this condition causes the upper part of a sound wave to travel faster, bending the wave back toward earth. This effect, known as wind shear, competes with the normal upward-bending effects of air cooling as altitude increases.” In such instances, the sound bounces back and forth, “causing alternating rings of sound and silence rippling away from the original sound.” Thus, a sound might jump over listeners normally within range, and reach those who would otherwise be out of earshot.²⁰

Ross pointed to numerous examples of acoustic shadow affecting Civil War battles, including engagements at Chancellorsville, Five Forks, and Seven Pines (Fair Oaks), and on several separate occasions during the battle of Gettysburg.²¹ Three other battles, however, are particularly instructive because acoustic shadows played decisive roles in their outcomes and, in two cases, in the futures of their commanding officers. Heavy precipitation, high winds, and irregular terrain created acoustic shadows during the battles of Fort Donelson, Iuka, and Perryville, respectively, and constituted points of friction that threatened Union success in each case. In the first example, excellence in leadership helped to overcome the

Clausewitzian friction caused by the acoustic shadow and helped to establish the reputation of the commanding officer, Ulysses S. Grant, as an able commander. Circumstances in the second instance revealed how nature can be a primary cause in the breakdown in communication, with potentially disastrous results; at Iuka, acoustic shadow paired with difficult terrain to nearly derail Union success in Mississippi. The third occasion of acoustic shadow resulted in a Military Commission inquiry investigating alleged misconduct by the ranking officer, Don Carlos Buell, and caused his professional downfall.

FORT DONELSON, TENNESSEE

On February 6, 1862, General Grant cooperated with Flag Officer Andrew Foote of the U.S. Navy to capture the Confederate position on the Tennessee River at Fort Henry. The joint army–navy operation took mere hours, partly because the fort’s commander, Brig. Gen. Lloyd Tilghman, recognized his untenable position early in the battle and moved most of his 2,500-man garrison twelve miles east to the much better situated Fort Donelson, located on the banks of the Cumberland River. Grant intended to move against Donelson on the 8th, but reported to the chief of staff, Brig. Gen. G. W. Cullum, that he was “perfectly locked in by high water and bad roads, and prevented from acting offensively, as I should like to do.”²² Despite continued muddy roads and high waters, Grant finally moved his forces on February 12 from Fort Henry to outside Fort Donelson, where he invested the Confederate defenses. His position was somewhat tenuous, as he was unable to transport his siege artillery because “half the country [was] under water.”²³ Nevertheless, Grant had to take Donelson; Grant’s commanding officer Henry Wager Halleck had predicted that Fort Donelson would be “the turning point of the war,” stating that it “must be taken at whatever sacrifice.”²⁴

To capture Fort Donelson, Grant once again required assistance from Foote’s ironclads. “Hoping to repeat the Fort Henry experience,” James McPherson wrote, “Grant ordered the navy to shell the fort while his troops closed the ring to prevent the garrison’s escape.”²⁵ Fort Donelson sat atop a hundred-foot bluff, and its guns enjoyed a decided advantage against Foote’s already damaged fleet. Early on the first day of battle, February 14, the Confederate artillery picked off Foote’s ironclads, leaving Grant to continue the attack alone. The same bluffs that enabled the Confederates to neutralize the naval threat left them little means for escape, however, if Grant’s superior numbers succeeded in fully encir-

cling the fort. To prevent the capture of nearly twenty thousand Confederate troops, the fort's commander, John Floyd ordered an attack against Grant's southern flank on the morning of February 15.

The Confederates benefited in their efforts from a major change in the weather. Early February brought unseasonably warm temperatures, but on the 13th, a storm front had moved in, bringing with it sleet, snow, and a strident north wind, plus temperatures in the low teens.²⁶ Brig. Gen. John A. McClernand reported that "the weather turned intensely cold, a driving north wind bringing a storm of snow and sleet upon the unprotected men of my division. The night set in gloomily, and the mingled rain and snow congealed as they fell, thus painfully adding to the discomfort of a destitution of tents and camp equipage, all of which had been left behind."²⁷ Gen. Lew Wallace noted that his Union soldiers "laid down as best they could on beds of ice and snow, a strong cold wind making the condition still more disagreeable."²⁸ Most of the Union soldiers had discarded their overcoats and blankets, seeing them as unnecessary during the recent warm spell. This left them vulnerable to exposure and physically weakened.

When the Confederate attack commenced on the morning of the 15th, with the storm still raging, Grant was five miles away conferring with Foote and was unaware of any of the developments along his line. He had expected no action unless he himself initiated it, so he ordered "his division commanders to hold their positions until further notice."²⁹ Despite being only a few miles from the action, he did not hear the sounds of battle and could not issue updated orders. According to Charles Ross, "The sounds of the engagement did not make it to his location for two reasons: a howling wind blew from north to south, carrying the sound in the opposite direction from him, and a fresh blanket of snow absorbed sound in all directions."³⁰ McClernand's command bore the entirety of the offensive and fell back from their positions for nearly a mile. "Demoralized and out of ammunition, they were in no condition to stop the rebels from escaping through the breach."³¹ The Confederates, too, suffered heavy losses and did not take advantage of the break in Grant's line. During the night, Confederate officers John Floyd, Gideon Pillow, and Nathan Bedford Forrest escaped with only a few thousand troops, leaving Grant's former West Point classmate Simon Bolivar Buckner to face the consequences as the ranking Confederate officer. On February 16 Grant reported to Halleck, "We have taken Fort Donelson and from 12,000 to 15,000 prisoners, including Generals Buckner and Bushrod Johnson."³²

Grant's congratulatory orders to his troops included acknowledgment of the natural forces they had had to overcome: "For four successive nights, without shelter, during the most inclement weather known in this latitude, they faced an enemy in large force in a position chosen by himself. Though strongly fortified by nature, all the safeguards suggested by science were added. Without a murmur this was borne, prepared at all times to receive an attack, and with continuous skirmishing by day, resulting ultimately in forcing the enemy to surrender without conditions."³³

Grant's capture of Fort Donelson provides an opportunity to understand how the forces of nature constitute an element of Clausewitzian friction, as well as how more traditional understandings of friction were also at play. In this particular case the acoustic shadow shaped the outcome of the battle, and Grant's career, not just through its chance occurrence, but because Grant acted quickly and effectively in response to it when he became aware of the obstacle. He was able to staunch the flow of the Confederate retreat through redirecting his own army's energy in a timely manner. He recognized the friction, understood its direction, and took measures, as any good Clausewitzian commander would, to remediate the damage. Unlike Burnside, who allowed the change in weather to defeat him, Grant took decisive action and turned a potential failure into a stunning, and personally important, victory. Grant succeeded, and earned the admiration of the Lincoln administration, because he adapted most effectively to the friction that nature, as an agent of historical change, presented.

IUKA, MISSISSIPPI

Iuka, a small settlement located along the Memphis and Charleston railroad near the Tennessee River in northeastern Mississippi, became a flashpoint in mid-September 1862. Gen. Braxton Bragg, commander of Confederate forces in the West, intended to launch a two-pronged invasion into Tennessee and Kentucky and needed his subordinates in Mississippi to keep Grant, newly promoted to commanding officer in the West, occupied in that state. Bragg ordered Maj. Gens. Sterling Price and Earl Van Dorn to engage Grant at Corinth, Mississippi, an important junction that served as a main Confederate rail connection in the Mississippi Valley. Price enjoyed early success in these efforts when he forced Col. Robert Murphy's federal troops from their positions protecting a large stockpile of supplies in Iuka, twenty miles southeast of Corinth, on September 14, 1862. In response, Grant ordered a pincer maneuver to com-

mence on September 18, intending not just to stop Price from advancing to Corinth but also to capture his entire army. According to Union plans, Maj. Gen. William S. Rosecrans was to conduct a flanking movement, approaching Price's army from the southwest, and turning the Confederate front toward that direction. Grant instructed Maj. Gen. Edward O. C. Ord to take two divisions east along the railroad to attack what ideally would then be Price's rear. Success depended on tight coordination and clear communication. However, in a classic case of friction, unexpected natural forces hamstrung Grant's plan.

The landscape between Corinth and Iuka, and south to Jacinto (the town from which Rosecrans was to initiate his part of the operation) was not ideal for cooperative campaigning. Though the roads were generally good, except during times of heavy precipitation, they were separated by thick forests and swampy ground. On the surface, this seemed to favor the Union plan to establish strongholds on each transportation route leading out of Iuka toward the south and west. If the Union troops could maintain control over each of these roads, Price would be cut off from Van Dorn's divisions in western Mississippi. Furthermore, if Ord successfully enveloped the Confederates from the rear, Price would be surrounded and unable to support Bragg's invasion of Tennessee and Kentucky. However, according to historian Michael Ballard, "the campaign that unfolded fell victim to many problems, including fatal problems with communications, most attributable to rugged, swampy, and hilly terrain that had not been well scouted by Union cavalry."³⁴

Ord's two divisions moved out by rail along the Memphis and Charleston railroad to his position six miles west of Iuka, where he awaited sounds of battle before joining the fight. Ord, in fact, had specific orders not to engage Price's troops "unless he should hear firing."³⁵ In contrast, a number of factors hampered Rosecrans's march. First, his troops moved out toward Jacinto during a major storm, which resulted in some of his troops getting lost as they tried to maneuver in the wet darkness through the thickly forested terrain.³⁶ These troops had to countermarch for more than four hours to get to their prescribed positions, which put Rosecrans and the entire Union operation behind a full day. Furthermore, Rosecrans found as he neared Iuka that his plan to cover both roads into town made for an untenable situation in terms of communication. The Fulton Road to the east and the Jacinto Road to the west were separated by "thickly brushed, swampy land," making "mutual support impossible."³⁷ Instead, he had to concentrate his strength along the western road, leaving Price a potential route for escape along the eastern route.

The troublesome landscape and poor weather created for Rosecrans what historian Russell Weigley called “yet another onset of the perennial friction of war.”³⁸ Rosecrans’s troops began skirmishing with Price’s early on the morning of September 19 and became fully engaged with them until around 4:30 that afternoon. When news reached Price of Rosecrans’s movement to Iuka, he did what Grant had expected him to: he moved two brigades to face the imminent threat, leaving a smaller, vulnerable force in front of Ord. Ord failed to take advantage of the situation, however, because he never heard the cue to attack—the sound of cannon fire. He later reported that on the afternoon of the battle Gen. L. F. Ross saw “dense smoke” around 4 p.m. “arising from the direction of Iuka.” At the time, Ord concluded “that the enemy [were] evacuating and destroying the stores.”³⁹ The next morning, Ord heard guns and “moved rapidly into Iuka and found it had been evacuated during the night.” He was surprised because those guns “were the first heard by us, although on the afternoon of the 19th the head of General Rosecrans’ column had engaged the enemy 2 miles south of Iuka about the time that General Ross reported a smoke in the direction of Iuka. The wind, freshly blowing from us in the direction of Iuka during the whole of the 19th, prevented our hearing the guns and co-operating with General Rosecrans.”⁴⁰ He defended his actions in his official report to Grant by reiterating Grant’s own orders: “You expressed the opinion that General Rosecrans was from last accounts from him too far from Iuka for us to attack on our front until further information was received as to his whereabouts, which was manifestly true. At the same time you directed me to move my whole force forward to within 4 miles of Iuka, and there await the sounds of an engagement between Rosecrans and the enemy before engaging the latter.”⁴¹ In the end, Price escaped on the road Rosecrans failed to block, and when the “Union pincers finally closed,” James McPherson wrote, “they grasped an empty town.”⁴²

Historians of the battle note many elements of friction in the contest for Iuka, but all point to natural phenomena as the reason for Ord’s failure to engage when needed. Charles Ross attributed it to an acoustic shadow caused by wind direction.⁴³ Russell Weigley’s assessment is the same: “A strong north wind kept Ord from hearing the fight.”⁴⁴ Without stating the cause, James McPherson noted that “an acoustic shadow masked all sound of the fighting from Ord, whose troops remained in blissful ignorance of Rosecrans’s battle a few miles away.”⁴⁵ Peter Cozzens provided the most extensive analysis, pointing to numerous reports among Ord’s command that no cannon fire had been heard and, coincidentally, that a

strong wind was present. Cozzens also noted that such testimony “does not square with the recollections of those on the battlefield.” There, “soldiers in both armies spoke of a heavy, still air that kept the smoke of the battle close to the ground. Assuming everyone’s recollections of weather conditions were accurate,” Cozzens argued, “the most reasonable conclusion is that the rolling ground close to the fighting dissipated the breeze Ord’s men felt, and that the damp air on the battlefield deadened sounds beyond a mile or two.”⁴⁶ In other words, September 19 brought together a combination of at least two of the main factors leading to acoustic shadow.

Once again, nature constituted a point of friction in the outcome of the battle. The Union strategy at Iuka hinged on two factors: first, the readiness of all divisions to strike on September 18; second, Ord’s ability to hear Rosecrans’s guns as the signal for his troops to move against Price’s front. Both miscarried. Stormy weather and rough terrain impeded the timely progress of Rosecrans’s troops against Price. Poor communication between Grant and his subordinate officers, due in part to bad weather and difficult terrain but also to simple bad management, was made worse by the larger phenomenon of acoustic shadow and prevented Ord from completing his orders. In the battle of Iuka, the Union officers charged with making on-the-ground decisions failed to adapt their plans to changing environmental conditions and allowed the enemy to escape. Their one consolation, perhaps, was that even though they did not capture Price, they did prevent him from invading Tennessee, a primary objective of Union strategy in the region.

PERRYVILLE, KENTUCKY

In 1862 Kentucky was still up for grabs and both sides were determined to take control. Maj. Gen. Braxton Bragg, supported by Edmund Kirby Smith and Leonidas Polk, led the Confederate Army of the Mississippi. In July Bragg conducted the largest Confederate railroad operation of the war, moving more than forty thousand troops into Tennessee. In early September Kirby Smith entered Kentucky via Knoxville with approximately 21,000 troops; Bragg marched north from Chattanooga, bringing with him 22,500 Confederates, hoping to gain men, materiel, and support from the locals. Maj. Gen. Don Carlos Buell commanded the 60,000 troops opposing Bragg. Federal strategy required that Kentucky remain in Union hands, so a fight was sure to ensue.

The battle of Perryville on October 7 and 8, 1862, began over access to water. “The particular battle that developed,” Russell Weigley observed,

“was not the one intended by either side. Federal troops were trying to ease a water shortage – the weather was still warm and uncommonly dry – from pools along Doctor’s Creek,” a small stream that ran north and west of the town.⁴⁷ On October 7 Polk took up defensive positions with his sixteen thousand troops just west of Perryville’s main stream, the Chaplin River. That evening Maj. Gen. Thomas Crittenden’s 2nd Corps “arrived and attacked unsuccessfully to gain control of the few stagnant pools in a tributary of the river.”⁴⁸ The following morning, Philip Sheridan’s 11th Division launched an offensive that captured Doctor’s Creek and the surrounding hills. “Sheridan might have set the stage for a decisive Union victory,” Weigley suggested, but none of his fellow Union commanders knew anything about his fight. In particular, Sheridan’s commanding officer, Buell, was completely ignorant of the unfolding events.

A westerly breeze blew through the area, creating an acoustic shadow over Buell’s headquarters just three miles from the battlefield. As historian Kenneth Noe remarked, “Nature as well as habitual overmanagement, overconfidence, and the consequences of his bruising fall the previous evening now combined to play a cruel joke on Buell.” The wind and the rolling terrain of the Chaplin Hills “bent the sound waves produced by the musketry west of the field” so only a few of the cannon were audible at Buell’s headquarters. Furthermore, “no smoke rose along the horizon either, as the wind drove it north or east.” Finally, “unable to fathom that the Confederates might not wait for him to perfect his lines and attack on the morrow as planned, Buell immediately concluded that either another artillery duel or at worst a skirmish had flared up.” He perceived the sounds as indicators of a waste of ammunition and powder and ordered it stopped. However, two hours later Buell “finally learned that both his army and his career were in for the fight of their lives.”⁴⁹

Ultimately, Buell’s failure to support Sheridan’s effort resulted in a court of inquiry regarding the commanding officer’s conduct during operations in Kentucky and Tennessee. The following report by J. Holt to the Secretary of War briefly explains the reasons for the investigation:

There are circumstances attending this brief but bloody engagement which baffle comprehension. General Buell, who had approached Perryville conscious of the presence there of the enemy in force, retired to headquarters, 2 ½ miles in the rear of his left wing, and, surrounded by a large and well-organized staff, was ignorant of the struggle until too late to render aid, although he heard the furious cannonade that gave token of a combat about

2 o'clock, pronouncing it a waste of ammunition and demanding that it should stop, took no steps, either through the signal corps then in operation or by his staff, to investigate the cause, or, if necessary, to apply a remedy.⁵⁰

In his defense, Buell noted, "It has been a matter of surprise that so severe an engagement could have taken place within 2 1/2 miles of my headquarters without my knowledge. The commander of an army covering a line 6 or 7 miles long, interspersed with woods and hills, must of necessity depend on the reports of his generals for information of what is transpiring on different parts of the field." He stated that because his army did not get into position when he expected, he did not anticipate a major engagement on the 8th. Furthermore, "a good deal of artillery firing had been going on between the advance guards of the two armies since our arrival the evening before, excepting at night. The cause of this was well understood, and the greater or less rapidity of the firing at intervals was not a matter to attract particular attention, especially as it was to be expected that information of anything of serious import would be promptly conveyed to me. For that reason," Buell continued, "I received with astonishment the intelligence of the severe fighting that commenced at 2 o'clock. Not a musket-shot had been heard nor did the sound of artillery indicate anything like a battle." Buell explained that his failure to hear the sounds of battle "was probably caused by the configuration of the ground, which broke the sound, and by the heavy wind, which it appears blew from the right to the left during the day." He claimed that hundreds could be brought before the commission to testify to that effect.⁵¹

In his history of the battle, Russell Weigley wrote, "Here was another example of acoustic shadow, similar to the one at Iuka: the failure sometimes of even the sound of a large-scale battle to carry to nearby troops." Weigley attributed the acoustic shadow to "the unevenness of the ground."⁵² According to James McPherson, "Less than half of the Union army was engaged in this fighting, while a freak combination of wind and topography . . . prevented the right wing and Buell himself from hearing the battle a couple of miles away."⁵³ Charles Ross suggested that the "weather was clear and cool on the day of the battle at Perryville" and that "the refraction effect" was "extreme." He noted that the "terrain and bizarre acoustics contributed to making Perryville a very chaotic fight, with units on both sides unexpectedly finding themselves mixed in with the enemy."⁵⁴ If the acoustic shadow caused Buell to be "bathed in silence," in Ross's words, then it provided Bragg an advantage during his retreat. Weigley

wrote that Bragg “contrived to break off the action and to slip away, no small tactical accomplishment even with the help of the quirky passage of sound.”⁵⁵ In this instance of acoustic shadow, nature created a point of friction that Buell simply could not overcome.

The battle of Perryville is considered by many historians as one of the most savage of the war. Perryville was arguably a Confederate victory, albeit a pyrrhic one. Massive casualties and the belief that Buell was bringing his entire force to bear against his own tattered troops the following day (in reality, Buell’s entire army had been there the whole time, just not engaged), Bragg chose to withdraw. Perryville was the last battle in the Confederacy’s bid for Kentucky, but Buell’s failure to participate in the fight meant that he earned no credit for that important development in the Union’s war efforts. Buell lost his command later that month, and though his arrogance and frequent missteps contributed to his fate, the friction caused by acoustic shadow at Perryville proved to be the fatal blow to his military career.

Concluding Thoughts

The foregoing pages intended to demonstrate the ways in which the concepts common to military history, Clausewitz’s notion of friction in particular, might be useful to environmental historians as they embark on analyses of nature’s role in the Civil War. Clausewitz provided clear analysis of the major factors affecting military outcomes and, most importantly for our purposes here, he developed language that those who study the war can use to communicate effectively, regardless of their disciplinary background. Military historians and geographers have long seen the utility of Clausewitzian analysis and have integrated his theories and terminology into their work on the Civil War. In recent years environmental historians interested in the intersections of war and nature have discovered mutually beneficial overlap in their work and that of military scholars. However, they have also correctly pointed out that though they and their military counterparts share common ground in wanting to understand the reciprocal influences between environmental forces and conditions and military developments, they often fail to communicate. This breakdown in communication need not continue to impede the fruitful discussions environmental and military scholars are cultivating within the context of the Civil War, especially since Clausewitz’s notion of friction, so familiar to historians of war, is closely analogous to environmental his-

torians' use of the concept of agency with regard to nature. We need not continue to reside in academic acoustic shadows. Instead, like Clausewitz's "good general," we must "know friction in order to overcome it" and we must push our analyses of the Civil War beyond an exercise on paper and into the real world of nature.

Notes

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1. James McPherson, *Battle Cry of Freedom: The Civil War Era* (New York: Oxford University Press, 1988), 584.

2. Harold A. Winters et al., "Too Much and Too Wet: The Civil War Mud March and Flanders' Fields," in *Battling the Elements: Weather and Terrain in the Conduct of War* (Baltimore: Johns Hopkins University Press, 1998), 36.

3. *Ibid.*, 38.

4. Ted Steinberg, "The Great Food Fight," *Down to Earth: Nature's Role in American History* (New York: Oxford University Press, 2002), 91.

5. Winters et al., "Too Much and Too Wet," 38.

6. Carl von Clausewitz, *On War*, ed. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), 119. See also Clausewitz, "Friktion im Krieg," *Vom Kriege* (Darmstadt: Weltbild Verlag, 1990), 77–79.

7. Clausewitz, *On War*, 120.

8. *Ibid.*

9. Stephen J. Cimbala, *Clausewitz and Chaos: Friction in War and Military Policy* (Westport, Conn.: Praeger, 2001), 2.

10. Jon Tetsuro Sumida, *Decoding Clausewitz: A New Approach to "On War"* (Lawrence: University Press of Kansas, 2008), 2.

11. See, for example, Raymond Aron, *Clausewitz: Philosopher of War*, trans. Christine Booker and Norman Stone (London: Routledge and Kegan Paul, 1983); Cimbala, *Clausewitz and Chaos*; Peter Paret, *Clausewitz and the State: The Man, His Theories and His Times* (Princeton: Princeton University Press, 1985); and Sumida, *Decoding Clausewitz*.

12. Alan Beyerchen, "Clausewitz, Nonlinearity, and the Unpredictability of War," *International Security* 17, no. 3 (1992–1993): 90.

13. *Ibid.*, 70.

14. *Ibid.*, 76–77. Beyerchen explained, "From this perspective, [Clausewitz's] famous metaphor of the 'fog' of war is not so much about a dearth of information as how distortion and overload of information produce uncertainty as to the actual state of affairs" (77). Here Beyerchen refers to Clausewitz's statement, "Finally, the general unreliability of all information presents a special problem in war: all

action takes place, so to speak, in a kind of twilight, which, like fog or moonlight, often tends to make things seem grotesque and larger than they really are" (*On War*, 140). Eugenia C. Kiesling questions whether Clausewitz saw fog as an apt metaphor for the chaos of war. See Kiesling, "On War without the Fog," *Military Review*, September–October, 2001, 85–87.

15. Barry D. Watts, *Clausewitzian Friction and Future War*, McNair Paper 52 (Washington, D.C: Institute for National Strategic Studies, National Defense University, October 1996), 84.

16. *Ibid.*, 104.

17. *Ibid.*, 106.

18. Donald Worster, "The Ecology of Order and Chaos," *Environmental History Review* 14, no. 1/2 (1990): 1–18.

19. Lutz Becks and Hartmut Arndt, "Transitions from Stable Equilibria to Chaos, and Back, in an Experimental Food Web," *Ecology* 89, no. 11 (2008): 3225–26.

20. Charles Ross, "Shh! Battle in Progress!," *Civil War Times Illustrated* 35, no. 6 (1996): 56–58. See also, Ross, *Civil War Acoustic Shadows* (Shippensburg, Pa.: White Mane Books, 2001).

21. Ross, "Shh! Battle in Progress!," *passim*.

22. Ulysses S. Grant to G. W. Cullum, February 8, 1862, *Official Records of the War of the Rebellion* (hereafter OR) ser. 1, vol. 7, 596.

23. Henry Wager Halleck to Don Carlos Buell, February 12, 1862, OR, ser. 1, vol. 7, 609.

24. Halleck to George B. McClellan, February 16, 1862, OR, ser. 1, vol. 7, 626.

25. McPherson, *Battle Cry of Freedom*, 398.

26. Grant to Halleck, February 14, 1862, OR, ser. 1, vol. 7, 613.

27. John A. McClernand to Grant, February 28, 1862, OR, ser. 1, vol. 7, 174.

28. Lew Wallace to John A. Rawlins, February 20, 1862, OR, ser. 1, vol. 7, 237.

29. McPherson, *Battle Cry of Freedom*, 400.

30. Ross, "Shh! Battle in Progress!," 59. Interestingly, Grant attributed no cause to this failure, other than that he did not expect a Confederate attack. See Grant to Cullum, February 16, 1862, OR, ser. 1, vol. 7, 159–60.

31. McPherson, *Battle Cry of Freedom*, 400.

32. Grant to Halleck, February 16, 1862, OR, ser. 1, vol. 7, 625.

33. Grant, "General Orders No. 2," OR, ser. 1, vol. 7, 629.

34. Michael B. Ballard, *The Civil War in Mississippi: Major Campaigns and Battles* (Jackson: University Press of Mississippi, 2011), 60.

35. Ulysses S. Grant to Henry Halleck, October 22, 1862, OR, ser. 1, vol. 24, 67.

36. Robert Collins Suhr, "Small but Savage Battle of Iuka," *America's Civil War* 12, no. 2 (1999), 45.

37. Ballard, *The Civil War in Mississippi*, 64.

38. Russell F. Weigley, *A Great Civil War: A Military and Political History, 1861–1865* (Bloomington: Indiana University Press, 2000), 156.

39. E. O. C. Ord to Grant, September 19, 1862, OR, ser. 1, vol. 24, 119.

40. E. O. C. Ord to Grant, September 20, 1862, OR, ser. 1, vol. 24, 110.

41. *Ibid.*

42. McPherson, *Battle Cry of Freedom*, 523.

43. Ross, "Shh! Battle in Progress!," 58.
44. Weigley, *A Great Civil War*, 156.
45. McPherson, *Battle Cry of Freedom*, 522–23.
46. Peter Cozzens, *The Darkest Days of the War: The Battles of Iuka and Corinth* (Chapel Hill: University of North Carolina Press, 1997), 129–30.
47. Weigley, *A Great Civil War*, 158–59.
48. McPherson, *Battle Cry of Freedom*, 519.
49. Kenneth W. Noe, *Perryville: This Grand Havoc of Battle* (Lexington: University Press of Kentucky, 2001), 215.
50. J. Holt by request of Lt. Col. Platt, to Secretary of War, May 23, 1863, OR, ser. 1, vol. 22, 20–21.
51. Don Carlos Buell, "Statement of Major-General Buell in review of the evidence before the Military Commission," sub-inclosure no. 2, May 5, 1863, OR, ser. 1, vol. 22, p. 50–51.
52. Weigley, *A Great Civil War*, 159.
53. McPherson, *Battle Cry of Freedom*, 520.
54. Ross, "Shh! Battle in Progress!," 61.
55. Weigley, *A Great Civil War*, 159.