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THE BATTLE OF TAKUR GHAR: A GEOGRAPHIC ANALYSIS

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ABSTRACT: *On March 4, 2002, American special operations forces fought at 3,186 meters above sea level in the highest military engagement in US History. On the snow-covered peak of Takur Ghar they battled a competent enemy and an unforgiving alpine environment. Deviating from the traditional analysis of mission command, this paper seeks to understand the battle from a geographic perspective. We examine how climate, terrain, the cultural landscape, and cultural capabilities of both forces played a significant role in the execution and outcome of the battle. We suggest that the highland climate influenced both human and aircraft performance, and when combined with the rugged topography of the Arma Mountains and an overconfidence in the use of technology, compelled American forces to insert their aircraft directly on top of the peak of Takur Ghar, a historic and well-reinforced mujahideen observation post. Once there, American forces found themselves isolated in a 17-hour battle with an enemy they expected to flee, but instead demonstrated a commitment to fight and die to maintain their mountaintop fortress. We conclude that the combination of climate, physical terrain, and cultural landscape effectively offset the American's combat power advantage, and when combined with the cultural capability of the mujahideen, led to one of the most grueling days of combat in NATO's Afghanistan campaign.*

Keywords: Military Geography, Takur Ghar, Shahi Kot Valley, Roberts Ridge, Operation Anaconda

INTRODUCTION

In the some of the earliest combat action in the NATO's Afghanistan campaign, American special operations forces engaged in a harrowing 17-hour fight on the highest battlefield in U.S. history deep in the snow-covered mountains of eastern Afghanistan. Seven American servicemembers were killed in action and two MH-47E helicopters were lost during the Battle of Takur Ghar, resulting in a pyrrhic victory for the coalition. Previous analysis has focused on the overreliance on technology (Milani, 2003) and the overall complexities of Operation Anaconda within the warfighting function of mission command (Blaber, 2008; Grochowski, 2015; Macpherson, 2005; Naylor, 2005; Self, 2008). We acknowledge the presence of these elements on the battlefield and their influence in the sequence of events. However, as in most combat engagements, the geography of Takur Ghar was not neutral – several environmental factors influenced the way the battle unfolded and played a central role in determining its outcome. This paper applies the environmental matrix to the Battle of Takur Ghar, focusing on the impact of climate, terrain, the cultural (militarized) landscape, and the mujahideen's cultural (tactical) capabilities during the planning, execution, and conclusion of the fighting (Galgano and Palka, 2011). First, we specify the site and situation of Takur Ghar and briefly summarize the battle to provide overall context. Next, we assess the operational environment through the lens of the environmental matrix to address the most important physical and cultural elements of Takur Ghar. Our analysis concludes with an evaluation of the influence of the physical and cultural elements on the outcome of the battle.

Site and Situation

Located at approximately 33° N 69° E, Takur Ghar is a 3,186-meter (10,452 foot) peak in the Arma Mountains (Figure 1) of eastern Afghanistan. In December 2001, coalition forces operated northwest of the mountain along the rugged Afghanistan-Pakistan border in Tora Bora, a historic base area for the mujahedeen against the Soviets and later a sanctuary for the Taliban and Al Qaeda. The mission was to capture or kill Osama bin Laden and his al Qaeda operatives. However, the coalition failed to establish blocking positions, and bin Laden along with numerous fighters, escaped across the border into Pakistan (Naylor, 2005). Immediately following Tora Bora, intelligence sources suggested that the remnants of al Qaeda in Afghanistan were regrouping just over 125 kilometers southwest in the Shahi Kot Valley (Macpherson, 2005; Naylor, 2005).

To act on this intelligence, coalition forces led by Task Force Mountain developed a hammer and anvil approach called Operation Anaconda (Figure 2). Task Force Hammer, composed of two Special Forces Operation Detachment Alpha (ODA) teams and Afghan militia forces, maneuvered through the suspected enemy locations of

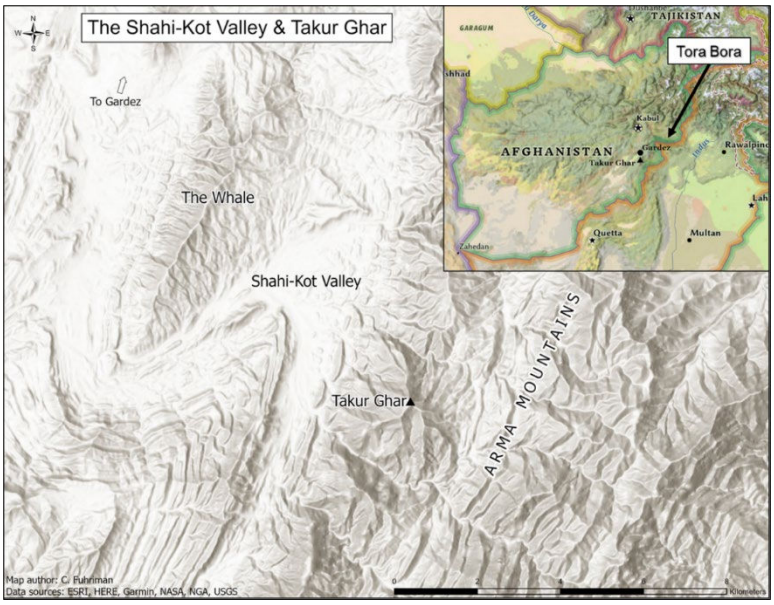

Figure 1. Takur Ghar in relation to the Shahi Kot Valley and Tora Bora.

Serkankheyl and Marzak. Meanwhile, Task Force Rakkasan, the anvil, established seven blocking positions along the eastern wall of the valley (Macpherson, 2005; Naylor, 2005; Neville, 2013). To support the operation, Task Force 11 established three observation posts (OP) overwatching historic escape routes to the south and the east (Blaber, 2008; Neveille, 2013). Two days into the operation, Task Force Mountain became concerned with mujahideen fighters escaping to the southeast through Ginger Pass. Consequently, two more OPs were inserted 48 hours after the operation began. One team, MAKO 30, chose Takur Ghar as its OP (Naylor, 2005; Neville, 2013).

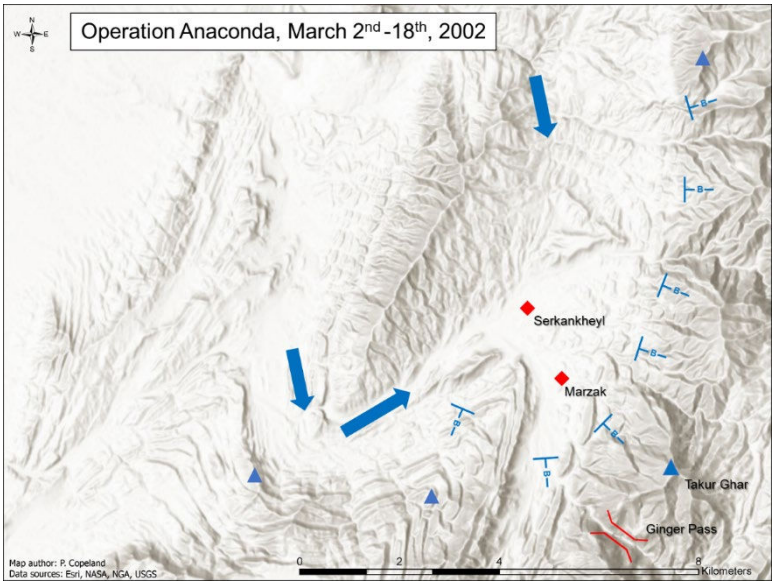

Figure 2. Operation Anaconda's hammer and anvil approach with Takur Ghar and Ginger Pass indicated. All positions are approximate and derived from Neville (2013) and Naylor (2005).

Brief Overview of the Battle

Constrained by the operational timeline, MAKO 30 had only one period of darkness on the night of March 3rd to establish their OP on top of Takur Ghar. Due to additional delays the night of the insertion, the team leader made the decision to land directly on the peak (Blaber, 2008). As RAZOR 03, the MH-47E carrying MAKO 30, flared to land, it was hit by a rocket propelled grenade (RPG). In the cacophony of war, a SEAL named Neil Roberts, fell from the aircraft. The pilots, unable to communicate with the SEAL team onboard their damaged aircraft, executed a controlled crash away from the peak, unknowingly leaving Roberts behind. RAZOR 04, RAZOR 03s wingman, picked up the downed crew and SEAL team and took them back to the coalition base at Gardez. Here, they dropped unneeded personnel and equipment prior to the flight back to Takur Ghar. Returning to the same landing zone (LZ), RAZOR 04 took heavy fire, but successfully inserted MAKO 30 before returning to base due to irreparable damage. MAKO 30 was unable to locate their fellow SEAL and were eventually forced to break contact off the mountain while under heavy fire (Blaber, 2008; Macpherson, 2005; Milani, 2002; Neville, 2013).

Nearly 170 kilometers to the north in Bagram Airfield, the Ranger quick reaction force (QRF) was activated and divided into two aircraft (chalks). Chalk 1, consisting of 13 personnel, was aboard RAZOR 01 and Chalk 2, consisting of 10 personnel, was aboard RAZOR 02. Due to a communication malfunction, RAZOR 01 returned to the same LZ unaware of the previous events or the robust enemy presence on the peak. The aircraft took heavy RPG and small arms fire and crashed onto the LZ. The 10 Rangers and three attached personnel were able to successfully repel the initial attack onto the LZ but were unable to maneuver upon the enemy bunker system until Chalk 2 arrived. Chalk 2 was forced to land 2,000 feet below the primary LZ before making a harrowing ascent to reinforce Chalk 1. Once there, the platoon was able to maneuver upon the fortified enemy position, kill the mujahideen atop the peak, and assume a better defensive position to fight off any looming counterattacks. However, with 11 casualties and five killed in action, their enemy quickly transitioned from the mujahideen to the altitude and the cold as they waited for the sun to set and darkness to cover their exfiltration from the battlefield (Macpherson, 2005; Milani, 2002; Self, 2008).

THE OPERATING ENVIRONMENT

The theoretical framework we employ for this analysis is the "environmental matrix, which is defined as the sum of all factors that operate in a place, and which can have an effect on the successful execution of any operation" (Galgano and Palka, 2011, p. 49). While the matrix outlines the physical and cultural elements separately, the battlefield environment exists at the dynamic intersection of these elements across time and space. Focusing on the geographic elements of climate, terrain, cultural (militarized) landscape, and cultural (tactical) capabilities, this paper answers three fundamental questions: "What was the operational environment like on Takur Ghar?," "Why was it like that there?," and "How did the environment influence the battle?" The first two questions are addressed for each physical and cultural geographic factor in Section 2, while Section 3 addresses the third question.

Highland Climate

Afghanistan is a landlocked country which spans three major climate types: BS (semi-arid), BW (arid), and H (highland). Continentality, topographic barriers, and the proximity to the subtropical high combine to create the arid lowland landscape that is dominated by seasonal temperature extremes with hot deserts in the south and cold deserts and steppes to the northeast and northwest (US Air Force, 2019). The presence of the Central Highlands and the elevated terrain along the eastern border region creates an undifferentiated highland climate where local climate determination can be difficult, and weather can be severe (Galgano and Palka, 2011).

Highland climates often exhibit unique local characteristics because the diversity of topography at a specific location makes a definitive climate classification difficult. However, as altitude increases in the lower atmosphere there is a decrease in temperature, pressure, and humidity (NOAA, NASA, and USAF, 1976; Jackson and Forster, 2010). Using the standard atmosphere temperature lapse rate of approximately 6.5°C per 1000 meters, at 3,186 meters (10,452 feet) the peak of Takur Ghar could be on average 20°C (68°F) colder than a similar location at sea level (Barry, 2008). Furthermore, wind direction and slope aspect can influence both precipitation patterns and exposure to solar radiation. Orographic lifting can create heavier precipitation patterns on the windward side of a highland, whereas equatorward facing slopes receive much more intense solar radiation than their poleward facing counterparts. Consequently, a soldier on an equatorward-facing slope will stay relatively warm even at a low air temperature during daylight hours. However, after sunset, especially in arid climates with limited humidity or clouds to absorb emitted radiation, the surface can cool rapidly, leaving a soldier exposed to frigid overnight lows (Jim Hughes, discussion with author, July 2021; Jackson and Foster, 2010). This combination of low temperatures and increased precipitation due

to orographic lifting can lead to heavy snowfall at higher elevations that often blocks mountain passes for extended periods during winter months (Palka, 2001).

Adding complexity, the decrease in pressure with altitude also reduces air density, which leads to less oxygen for human performance and less lift for aircraft performance (Ombach et al. 2019; Filippone, 2006). Operating at higher altitude stresses the human body and requires acclimatization for the necessary physiological changes in the body to occur. According to the US Army's Army Techniques and Procedures (ATP) 3-90.97, any operation over 7,870 ft. (2,400 m) is considered high altitude where "illness and performance decrements are more common" and even fatal (2016, p. A-2). Even casualty triage is affected, as only a minor wound may require the soldier to descend to lower altitudes for treatment and recovery. Further, non-battle injuries such as exhaustion, dehydration, and hypoxia (insufficient oxygen) can "impair judgment and physical performance" (Department of the Army, 2016, p. A-3). US Army pilots who fly above 10,000 feet (3,048 meters) for longer than one hour in unpressurized aircraft are required to carry oxygen to combat these effects (Department of the Army, 2018).

Physical Terrain and Cultural Landscape

Compounding the challenges of the harsh highland climate, Afghanistan is dominated by rugged topographic terrain with mountains covering about 70% of the country (Galgano and Palka, 2011). The Hindu Kush comprise the Central Highlands, while several equally unforgiving mountain ranges span the eastern border as part of the north-south curving Baluchistan Arc, an extension of the east-west trending Himalayan Arc (Abdel-Gawad, 1971). Here, the Sulaiman Range and the Spin Ghar Range create a formidable border between northeast Afghanistan and western Pakistan's tribal area. The formation of this warped topography began approximately 50 million years ago when the Indian Plate collided with the Eurasian Plate (Jaddon et al., 2020). The resulting compressional and shear forces formed the Chaman fault zone which spans 900 kilometers, the Sulaiman and Kirthar Mountain Ranges which extend 1000 kilometers to the south, and the 400-kilometer-long Spin Ghar Range to the north (Jadoon et al., 2020; Abdel-Gawad, 1971). Takur Ghar, which translates to "Tall Mountain" in Pashtu (Macpherson, 2005), is located in a southern extension of the Spin Ghar Range, known locally as the Arma Mountains, named after the neighboring Arma area and Arma people (Macpherson, 2005, p. 3; Department of the Interior, 1992; Geibel, 2002).

An earthquake on March 3, 2002, demonstrates that the region is still seismically active (Self, 2001). The two tectonic plates have maintained their counterclockwise collision, perpetually shaping a landscape that is dominated by folding and thrust faults (Jaddon et al., 2020; Reynolds, Copley, and Hussain, 2015; Abdel-Gawad, 1971). The series of folds and faults along this dynamic plate border zone creates an alternating landscape of steep ridges and commanding peaks overlooking narrow defiles that connect the flat but intermittent valley floor. Military operations in such landscapes require the control of key mountain passes, which can only be secured by occupying elevated terrain for observation and sectors of fire for weapons systems. Takur Ghar dominates the southern Shahi Kot Valley, overlooking the primary avenues of approach from the southwest and the historic escapes routes to the east. For both US and mujahadeen forces, it was "an obvious site for an observation post" (Neville, 2013, p. 34).

Drawing from Jackson and Hudman's (1990) concise definition of cultural landscape: "the visible human imprint on the land," we limit our analysis of the cultural landscape of this battle to the deliberate human modification of the physical terrain to suit specific military objectives within the battlespace (p. 543). In other words, this analysis focuses on the militarized landscape on the mountain peak. While it is unlikely that the Shahi Kot Valley was ever the locale of intense military engagements in the past, it has been a refuge for Afghan guerrillas for thousands of years and was reinforced accordingly. During the Soviet-Afghan war, the mujahadeen bolstered it with observations posts, bunkers, trench lines and an underground hospital (Grau and Billingsley, 2011). The mujahadeen understood the mobility and logistical challenges of the rugged mountainous terrain and developed each position to be a self-sustaining strongpoint (Grau and Billingsley, 2011). They equipped the peak of Takur Ghar with three bunkers, a trench system, a living area with a command a control (C2) tent, a DShK heavy machine-gun, and up to five 82-millimeter mortar positions (Grau and Billingsley, 2011). With this defensive framework in place, an adversary attempting to secure the peak would be forced to assault uphill against a fortified machine gun position and complementary fighting positions from all directions. Given a will to fight, the mujahadeen had the advantage of an elevated position with enough protection to ensure a long and arduous confrontation.

The operational environment of Takur Ghar is dominated by its physical geography and complemented by the cultural (militarized) landscape imprinted on the physical landscape. The mountain itself was and continues to be shaped by the underlying plate tectonics of the region, and its domineering stature made it key terrain for any force operating within the Shahi Kot. This physical significance directly led to development of a militarized landscape, one specifically designed as a robust defense-in-depth. The strongpoint atop Takur Ghar served as an observation post, command and control node, and a well-constructed fighting position. For the coalition forces, the effects of a

potentially ruthless highland climate on the highest battlefield in U.S. Army history presented just as great a challenge as the enemy who called this landscape home.

Tactical Capability

The mujahideen defending the peak of Takur Ghar proved their will to fight and die in place instead of fleeing as initially anticipated (Naylor, 2005). However, before assessing their battlefield commitment, we first assess the context of its evolution. The Shahi Kot valley served as a critical operations base for nearly two thousand years, supporting indigenous tribes who defended against Alexander the Great in 327 BC, the British colonial troops in the 1840s, and the Soviet Union in the 1980s (Macpherson, 2005). Against the Soviets, the Shahi Kot served as a logistics base that supported a primary 'ratline' into Pakistan under the control of Malawi Nasrullah Mansoor (Grau and Billingsley, 2011; Neville, 2013). His son, Saifur Rehman Mansoor, assumed control of the Shahi Kot after his father's death and began buying/forcing out local Afghans to support the influx of al Qaeda fighters and their families. As al Qaeda was forced out of Kandahar and eventually Tora Bora, their families fled to Pakistan and the fighters congregated in the Shahi Kot to orchestrate the catastrophic attack bin Laden expected would force the US out of the region (Grau and Billingsley, 2011).

The enemy defense was incredibly well developed, and the fighters were seasoned warriors. Observation posts and outlying villages provided an early-warning system along the northern and southern approaches, while multiple mortar positions with baseplates pre-cemented into the ground covered each ground avenue of approach to Takur Ghar. Mountain top strongpoints overwatched air avenues with air defense weapon systems with deliberate engagement areas prepared at each location (Blaber, 2008). Additionally, diagrams on how to shoot down helicopters were discovered on the battlefield – products of the knowledge and expertise the fighters developed in Afghanistan against the Soviets and in Chechnya against the Russians. (Naylor, 2005). Using early warning systems and rehearsed battle drills, the mujahideen had become quite competent at employing air defense ambushes with "massed RPG fire against hovering or landing helicopters" (Jalali and Grau, 1995, p. 239). Following the assault, they would rapidly overrun the LZ to prevent a counterattack and even "hug Soviet forces so that [supporting] helicopter gunships could not fire at them" (Jalali and Grau, 1995, p. 239).

The composition of the enemy aligned with a historic theme in Afghanistan's history: a nation composed of various feuding tribes and nationalities who routinely come together to oust foreign invaders (Grau, 1998). In this case there were reportedly "440 mujahideen in all, comprising 175 Afghan mujahideen. . . 190 mujahideen from the Islamic Movement of Uzbekistan…, and about 75 Arab mujahideen, the majority of whom had previous military knowledge and training" (Blaber, 2008, p. 242). The Afghan mujahideen occupied the bottom of a caste-style system with the Uzbeks and Chechens above them, and the Arab al Qaeda forming the top tier. While reports claim the Arab fighters "actually forbade the Taliban from speaking directly to them" (Blaber, 2008, p. 246), the combat experience and unity of effort against the American invaders could not be underestimated. Further, with Eid al-Adha being celebrated in late February 2002, many of the fighters took part in communal celebrations, prayers, and recommitment to their cause (Blaber, 2008: 255).

The tactical capabilities of the mujahideen fighters on Takur Ghar can be summarized with a pair of themes: first, they are experienced in combat, and second, they bring a tactical expertise in countering air assault operations against a technologically superior foe, all while possessing a strong willingness to fight. These factors have roots in the long-running historical context of the Shahi Kot Valley as a place of resistance, and the experience with jihad for the defenders on the mountaintop.

ENVIRONMENTAL INFLUENCE

"When conducting military operations in mountain or cold weather environments, leaders and soldiers must plan to fight two enemies: the environment and the opposing force" (ATP3-90.97, 2016: vii). On 4 March 2002, the 3,186-meter summit of Takur Ghar contained both. Its terrain in a harsh alpine environment was unforgiving, and a capable enemy was lying in wait in a fortified bunker system of a historic observation post (Figure 3). Both enemies posed significant problems for the coalition forces. History is replete with examples of extraordinary combat leadership, but one of the most essential characteristics of a successful leader is the ability to "quickly, almost intuitively" evaluate the terrain (Hamburger et al., 1984, p. 1). Those that understand the battlefield environment succeed, while those who do not find it to be an adversary as or more lethal than the enemy.

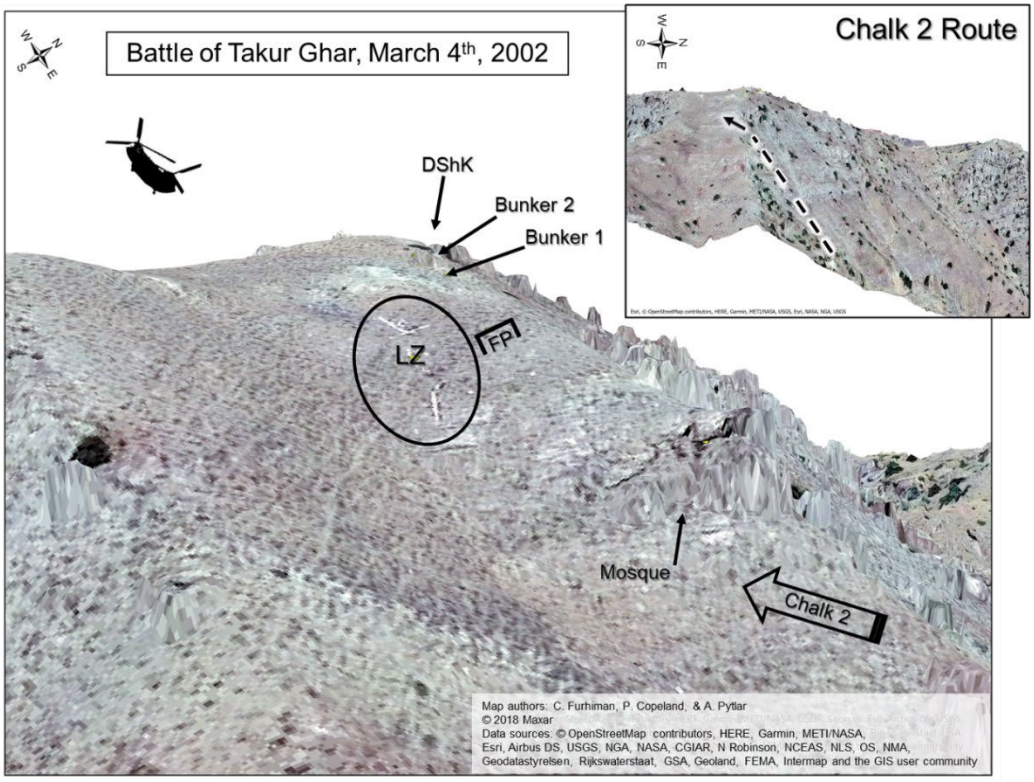

Figure 3. The Summit of Takur Ghar with landing zone (LZ), Ranger fighting position (FP), mujahedeen fortified bunker system and DShK, and the most likely route for Ranger Chalk 2.

Climate and Terrain

In mountainous terrain, occupation of the high ground can be decisive, but getting there can be problematic. At above 3,000 meters, many of the environmental effects on soldiers and equipment on a battlefield at this altitude were untested (Macpherson, 2005). While the AFO commander, tasked with inserting MAKO 30, had a "no heavy-lift helicopter policy" (Blaber, 2008: 227), the time distance analysis for a foot insertion and rotary aircraft performance at altitude meant the only option was to use a MH-47E Special Operations Helicopter. Additionally, due to unanticipated delays on the night of execution, the MAKO 30 team aboard RAZOR 03 (call sign for the first MH-47E) inserted directly on top of the snow-covered peak of Takur Ghar.

Even the MH-47E struggled to perform at the altitude of the battlefield. RAZOR 04, who responded to the crash of RAZOR 03, had to return to Gardez prior to reinserting the MAKO 30 team back onto the summit to rescue Neil Roberts, as the aircraft could not reach the LZ with the weight of two crews and MAKO 30 (Macpherson, 2005). This delay meant when RAZOR 04 was able to return to the battlefield, Roberts had already been killed (Naylor, 2005). Further, the restricting topography of the summit forced the aircraft to return to the same LZ, a reality that would also doom RAZOR 01 as it delivered Chalk 1 of the Ranger QRF. Further compounding the problem, the snowpack and recent snowfall from a storm the day prior only added to the difficulty of identifying alternate LZs amid the treacherous topography of the summit (Macpherson, 2005).

The LZ where RAZOR 01 crash landed was a bowl-shaped, rocky surface covered in snow, with the Rangers in the center of a prepared ambush zone (Macpherson, 2005; Self, 2008). They were 60 meters from the enemy and forced to fight out of the bowl uphill in every direction, while the only piece of cover was a small pile of rocks in an open snow field between the enemy bunkers and the downed helicopter. The main bunker was virtually impenetrable from small arms fire (Naylor, 2005) and the slope of the battlefield meant rounds from the M203 Grenade Launcher were either short or arched well beyond the target only to detonate on the reverse slope. Additionally, a 60-meter throw uphill put them well out of hand grenade range (Self, 2008). Finally, they could not flank the bunker system because the only available route outside of the enemy's field of fire was to their right (northeast), which was a vertical cliff (Self, 2008). The Rangers were caught in a predicament wherein they could not penetrate the reinforced terrain

with the weapon systems they carried, nor could they assault uphill through knee-deep snow within the beaten zone of enemy machine gun fire. They were forced to rely upon close air support (CAS) and weapon systems that were not designed to "support troops in close contact" (Self, 2008, p. 177).

Due to the cold temperatures, communication with the aircraft was not as easy. The attached Air Force Joint Terminal Attack Controller (JTAC) struggled to keep his equipment operational. Because battery performance diminishes in the cold, the JTAC was forced to switch out his batteries and keep them warm by placing them against his body (Macpherson, 2005). Further, the combination of terrain and weapon systems posed an issue. The Rangers were too close to the enemy positions to bomb them directly and the topography of the summit protected the enemy positions from each offset blast. Forced to rely upon strafing runs by jet aircraft with 20mm cannons, they were able to suppress the enemy bunkers, but they had to wait for the precise strike of a Hellfire missile from a Predator Unmanned Aerial Vehicle (UAV) and the arrival of Chalk 2 before they could destroy the main bunker, defeat the enemy, and secure the summit (Self, 2008).

Eventually forced to utilize an offset LZ, RAZOR 02 inserted Chalk 2 of the QRF over 600 meters below the summit. As the Rangers exited the aircraft, they described the terrain as "precipitous" (Macpherson, 2005, p. 217). Initially estimating a 45-minute movement to the summit to reinforce Chalk 1, Chalk 2 labored for over two and a half hours up a northeast facing slope through knee deep snow and near vertical escarpments before they finally reached RAZOR 01. The movement was so demanding that SSG Canon, the Platoon Sergeant, ordered the Rangers to drop any unnecessary equipment and remove their protective back plates. At seven pounds apiece, the weight of the Kevlar armor was unbearable on the 70° slopes (Macpherson, 2005). While Rangers are recognized as an elite light infantry unit renowned for their physical fitness, these warriors found themselves scrambling on all fours while vomiting and spitting up blood as they battled altitude sickness in the frigid mountain air (Naylor, 2005; Macpherson, 2005; Self, 2008).

The temperature and altitude also complicated the movement and treatment of casualties. "It took [four to six] men in superb physical condition twenty minutes to move a [casualty] eighty meters" (Naylor, 2005, p. 363). Further, keeping the casualties warm was difficult and required innovation. As the sun began to set, soldiers stripped clothing from those already dead to cover the wounded, adding stripped insulation from the helicopter when that clothing was not enough (Naylor, 2005; MacPherson, 2005; Self, 2008). Those managing the casualties had to place intravenous (IV) bags under their clothing and against their skin to keep them from freezing (Naylor, 2005). Even pain management became difficult, as the use of morphine at such altitude could be just as fatal as the casualty's wounds themselves (Macpherson, 2005). As oxygen decreases with altitude, and because opioid use also decreases oxygen to the body through respiratory depression, the use of morphine at altitude increases the potential for hypoxia (Ombach et al., 2019). Consequently, the casualties were battling their wounds and the compounding effects of the alpine environment. Those by their sides could do little more but wait for the cloak of darkness to cover their exfiltration.

Cultural Landscape and Capability

If the altitude and terrain were not enough, the mujahideen who occupied these highlands brought a cultural dimension that further challenged the coalition planning assumptions and dramatically influenced the execution and eventual outcome of the battle. Specifically, the coalition miscalculated the tactical capability of a committed enemy operating within a prepared defensive posture that it had used for decades. Coalition planners pursued a "hammer and anvil" maneuver as they expected it would force the enemy to flee from the villages directly into the American Soldiers elevated blocking positions. However, the official Department of Defense summary states: "rather than flee, these disciplined and well trained al Qaeda soldiers stood and fought, and at times were reinforced" (Milani, 2002, as cited in Macpherson, 2005, p. 312-313). Put another way: "they had not travelled to hide from American and coalition forces…They had come to the Shah-i-Kot for a showdown with the Americans in a place of their own choosing" (Macpherson, 2005, p. 99). This overall commitment to the fight from the enemy, and the misreading of this commitment from a coalition perspective, would influence both planning and execution.

The operation started with two competing plans. Coalition forces expected to encounter villages full of fighters, a proverbial hornet's nest. However, the defensive posture of the mujahideen forces arrayed most of their fighters in the mountains, as opposed to in the villages in the valley below. In addition to the historical context of how the mountains were occupied and fortified highlighted earlier, AFO's environmental reconnaissance missions confirmed in real-time the mujahideen's mountain-based defenses (Neville, 2013; Blaber, 2008). In a discussion with a local warlord just prior to Anaconda, Blaber recounts being told: "the mountains around Gardez, you must look for them [al Qaeda] in the mountains" (Blaber, 2008, p. 211). Consequently, coalition helicopters had chosen to infiltrate into occupied highlands where the enemy was well practiced in the art of countering air assault operations.

Reinforcing their tactical expertise of weapons employment honed during the Soviet-Afghan war, their acquired capability of defeating the technologically enhanced coalition forces proved pivotal. Despite the known risks of landing directly on the peak, coalition forces mitigated this with an infrared sweep by an orbiting AC-130. Call sign NAIL 22, with the most advanced sensor suite available, declared a "cold" – or without signs of life – landing zone (Neville, 2013, p. 35). As MAKO 30 approached aboard RAZOR 03, the crew chiefs and members identified a tethered donkey, goat carcasses hanging in the trees, and multiple individuals hidden within the cracks and crevasses of the peak. Hindsight showed an enemy bunker system with a C2 tent and living area all placed within the crevice of rocks or under the cover of foliage and up to three feet of snow, making them nearly invisible from the air (Milani, 2003; Naylor, 2005).

Given the camouflage, protection, and tactical emplacement of these positions above and along primary ground and air avenues of approach, it was clear that the leaders who designed this defense understood the terrain and their technologically advanced adversary's most likely operational course of action (Neville, 2013). Likewise, the execution of the ambush itself was impeccable. Almost as if they were following a battle drill, the mujahideen atop the peak waited until the MH-47E flared and touched down prior to launching the barrage of RPG fire. They had become experts at using the RPGs in "air burst mode to down helicopters" (Naylor, 2005, p. 219), by setting the round to explode before it contacted the target, thus unleashing a shotgun blast of shrapnel. Once subdued, they pulled Roberts's body into a bunker, and while we will never know who activated his infrared beacon, the proximity of his signal to the enemy prevented the responding AC-130 from pounding the mountain top fortress. Finally, when the QRF was shot down onto the LZ, the mujahideen responded with a ferocity that the Ranger platoon was not easily able counter (Self, 2008; Macpherson, 2005; Naylor, 2005).

Perhaps one of the more surprising aspects of the battle was how committed the mujahideen were to the defense of the area. The aggressive defense of Takur Ghar is best summarized in the flow of fighters into the area of operations. From (OPs) overwatching surrounding mountain passes, special operations forces were tasked with preventing enemy forces from escaping, or "squirting," into Pakistan. One position identified numerous fighters, but instead of fleeing the valley, fighters were headed to Takur Ghar to pursue the fight "like they have the smell of blood" (Macpherson, 2005). These fighters would eventually form the counterattacking force that was ultimately repelled by the Ranger QRF after they seized the summit Takur Ghar from the initial defenders (Macpherson, 2005). The unaccounted-for unity of effort and commitment to hold and defend the terrain of the Takur Ghar clearly manifested as a completely different battlefield experience than expected. As SSG Canon reflected during the battle, these fighters could not be easily dismissed, as they "had been locked in combat with Soviets, had traveled to Chechnya and fought the Russians, and now they were fighting the Americans at 10,000 feet dressed in pajama bottoms and 99-cent plastic shoes" (Macpherson, 2005, p. 256).

Throughout operations on Takur Ghar, the militarized landscape and tactical capabilities of the mujahideen fighters defending the peak played a significant role. The coalition's planning phase did not fully account for the military landscape, nor did it incorporate a holistic understanding of the tactical capabilities of the mujahideen fighters. As such, it could not anticipate the impact these factors would have on the operation. While the militarized landscape was characterized by a deliberately emplaced defense and the mujahideen fighters brought the will and expertise to defend that ground, the planning did not anticipate this course of action. Ultimately, operations on Takur Ghar were impacted by underestimating these cultural factors.

CONCLUSION

At 3,186 meters above sea level the operational environment on Takur Ghar was anything but neutral. The altitude of the battlefield and the ruggedness of the terrain along any presumable avenue of approach limited options for advancing US forces to either a long and grueling foot march or an exposed aerial insertion by heavy-lift helicopters. The mujahideen understood this dichotomy and, through decades of tactical experience, modified the battlefield to occupy it in a manner that allowed them to exploit the terrain and their enemy's tactics. Consequently, the interaction of the physical and cultural (militarized) landscape led to a technologically advanced force fighting an uphill battle against mujahideen guerillas who possessed the capability to counter the most sophisticated sensors the coalition could employ. The mujahideen's unanticipated will to defend and die, combined to transform the peak of Takur Ghar from observation post to combat arena. Here, the coalition simultaneously battled a very capable enemy and an unforgiving alpine environment. The combination of climate, physical and militarized landscape, and the mujahideen's tactical capabilities offset the coalition's combat power advantage. The result was one of the most grueling days of combat in NATO's Afghanistan campaign.

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