

# Mountain Warfare— The Need for Specialized Training

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**M**OUNTAIN WARFARE is specialized combat with unique characteristics. Military leaders and soldiers need training and experience to understand the peculiarities of mountainous environments and how they affect combat. Armies that train for mountain combat perform much better than those that do not.

During World War II, the German Army raised an entire corps of elite mountain troops called “gebirgs jaeger” (mountain troops). Although not all of these troops were used in the mountains, they demonstrated superior abilities in almost all theaters in which they were used. The German Fifth Gebirgs Division marched more than 248 miles, crossed mountain passes above 6,500 feet, and secured well-entrenched defenses on the Mestksas Line.<sup>1</sup> Other gebirgs jaeger captured most of the Caucasus mountain region in the summer of 1942.

The U.S. Army 10th Mountain Division, trained in the mountains of Colorado during World War II, captured Riva Ridge in northern Italy. U.S. Army Field Manual (FM) 3-97.6, *Mountain Operations*, cites this action as clearly demonstrating the value of superior skills in mountain warfare.<sup>2</sup> The importance of preparing leaders and soldiers for high-altitude combat cannot be overemphasized.

The Pakistan Army has been in Kashmir for more than 50 years and has a great deal of experience in fighting in mountainous, glaciated terrain. While the U.S. Army has quality training institutions for mountain warfare, it does not have many troops with extensive, current mountain-combat experience. A comparison of the training techniques of U.S. and Pakistan armies provides insight into preparing for mountain combat.

## Training Prerequisites for Mountain Warfare

Physical fitness is the first prerequisite of mountain-warfare training. The effects of cold weather

and unforgiving terrain require a high level of physical fitness for long-distance climbing and walking, and the physical fitness required for mountainous terrain must be developed at high altitude. But being physically fit does not necessarily mean soldiers will be able to perform adequately at high elevations. U.S. soldiers selected to attend the mountain-warfare school in Kakul, Pakistan, required additional climbing time to attain the desired level of physical fitness. The body must adjust to the thin mountain air, and climbing muscles must be developed.<sup>3</sup>

Mountainous terrain can be an ally or a dangerous adversary. In Kashmir each year, thousands of troops are introduced to the mountainous environment to help them understand and appreciate it. A marked difference exists in the performance of units that have conducted vigorous acclimatization training and those that have not. Weather and terrain-related casualties are a big indicator. During initial training in Colorado during the early 1940s, the U.S. 10th Mountain Division suffered more casualties from weather-related injuries than from actual mountain combat in Italy.<sup>4</sup>

Field Manual 3-97.6 defines high mountains as those above 3,000 feet; however, it does not fully explain the high-altitude environment. Despite the fact the Pakistan Army has been fighting in Kashmir for a long time, operations at higher altitudes (18,000 to 22,000 feet) were not fully understood before the Siachen conflict between India and Pakistan in 1984.<sup>5</sup> During the conflict, frostbite, sunburn, and other high-altitude sicknesses caused large numbers of casualties. Such incidences are now rare, however, because troops and commanders are trained to take precautionary measures.

In Kashmir, stone or wooden bunkers, which double as living accommodations and fighting bunkers, are found at posts below 13,000 feet, but at high altitudes, stone structures are not practical. Cement will not bind, and the underlying glacier is al-

ways moving. Instead, prefabricated, synthetic domes (igloos) are used.<sup>6</sup> The domes are easy to carry and assemble even at 18,000 feet and above. They can be retrieved from even large amounts of snow and set up again quickly.

Soldiers must also be trained to wear proper clothing. Loose-fitting layers and insulated and polypropylene clothing that does not allow perspiration to accumulate close to the body are best. Developing frostbite from touching metal equipment with one's bare hands is possible when temperatures drop to minus 22 degrees Fahrenheit. Pressurized sleeping bags help stabilize soldiers suffering from altitude-related sicknesses.<sup>7</sup>

Basic mountaineering and high-altitude skills are vital for soldiers to develop confidence and survive in mountainous environments and essential in combat. As mountain height increases, so does the required skill level. At altitudes below 13,000 feet, it might be enough for soldiers to understand climbing techniques, navigation, route selection, the use of ropes, and procedures to avoid landslides and snow avalanches, but at high altitudes, soldiers must learn more complex techniques, such as those required for mountain expeditions.<sup>8</sup>

Because it is not always possible to transport material by helicopter, troops are often required to carry awkward loads, including kerosene oilcans, rations, and building materials for bunkers. The Soviets learned this lesson while fighting in difficult terrain in Afghanistan.<sup>9</sup>

At high altitudes, where it is difficult to keep weapons functioning, covering and protecting weapons and equipment against snow and ice is a necessity. Batteries often will not perform optimally in the cold, and complicated mechanisms, such as those in surface-to-air missiles, can easily malfunction. Also, artillery shells sometimes behave erratically because of thin air and gusting winds.<sup>10</sup>

Surviving and operating in mountainous terrain requires more energy than usual. A soldier who needs 3,000 to 4,000 calories under normal circumstances will require 6,000 or more calories in the mountains. To complicate the situation, high altitude adversely affects a person's appetite. Soldiers tend to eat and drink less in high altitudes, which reduces morale and fighting capabilities and makes them more susceptible to mountain-related illnesses.<sup>11</sup> U.S. soldiers conducting mountain-warfare training at Abbotabad, Pakistan, which is at 4,000 feet, lost approximately 25 pounds during a 3-week training period.<sup>12</sup> Commanders must ensure soldiers consume proper diets and are well-hydrated.

Physiological and psychological effects become more pronounced at altitudes above 8,000 feet. Soldiers must take preventive measures and be trained to detect signs of illness in colleagues. Common symptoms include severe, persistent headaches; coughing; difficulty in breathing; and aloofness. Other symptoms might include swelling around the eyelids, incoherent speech, intolerance, and even outright aggressiveness.<sup>13</sup>

Many problems, including altitude sickness, can occur during the initial stages of a soldier's arrival at high altitude. The biggest killer, cerebral or pulmonary edema, is difficult to detect, but often develops if soldiers stay too long at high altitude.<sup>14</sup>

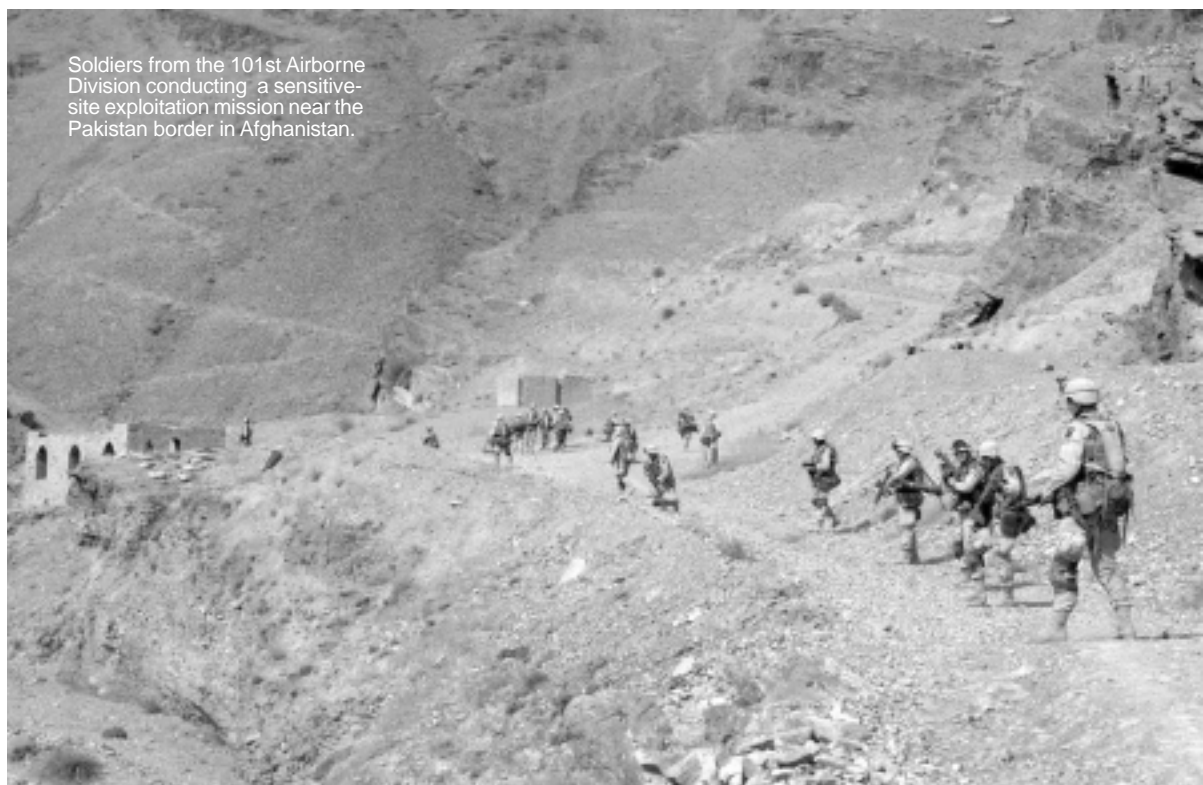
The normal practice in glaciated areas is to not keep soldiers above 19,000 feet for more than 3 to 4 weeks before returning them to lower elevations. If soldiers experience any signs of altitude illnesses, commanders must evacuate them promptly. For most mountain illnesses, evacuation to below at least 3,000 feet is the first requirement for saving a person's life.<sup>15</sup> Delaying evacuation might not only cost the soldier's life, but imperil the lives of the soldiers who might have to conduct evacuation procedures during bad weather.

Replacements being sent to high-altitude environments must have operated at heights similar to those to which they are being sent for at least 10 to 15 days. If not, they could quickly become casualties themselves. Well-trained, acclimatized troops must be available to replace those at higher altitudes.

High-altitude environments can take heavy physical and mental tolls on soldiers. While in the Caucasus, the Germans learned that troops wore down much faster in mountains despite the fact they were elite troops, picked for their mental abilities and physical prowess. Operations in such environments involve extreme physical exertion.<sup>16</sup> Living conditions in mountainous terrain can be difficult. At times all movement is stopped, soldiers do not receive mail, and replacements might not arrive on time. These factors can lead to depression and boredom and a sharp decrease in fighting spirit. Simple tasks such as manning weapons, sentry duty, and patrolling require determination.

Offensive actions in mountainous terrain are difficult and costly. Not only must soldiers fight the enemy, they must also brave the elements of harsh terrain, which are equally formidable. These conditions call for strong leadership by junior leaders, who must physically lead and be mentally tough.

**Leadership.** Mountainous and high-altitude environments are extremely demanding and require a



Soldiers from the 101st Airborne Division conducting a sensitive-site exploitation mission near the Pakistan border in Afghanistan.

US Army

high level of leadership at the small-unit level as well as at higher levels. Leaders must understand the constraints placed on their soldiers' performances and should include terrain and weather in planning and executing actions to avoid miscalculating the timeframe, logistic requirements, and force capability.

Mountain combat is decentralized and often takes place at the platoon or squad level. The quality of junior leadership is decisive. The Russians observed in Afghanistan that even a small unit, maneuvering boldly, could decide the outcome of a battle.<sup>17</sup>

A hallmark of German alpine troops during World Wars I and II was the quality of their leadership. German Field Marshal Erwin Rommel, who began his career in a German mountain regiment during World War I, relentlessly advanced his small detachment in difficult terrain capturing one hilltop after another.

Mountainous environments demand that junior leaders set the example of physical fitness and endurance. During the Pakistan-India conflict at Kargill in northern Kashmir in 1998, Captain Sher Khan was posthumously awarded the "Nishan-E-Haider," Pakistan's highest military award, for conducting daring raids with a handful of men against enemy patrols and convoys. His last action included a successful counterattack to recapture a post against

overwhelming odds. Such leadership inspires subordinates and raises the morale of the entire unit.

At high altitudes, small-unit leaders must be trained to recognize and address physical and psychological fatigue in their soldiers, including loneliness, depression, and violent mood swings. The relationship between officers and troops is more intimate than under normal circumstances, so leaders should be able to identify signs of deterioration in soldiers before they become pronounced.

Decisions at higher levels influence the conduct of tactical actions. The German Army emphasized the importance of meticulous planning and preparation even for small-scale operations.<sup>18</sup>

Field Manual 3-97.6 emphasizes realistic timetables based on reconnaissance and the commander's practical knowledge of the mountain battlefield.<sup>19</sup> Planners must understand that mountainous terrain adversely affects time and space calculations—an important lesson learned during the U.S. Marine Corps (USMC) exercise *Alpine Warrior* at Fort McCoy, Wisconsin, in 1986.<sup>20</sup>

Cost-effective mountain combat requires skilled and well-trained troops. Soldiers cannot be sent into a fight at high altitude at the last moment. Doing so could invite disaster. One example of such an action is the employment of the 7th Indian Brigade against the Chinese in the 1962 Himalayan con-

flict.<sup>21</sup> The brigade had not been stationed in the mountains previously, and when things began going badly, the brigade was moved from the plains straight into mountain combat. The soldiers, who had not been acclimatized or equipped to fight in the mountains, suffered heavy casualties because of frostbite, edema, and other high-altitude-induced illnesses.

**Communications.** Terrain and unpredictable weather conditions affect communications at high altitudes. Satellite communications and the use of command and control (C2) aircraft can offset some terrain limitations and reduce reliance on bulky radio equipment. Crews responsible for installing and maintaining retransmission stations—often situated on the highest peaks to provide adequate range and coverage—must be well trained in mountain-survival techniques. Also, these isolated stations are targets for guerrilla bands, as the Soviets discovered when they tried to protect similar sites in Afghanistan.<sup>22</sup>

**Fire support.** Mountainous terrain significantly influences artillery fire support. Targets are located on peaks, in ravines, and on reverse slopes; no continuous front exists; and weather conditions are unpredictable. Undulating terrain and intervening crests require a large number of observers located on dominating heights to cover the entire area of operations. Gun positions that are ideal for range and coverage might not be suitable because of intervening features and masking fire. At other times a location might be tactically sound but will be an area prone to avalanches or flash floods. Once guns are deployed, major engineering and logistical efforts might be necessary to shift them to alternate locations in a timely fashion.

Air burst and variable time fuzes are more effective than point-detonating artillery rounds. Howitzers and mortars are more effective because of their ability to engage targets on reverse slopes. The Taliban used mortars to hit U.S. troops successfully during operations in Afghanistan.<sup>23</sup>

**Maneuver.** Mountainous terrain is ideally suited for the defense. During World War II, some of the heaviest casualties in the Italian Theater occurred during an attempt to overcome German defenses at Mount Casino. In Afghanistan, the Russians attacked the strategic Panjshir Valley repeatedly but were unable to clear it despite their advantage in firepower and mobility.<sup>24</sup> The line of control in Kashmir in 2003 was not much different from the cease-fire line of the India-Pakistan war in 1949.<sup>25</sup> Both Indian and Pakistan forces found that an assault on well-defended positions was extremely costly. Defense requires the control of dominating heights, passes,

and lines of communication by strongpoints. An integrated defense is not possible in cut up, mountainous terrain. During training, commanders need to understand the techniques of defense with all-around protection and emplacement of direct fighting weapons. Field Manual 3-97.6 highlights that reserves must be closer to important defense locations because reaction times in mountainous terrains are longer than usual, which could require several small rather than one large centralized reserve.<sup>26</sup>

Mountainous terrain offers opportunities for infiltration, requiring defenders to be aggressive at all times. Aggressive patrolling enhances security and keeps soldiers active and sharp. In Kashmir this helped prevent a bunker mentality. Although sensors provide some protection, mountainous terrain is too compartmentalized for complete electronic surveillance. Combat service support (CSS) elements must provide their own protection and must train in patrolling and perimeter defense while developing a mindset focused on constant vigilance.

Offensive operations require meticulous planning and preparation because of the inherent strength mountainous terrain provides to the defender. Training plays a vital role in ensuring an edge for the attackers. Since the defender has an advantage, successful attacks should isolate the defender and keep him under constant pressure. The Soviets laid great emphasis on junior leaders and company-level mountain operations, advocating envelopment by smaller, autonomous groups.

During Operation Anaconda in Afghanistan, U.S. forces used more decentralized combat than on normal terrain. Junior leaders' initiative and skill is vital to the mission's success, especially in security and reconnaissance missions. Mountainous terrain and bad weather provide opportunities for small forces to concentrate and achieve surprise. Russian and Afghan government forces suffered heavily when they neglected this aspect of the battlefield environment.<sup>27</sup>

The Soviets used helicopters in Afghanistan to airlift troops and supplies into battle.<sup>28</sup> Helicopter gunships effectively supported ground operations until the Mujahideen obtained Stinger missiles, which tilted the situation in their favor.

U.S. forces also rely on helicopters for transportation and movement in the mountains, requiring aviation planners to be involved in the planning process early. With beyond-line-of-sight and precision-guided munitions, aviation and air assets have neutralized many inherent problems in mountain warfare, but they have not eliminated the need



Soldiers from the 101st Airborne Division prepare to move out after having been dropped off at a battle zone during Operation Anaconda, 5 March 2002.

US Army

for specialized training. Because mountain combat tends to be decentralized, control of supporting fire is more difficult. Tight control of jet aircraft and helicopter gunships is necessary to avoid fratricide.

**Logistics.** Logistics support in the mountains is difficult and time-consuming. In Kashmir, a variety of transport is used for logistical support, road transport being the most reliable and cost-effective. At higher altitudes where tracks cannot be maintained because of snow and difficult terrain, mules are a preferred means of transport.<sup>29</sup> At altitudes where even mules cannot go, porters can. Porters are local people capable of carrying heavy loads across difficult terrain.

In the Caucasus Campaign, the German army used sleds, mules, and horses in addition to trucks.<sup>30</sup> Recently, despite technological advances, the U.S. Army had to use horses and mules in Afghanistan. Helicopters are a quick, versatile means of transportation, but at higher altitudes their lift capability is severely limited. The French Alouette helicopter can fly higher than U.S. helicopters can, but even it can deliver only about 180 pounds above 20,000 feet. Because helicopters cannot be used in adverse weather, a mixture of resources is necessary to ensure reliability and flexibility.<sup>31</sup>

The road network in the mountains is generally a logistician's nightmare. Main supply routes are lim-

ited and often do not support vehicles that require large turning radii. Many roads do not permit two-way traffic.

While tactical plans take into account main roads, tactical engagements do not usually occur close to roadheads. At Siachen, the Pakistan Army built roads near forward defenses, but the real challenge was in transporting supplies across the last few miles from roadheads to forward posts.

The Center for Army Lessons Learned (CALL) analysis of the operation in Afghanistan recognized the need to have logistics as far forward as possible: "It might require additional staff work from the logisticians to deploy the logistics to the work area (like rations to the platoons, mortar rounds to the mortars), but the advantage is reduced expenditure of energy for those on the ground."<sup>32</sup>

Logistics estimates and loads must be customized for the mountainous environment. For example, using mules requires loads be broken up according to their carrying capacity. Also, overages must be built into supply estimates because there is always a need for a large reserve of items that wear out quickly, such as boots, jackets, and gloves. If soldiers use improper or worn clothing for even a short time, the chance of developing altitude and cold-related sicknesses increases significantly. In addition, combat casualty evacuation involves many challenges. Air

evacuation remains the preferred method, but because of the dispersed nature of troops, expert medical help might not be available quickly. Therefore, self-aid, buddy help, and the availability of more combat life savers in the unit is important.<sup>33</sup>

Canadian small-unit support vehicles, specially designed for restrictive terrain, were particularly useful for logistics support at high altitude in Afghanistan, whereas the bulky ground-held laser designating system was not. Soldiers' personal loads of more than 50 pounds were too heavy at high altitudes. Equipment must be upgraded for future mountain warfare.<sup>34</sup>

### **Training for Mountain Warfare**

Recent operations by U.S. and other Allied forces confirm the need for specialized mountain-warfare training. CALL's analysis recognizes that soldiers with mountain experience exhibit exceptional morale, physical stamina, and technical competence in decisive combat operations. The analysis also recognizes that coalition forces specially trained in mountainous environments are better trained overall.<sup>35</sup>

**Acclimatization training.** Mountain troops should be stationed at high altitudes to maintain a high standard of physical fitness and acclimatization. Before World War I, German alpine troops were stationed in the Bavarian Alps.<sup>36</sup> In Transcaucasia at 6,500 feet, Soviet troops occupied ideal terrain to train soldiers.<sup>37</sup> Pakistan and India maintain a large number of troops on the line of control in Kashmir. This automatically provides ample opportunities for acclimatization. The U.S. 10th Mountain Division, however, is stationed at Fort Drum, New York, which is not in high mountains.

Although troops need to be acclimatized for any kind of mountainous terrain, the duration depends on the altitude at which the unit must operate. Acclimatization for mountains below 13,000 feet takes 3 to 4 weeks. Pakistan troops train by bivouacking at high altitudes and conducting routine administrative activities and route marches. Each week they conduct hill climbing at increasingly higher altitudes to increase their ability to function. The rigorous training also helps identify soldiers who have medical problems.

Acclimatization for higher altitudes is rigid, and the length of training cannot be shortened without serious consequences. Although the pattern of training remains the same, troops are trained at an altitude of between 8,000 and 10,000 feet for 2 weeks, followed by 1 month's training at 11,000 feet. The troops conduct route marches, fire weapons, climb rocks, and

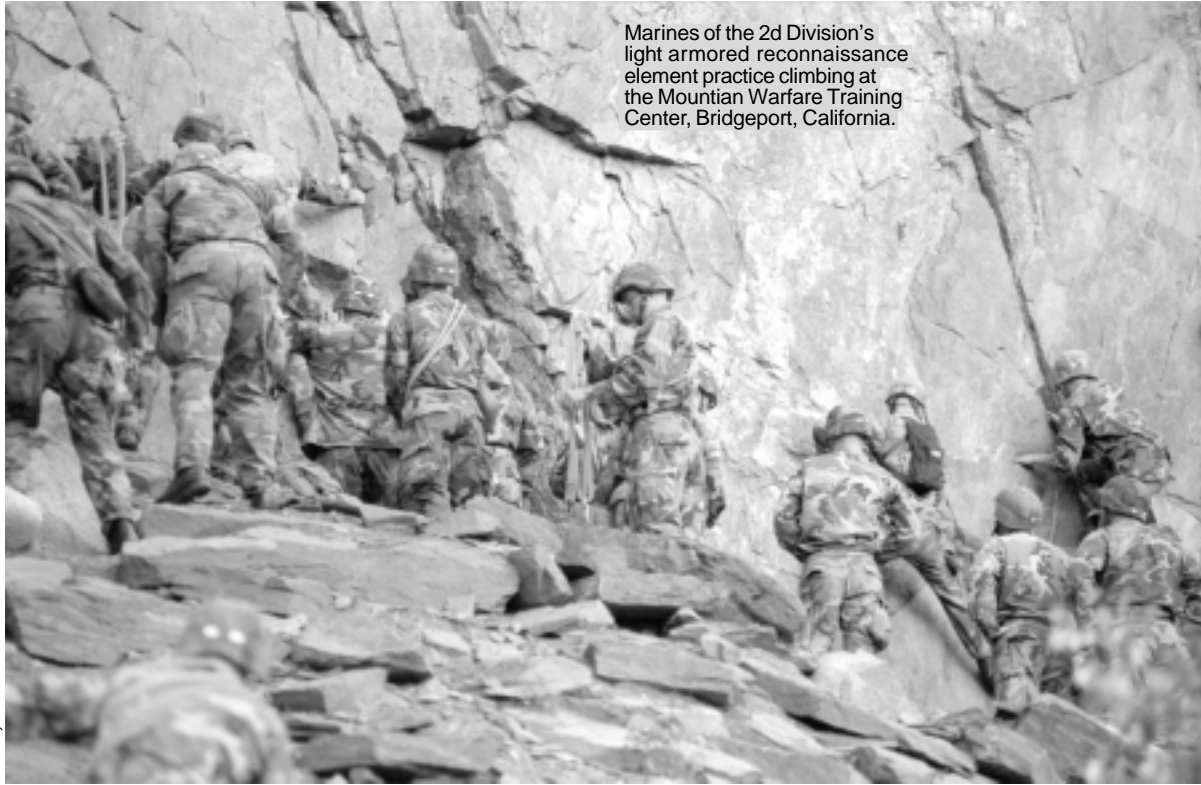
cross crevasses. They then move in stages from 13,000 feet to forward posts at heights up to 21,000 feet. The basic principle is to bivouac one night for about every 3,000-foot increase in altitude. Troops returning from leave must repeat the process.

Because the U.S. Army 10th Mountain Division is not stationed in a high-altitude environment and its soldiers are not acclimatized, deployment to high mountains would require an additional 2 to 3 weeks of acclimatization. This also applies to units that have conducted mountain-warfare training but are not currently stationed at high altitudes. Physical conditioning is essential to mountain combat in Afghanistan.<sup>38</sup>

**Leadership training.** Leadership training is extremely important for mountain warfare. During World War II, German alpine troops displayed strong leadership traits based on their culture of *auftrags-taktik*.<sup>39</sup> In the Pakistan Army, mountain training is considered part of overall training. The Soviet Army recognized the critical importance of junior-leader initiative during its experiences in Afghanistan.<sup>40</sup> The U.S. Army focuses on leadership, but it does not have a package designed specifically for training at different levels of leadership in mountainous environments. Mountain leadership training should be based on the unique characteristics and demands placed on leaders.

Junior leader training requires initiative, personnel management, and mental toughness. In the Pakistan Army, most of these skills are learned through experience and exposure to tough environments. During mountain-combat deployment, junior-leaders often conduct patrols, lead expeditions, and direct command posts, despite sometimes having to endure heavy artillery shelling and adverse living and weather conditions. The U.S. Army Mountain Warfare School emphasizes gaining mountaineering skills rather than training combat leaders. The U.S. Marine Corps Mountain Warfare Center has a mountain leader course designed for junior leaders, but it is heavily skills-oriented.<sup>41</sup>

Mountain leader training should begin with an introduction to issues and problems unique to mountainous terrain. Practical exercises and historical case studies increase leader awareness. Training outdoors in command positions with specific tasks, such as navigation, patrolling, raids, and ambushes, should be conducted at altitudes above 8,000 feet. Simulations that force junior leaders to make tough choices between their soldiers' physical capabilities and mission accomplishment are essential to mountain leader training.



Many senior leaders consider themselves well-equipped to plan and conduct operations in any environment, but commanders who have served in the mountains as young leaders are far better at understanding and planning for such environments. Wargames and live exercises are valuable tools to help senior leaders understand mountain warfare. Live exercises illustrate human limitations in such an environment.

**Individual/team training.** Most armies from countries with mountainous terrain have well-established training institutions. Location of training institutions is an important consideration for mountain training. The Pakistan Army's High-Altitude School, at Rattu in Northern Kashmir, is an ideal location on the confluence of the Hindukush, Himalayas, and Karakorum ranges. The school conducts training throughout the year and includes mountain climbing on peaks ranging from 15,000 to 20,000 feet and survival on glaciated terrain and in snowy and icy conditions. The Indian Army's high-altitude warfare school is at Gulmarg, which is at 8,000 feet.<sup>42</sup> The U.S. Army Mountain Warfare School is located in Vermont, while the USMC Mountain Warfare School is located in Bridgeport, California, which is at 9,000 feet.

The purpose of these training institutions is to train individuals to survive and take advantage of the ex-

treme terrain and weather conditions in the mountains. Physical conditioning is the first prerequisite of mountain warfare. Training should be progressive, starting with light physical exertion followed by route marches and mountain climbing, culminating in test exercises in difficult terrain. Most schools have similar programs for this purpose. Although training individuals at heights up to 10,000 feet can achieve a great deal, to develop high-altitude skills, some training should occur above 13,000 feet.

The ability to navigate and move across difficult terrain builds confidence and enables soldiers to plan and execute maneuvers across seemingly impenetrable and inhospitable terrain. The small-unit mountain operation exercise the U.S. Army Mountain Warfare School conducts is a good example.<sup>43</sup> Participants must navigate to six different sites within a set time. The exercise incorporates various skills soldiers need to complete actions successfully in a time-compressed, competitive environment. Some skills frequently required during mountain warfare include using rope bridges and vertical haul lines and medical evacuation. Mobility in winter has several prerequisites, including using snowshoes, skiing, climbing ice, crossing crevasses, and detecting avalanche hazards.

A key training objective in mountain training is properly using winter clothing, weapons, and equip-

ment and recognizing and preventing cold-weather injuries. Such skills are especially important for officers and noncommissioned officers who must enforce these practices. Lectures, demonstrations, and practical experience can help address these problems. The Pakistan Army's standard training procedures cover most safety issues, such as frostbite prevention, high-altitude sickness, and pulmonary and cerebral edema.

The U.S. Army Mountain Warfare School teaches winter sustainment using the Akhio tent and stove group. The Akhio sledge contains a 10-man arctic tent, a diesel-fired stove, fuel, and other basic supplies. Kashmir tents have a short lifespan because of the wear and tear from blizzards and heavy snowfall. Stone structures and synthetic igloos are the preferred structures. In noncontiguous and non-linear battlefield environments, soldiers must build protective shields around winter shelters to avoid becoming targets for raiding parties and artillery fire.

Once trainees understand mountainous terrain and its effects on combat, the next step is to conduct small exercises involving patrolling, raids, and ambushes. These exercises should incorporate mountaineering skills in situations that tests trainees' abilities to modify traditional tactics to mountainous terrain. These exercises build leadership skills, initiative, flexibility, and team spirit. Although no opposing force (OPFOR) exists in the Pakistan Army's High-Altitude School or at the U.S. Army Mountain Warfare School, an OPFOR is necessary for creating a realistic environment and developing mountain warfare skills.

U.S. Army Mountain Warfare School instructors are topnotch mountaineers. However, most do not have actual mountain-combat experience.<sup>44</sup> Posting officers who served in Afghanistan to the Mountain Warfare School might address this problem.

**Collective training.** Collective training is an opportunity to test units and formations in actual mountainous environments, reinforcing and building on skills gained through acclimatization and individual training and allowing commanders to check the viability of their assumptions and plans in a realistic setting. Synchronization and coordination between fighting and supporting arms and among all the battlefield operating systems are also key elements of this training.

Collective training in winter and summer environments is a regular part of the Pakistan Army's mountain training. Because altitude is an important consideration, reserve units train at heights equivalent to those at which they are expected to fight. Train-

ing is primarily mission-centric, based on the nature of tasks assigned to the units, and includes offensive and defensive tasks and small-unit actions.

The U.S. Army does not conduct collective training in mountain warfare; it focuses more on survival training rather than high-altitude combat.<sup>45</sup> The USMC conducts infantry battalion training, but the training does not include artillery, engineers, aviation, or other supporting arms.<sup>46</sup> Considering the unique requirements of mountainous and high-altitude environments, these can be serious limiting factors for coordinating and synchronizing the combined arms fight and can easily lead to faulty planning and wrong assumptions about each other's capabilities and limitations.

Operation Anaconda demonstrated that fighting in the mountains is not a special operation or exclusively an infantry domain.<sup>47</sup> Mountain warfare involves logistics, aviation, artillery, communications, and air assets. With the level of sophistication in these branches and services, there is an even greater need for collective training in order to use their unique characteristics fully.

**Branch-specific training.** All branches and services need to train for mountain combat to understand the capabilities and limitations of their equipment. Aviation is critical to mobility, timely logistics, and precision firepower. Pilots should be well trained in mountain flying and in understanding an infantryman's problems in mountainous terrain. The Pakistan Army's 8th Aviation Squadron supports operations in Kashmir. Pilots have hundreds of hours of combat flying experience and understand the mountainous environment.

With the enhanced capabilities of Apache helicopters to acquire and engage targets beyond visual range, U.S. Army pilots, in conjunction with ground troops, need to practice firing in the mountain. The Russians recognized the need for close coordination between aviation and ground troops during their war in Afghanistan.<sup>48</sup> The U.S. experience in Afghanistan highlighted the need for attack aviation to train with Special Operations Forces and to practice using night-vision devices.<sup>49</sup> Pilots for cargo and troop-carrying helicopters also need to train in mountains in various weather conditions. High-altitude training combining attack and cargo helicopters is essential for high-altitude combat.<sup>50</sup>

The U.S. Army has a variety of sophisticated communication equipment. Although some equipment works well in the mountains, some requires improvisation and alternatives because FM communications are often ineffective at high altitudes and



distances impeded by mountainous terrain.<sup>51</sup> Shifting retransmission stations and using equipment in various weather conditions is essential to providing a variety of options to communication providers and users.

Engineers, who are key to mobility, countermobility, and survivability, must also train and work in high-altitude conditions. Constructing shelters, laying minefields, providing clean water supplies, and constructing bridges and roads require different considerations in the mountains. Training in a mountainous environment is the only way to ascertain the type and quantity of materials and equipment needed.

Artillery units need to train in mountains to ensure optimum fire support under all circumstances and all weather conditions. Selecting gun positions and shifting and readjusting guns by air, as well as ground transport, to support various tactical contingencies require training and experience, as do observation and fire direction.

In mountainous environments, CSS elements also need to learn how best to use trucks, aircraft, porters, and mules. Training under real mountain conditions helps them identify the differences in logistical calculations for mountainous environments. Other issues, such as protecting logistic bases, are equally

important. The Mujahideen often successfully attacked and destroyed Soviet logistic bases in Afghanistan.<sup>52</sup>

Doctors and medical staff also need special training in recognizing and treating high-altitude-related injuries and illnesses. In Kashmir, doctors are fairly confident in dealing with them. During World War II, medics accompanying German mountain troops were experts at treating frostbite, snow blindness, and other problems.<sup>53</sup> The Soviet Army instituted more than 100 hours of training through a special course for doctors and their staffs.<sup>54</sup>

## Contemporary High-Altitude Operations

The U.S. Army had a distinguished history of mountain operations during World War II. The 10th Mountain Division proved its utility as an elite mountain-trained force during the Italian Campaign. More than 50 years later, Operation Anaconda in Afghanistan highlighted the continued need for specialized training in mountain warfare. The Army has embarked on an impressive Transformation intended to meet the challenges of the 21st century; expert mountain troops available for deployment on a short notice should be a part of this Transformation. **MR**

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