COLD REGIONS:

ENVIRONMENTAL INFLUENCES ON MILITARY OPERATIONS, PART 2

BRIGADIER GENERAL PETER W. CLEGG

COLONEL ROBERT H. CLEGG

EDITOR'S NOTE: This article is the second in a two-part series on the environment in cold regions and the way that environment affects military operations. The first part (in the July-August issue) detailed the climatic conditions and the terrain found in these regions and discussed the resulting effects on observation and fields of fire, cover and concealment, and movement. This second article discusses the influences of these conditions on soldiers, equipment and facilities, support, and combat operations. (Please note a correction to the first article on page 28, second paragraph: The U.S. Army did not engage in operations in Iceland in World War I. Rather, our first World War II deployment was to Iceland.)

In cold climates, survival rapidly becomes the major concern. Even with the soldiers' survival assured, cold still affects their performance by inflicting physical injury upon them and impairing their psychological stability as well. Precipitation, wind, and terrain intensify the effects of temperature and influence safety. Although soldiers cannot acclimate to cold as they can to heat, training in the effects of cold conditions allows them to take certain precautions.

The cold kills. During Napoleon's withdrawal between Berezina and Vilna, 40,000 soldiers perished from cold in four days. A fresh division numbering 15,000 dispatched to assist lost 12,000 to the cold in three days. At the same time, Russian losses to the cold numbered 83,000.

During their winter war with the Soviet Union in 1939-1940, the Finns destroyed the first two divisions invading their country using harassing operations on skis, isolating groups of forces from supplies, and hitting the easily detected Russian field kitchens. The Soviets suffered 48,000 men killed and 158,000 wounded or injured in the early fighting, mostly from the cold. From 1 January to 31 March 1942, the Germans sustained 14,236 casualties from frostbite. Overall, during Operation Barbarossa, the Germans lost some 100,000 soldiers to frostbite, including 14,000 who required amputations.

In November and December 1950, U.S. units in Korea suffered 7,000 non-battle casualties, primarily from frostbite (35 cases per 1,000 soldiers in the combat zone). Cold injuries peaked when the intensity of enemy activity increased; soldiers had to leave sheltered positions, lie on the frozen ground, and stand guard at night. On the Kot-o-ri plateau in early November, temperatures dropped to -8 degrees Fahrenheit, winds were 30 to 35 miles per hour, and U.S. soldiers experienced their first shock of cold. Even though the temperatures would be colder (-25 degrees Fahrenheit) as the winter progressed, the effects of this first shock wave were severe. Within two days, more than 200 men in a single regiment collapsed from the cold. Stimulants had to be used to counter depressed breathing. The 7th Division treated 142 men for frostbite as early as 23 November. (Americans in Korea learned that the hot temperatures, characteristic of cold regions in the short summer, also caused major problems. On 7 August 1950, for example, temperatures reached 120 degrees Fahrenheit, and the heat prostration cases were six times the number of enemy-inflicted casualties.)

It is the cold of the long winter, however, that presents the major challenge. In the plains of Russia, the temperature regularly drops to -60 degrees Fahrenheit, in winter, and in Korea -30 degrees is not unusual. These temperatures are also routine in Canada and Alaska.

Frostbite, the major threat, can occur at 32 degrees. Its symptoms are numbness and tingling, and discoloration (with first a red appearance, then pale or waxy white, and, for darker-skinned soldiers, a grayness). Once a soldier has had this injury, he becomes more susceptible, and black soldiers are more susceptible than others. The use of alcohol or drugs speeds the loss of body heat and increases susceptibility. Keeping the blood circulating is a preventive measure, as is proper clothing. Layers of clothing must be worn loosely and head gear is imperative, since much body heat is lost through an uncovered head.

With warmer temperatures of up to 50 degrees and wet conditions, trench foot becomes a problem, because feet perspire more readily than other parts of the body. Changing socks regularly to keep feet dry is the preventive measure and leaders must ensure that this is done. Other concerns, such as dehydration, hypothermia, fatigue, poor hygiene, and lack of nutrition, all lead to reduced performance and susceptibility to heat or cold injuries.

In below-freezing temperatures, contact with liquids is hazardous. Fuel spilled on a bare hand leads to immediate frostbite. Falling through ice on a lake or stream can result in hypothermia, another killer. Water does not have to be freezing to cause injury; however at 60 to 70 degrees Fahrenheit, it can cause loss of consciousness in two hours. In water up to 40 degrees, a soldier may lose consciousness in only 15 minutes. During the Korean War, for example, men of Company L, 3d Battalion, 17th Infantry began to wade into a shallow stream in air temperatures of seven degrees below zero. When it became apparent that they would be frozen almost immediately, they were called back. Their clothes had to be cut from them, and the abortive crossing resulted in 18 frostbite cases.

Cold injury results from unpreparedness. Both the likelihood and the extent of injury can be reduced if soldiers are active and properly clothed. (It is better to be slightly cold than overdressed, since perspiration can become excessive and speed up heat loss.) Dryness causes perspiration to go unnoticed, so water intake becomes as important as in desert climates. *(See "Environmental Influences on Desert Operations," by Colonel Robert H. Clegg, INFANTRY, May-June 1992, pages 28-34.)* Lack of activity, which may be unavoidable in combat situations, can be a prime cause of cold injury. Sitting in foxholes or even lying on the ground, whether to fire weapons or repair vehicles, increases susceptibility. Soldiers must be kept moving.

Shelter is vital but hard to find. In 1941, the 6th Panzer Division in Russia occupied open terrain in temperatures of -50 degrees. The division sustained 800 frostbite cases daily. When the soldiers found hand tools useless for digging foxholes, they blasted craters into the ground and built improvised shelters, thus reducing frostbite cases to four a day.

Personal hygiene is another preventive measure. Sanitation can be difficult (especially waste disposal), but attention to it is critical. Nutrition is also critical. Troops burn up a lot of energy working in cold temperatures. In the Korean War, soldiers ate candy for energy at alarming rates (six or seven Tootsie Rolls in 10 to 15 minutes).

Logistics requirements in cold regions (for food, water, fuel, and clothing) are more than twice the requirements in warmer climates. This places an increased workload on soldiers, who can easily be burdened with more than 90 pounds of clothing and equipment. The depth of snow or mud also makes foot movement exhausting, and fatigue makes soldiers more susceptible to injury. Rotation and rest periods are required. Sleeping in vehicles, however, is just as unsafe in cold regions as anywhere else, because of the danger of carbon monoxide from heaters. And unheated vehicles are colder than tents.

Many other aspects of cold-region operations cause problems for soldiers. Vast flat areas covered with snow reflect solar energy and produce snow blindness as well as sunburn. In Arctic summers, when the ice and snow melt, the abundant moisture brings with it mosquitoes and flies. These insects distract the soldiers' attention and cause discomfort, which can lead to mistakes and injuries.

A psychological hazard called "arctic hysteria" results from short days, long nights, persistent cloud cover, and cold temperatures. This ailment is characterized by passivity, low morale, depression, insomnia, claustrophobia, and suicidal tendencies. In below-zero temperatures, these states of mind are killers, because they lead to personal neglect, inactivity, and carelessness. Fear of isolation and freezing to death can get out of control. German accounts during World War II reported soldiers who became apathetic and indifferent, which destroyed their will to survive.

Arctic winds intensify the effects of cold by creating wind chill. As air moves across the flesh, the body loses heat. At -20 degrees Fahrenheit with a wind of 25 miles per hour, the wind chill is -75 degrees Fahrenheit. Or if a soldier is riding in an open vehicle moving at 20 miles per hour into a wind of 10 miles per hour with a temperature of 15 degrees Fahrenheit, the wind chill is -25 degrees, and that soldier's exposed flesh will freeze in one minute. The blast from propellers and rotors creates the same situation. Strong winds such as the williwaws of mountainous coastal regions kick up debris that can cause injury to soldiers. Trees and structures blown down by strong winds also cause injuries. Winds are responsible for blizzard conditions that can disorient soldiers, isolate positions, and lead to life-threatening situations.

The terrain in cold regions can also be a source of injury to soldiers. The rocky surfaces of volcanic mountains lead to foot and ankle injuries. On steep slopes of Alpine-like mountains, rock falls and avalanches occur regularly. During the Korean War, the bare 60-degree slopes of the Naktong Mountains, coupled with 100-degree temperatures, caused more U.S. casualties than enemy action. Glaciers are dangerous because they move, and huge blocks of ice fall off. Soldiers have disappeared into crevasses and have been crushed.

Effect on Equipment and Facilities

During World War II, the Soviet commander of the Southwestern Front encouraged his comrades by saying: *The great danger for the German command is that the first big change in the weather will knock out all their motorized equipment. We must hold out as long as and in any way possible but immediately go over to the attack when the first few days of cold have broken the back of the German Forces. This backbone consists of the tanks and motorized artillery that will become useless when the temperature hits 20 degrees below zero.*

As the Germans approached within nine miles of Moscow, winter struck with -40-degree temperatures. The soldiers were so numb they could no longer aim their rifles. Firing pins shattered, recoil liquids froze in machineguns, and artillery rounds detonated with little effect in the deep snow. The Red counteroffensive then began. German General Heinz Guderian later complained that his tanks were breaking down in the cold while the Soviet tanks kept running.

The cold obviously affects the performance and durability of military equipment and facilities. Temperature, precipitation, and wind cause equipment failure and damage. Lubricants become stiff; plastics and rubber become brittle; gauges, dials, and linkages stick; brakes freeze to drums; fuel tanks, filters, and fuel lines become blocked; protective paints chip and lead to corrosion; battery efficiency is reduced; drain plugs freeze tight; power train breathers and vents clog from slush; and windshields crack easily, especially when hit by warm air.

During the Korean War, troops complained that their vehicles froze up on the move, brakes grabbed, and transmissions stiffened. Keeping vehicles moving is a challenge when the cold is intense enough to halt them; add a few feet of snow, and engines and transmissions are taxed. In mud, engines and transmissions can burn up if a vehicle is improperly driven. It is important to operate in low gear to preclude stalling. Deep snow tends to pack under the hull, which can lift the vehicle and reduce traction. Soviet drivers are taught to shift immediately to reverse when tracks lose their bite and spin. They are also taught to accelerate gradually and smoothly on ice and snow. It is best for a driver to avoid the tracks of the tanks in front of him and plow his own course over fresh snow.

Artillery has unique problems in frozen environments. Aside from the cold, which affects the accuracy of a gun and also makes it dangerous to touch with bare hands, it cannot be stabilized because the ground is frozen and the blades cannot dig in.

The gun tubes expand and contract with temperature changes when firing and then remaining silent for extended periods. The effectiveness of ammunition can vary considerably. Projectiles may not penetrate the ground. If snow is deep in winter (mud or muskeg in the summer), shrapnel is confined and absorbed. Field Manual 31-71 says the impact burst can be reduced by 80 percent, and this also applies to grenades. The frozen ground reduces the penetration of all munitions. During the Korean War, aircraft munitions actually bounced off the frozen ground.

Fuzes are affected by cold. They run slower, and some types of variable time-fuzes malfunction at 0 degrees and below. Proximity fuzes can "see" through dry snow and sense the ground, but wet snow may cause premature detonation. Point detonating fuzes can get buried in the snow and not detonate at all.

Illumination rounds tend to malfunction because of the many moving parts and the parachute. Cold, dry conditions inhibit the development of smoke plumes. White phosphorus is most affected, because its heat can bury it in the snow.

A positive result for artillery is that exploding rounds send out frozen clods, stones, and chunks of ice, which are as deadly as shell fragments. Small arms have problems as well. The metal can get so brittle that rifles break, and automatic weapons jam as the lubricants freeze. Cold also changes the zero and slows firing rates as gas escapes more slowly. For rockets and missiles, propellant burn is slower, which reduces range. The back-blast danger area is tripled. Heavy firing of weapons causes ice fog, which obscures visibility and reveals firing positions.

Communications equipment—especially antennas, ground wires, and radios—is affected by frozen conditions. Icing of one-fourth inch on antennas reduces range and increases noise. Antennas get out of tune, especially at higher frequencies. Setting up antennas is a problem, because the stakes cannot be driven into the frozen ground; mountain pitons might be used to correct this. Wires and poles break from the pressure of ice and wind.

Frozen ground offers high electrical resistance, and no more than one transmitter should be connected to the same ground. A drill may be needed to put grounding rods in. Salt can be added to water and poured on grounding rods to increase their effectiveness. Ranges are generally increased in the cold, dry, stable air, but cold radios need to be warmed. Batteries and plastic and rubber parts are susceptible to reduced performance. Deep snow and snow-covered evergreen trees weaken signals.

Soldier during winter training exercises. Logistics planners must see that soldiers have adequate clothing and equipment.

Sensors operate well in cold, dry environments. A test was conducted in Baumholder, Germany, with two tanks—one with an operational personnel heater and the other without. With both engines and the heater shut down, the heated tank "glowed" for three-and-one-half hours longer than the one without the heater. Light-intensifying sights increased the likelihood of target hits by 300 percent. Moderate snowfall degrades infrared systems such as thermal sights and laser designators. Snow-covered terrain creates false targets for acquisition systems operating in the infrared and millimeter wavelengths of the electromagnetic spectrum.

Icing is a major cause of air crashes in cold climates. It causes a power loss to induction systems, decreases lift, causes dangerous vibrations, and interferes with elevators and rudders. Anti-icing and de-icing equipment is required for aircraft operating in freezing temperatures. Airframes also contract in the cold more than their control cables, and sensitivity to such changes can cause air crashes. Ice on the Pitot tube can cause instruments to give false readings, and ice on windshields obscures the view.

Since water expands by 10 percent when it freezes, containers will crack if filled beforehand. Gortex clothes are warm, but they can be noisy when temperatures drop and can alert the enemy. Protective clothing, particularly masks and gloves, becomes brittle in extreme cold, and placing them on skin can induce injury. Decontamination presents particular problems because it requires water.

Temperature, snow, and strong wind affect facilities. Alternate freezing and thawing buckles asphalt and cracks pavement, damaging roads, airfields, and building foundations. The change from frozen ground in winter to moist ground in summer also damages and jars fixed facilities such as rails, roads, and buildings. Bridges and port facilities sustain damage from ice when a spring thaw occurs, and huge chunks flow downstream hitting abutments and docks.

The weight of compacted snow and ice can collapse buildings, tents, and hangars. Heavy winds associated with extreme variations in air pressure create hurricane-like conditions, damaging structures, downing utility poles, and disrupting transportation centers. Steep slopes can be a source of danger for facilities, because unstable rock in mountains can cause landslides, rock falls, and avalanches. Structures should be sited only after these have been considered. Finally, the mountainous areas are subject to earthquakes and volcanic activity.

Effect on Support

An army does not go far in any environment without a well-coordinated and complete logistics system, but such a system is even more critical in cold regions. A logistical system depends upon a base and its ability to move personnel, equipment, and supplies to and from the base.

In the far north, there are few sites suitable for a logistical base. In the more moderate, urbanized cold regions, many locations are available, and many bases can be established. In severe cold areas, however, there are limited transportation and communication networks, and such networks are not well developed. Few structures are available for storage. Because of these limitations, the base, once established, becomes a likely enemy target and may even be the ultimate objective. Combat forces must therefore be dedicated to defending the base.

Logistics planners determine what supplies and equipment are required and in what quantities. For cold regions, special equipment is required—plows, clothes, drills, cross-snow vehicles, skis. The Germans, outfitted with summer uniforms, faced subfreezing temperatures in Russia and thousands died as a result. The 7th Infantry Division's biggest mistake when its soldiers attacked Attu was their inadequate clothing and gear. The soldiers had little protection from the rain and wind. Their high-topped leather boots were not waterproof, and they had been trained in California for deployment to North Africa and were not prepared for the rigors of cold and wet weather. (The division later deployed to Leyte in the tropics.) They had not been issued their equipment until they were on board the ship. Their cold, wet feet were rubbed raw, leading to hundreds of cases of frostbite, trench foot, and gangrene.

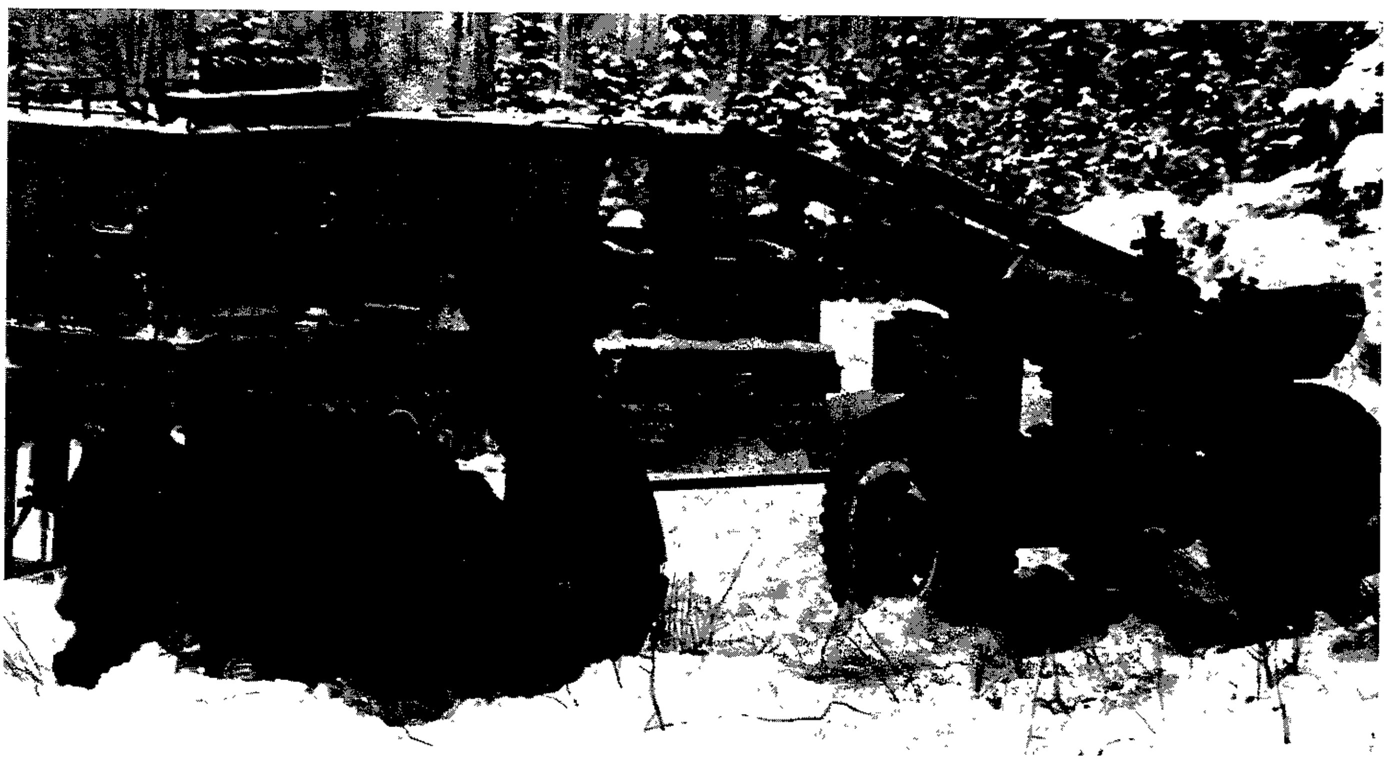
Because summers can be warm in cold regions, both summer and winter clothing and camouflage are necessary. This increases the variety and quantity of materiel required, and thus the complexity of the logistical task. The extreme cold, deep snow, and mud reduce the durability of equipment, and larger stocks must be on hand than in more temperate areas. Food, water, and fuel consumption is higher in cold regions. Fuel usage has been estimated at ten gallons per day per squad for heating alone.

All classes of supply must be moved first to the logistics base and then issued to units, and this can be hampered by trafficability and air delivery limitations. Engineers are part of the solution, but road and rail construction is difficult, expensive, and time-consuming. Aircraft are subject to all the restrictions previously discussed, and their number and load capacities are limited. Getting materiel to the soldier may be the biggest challenge.

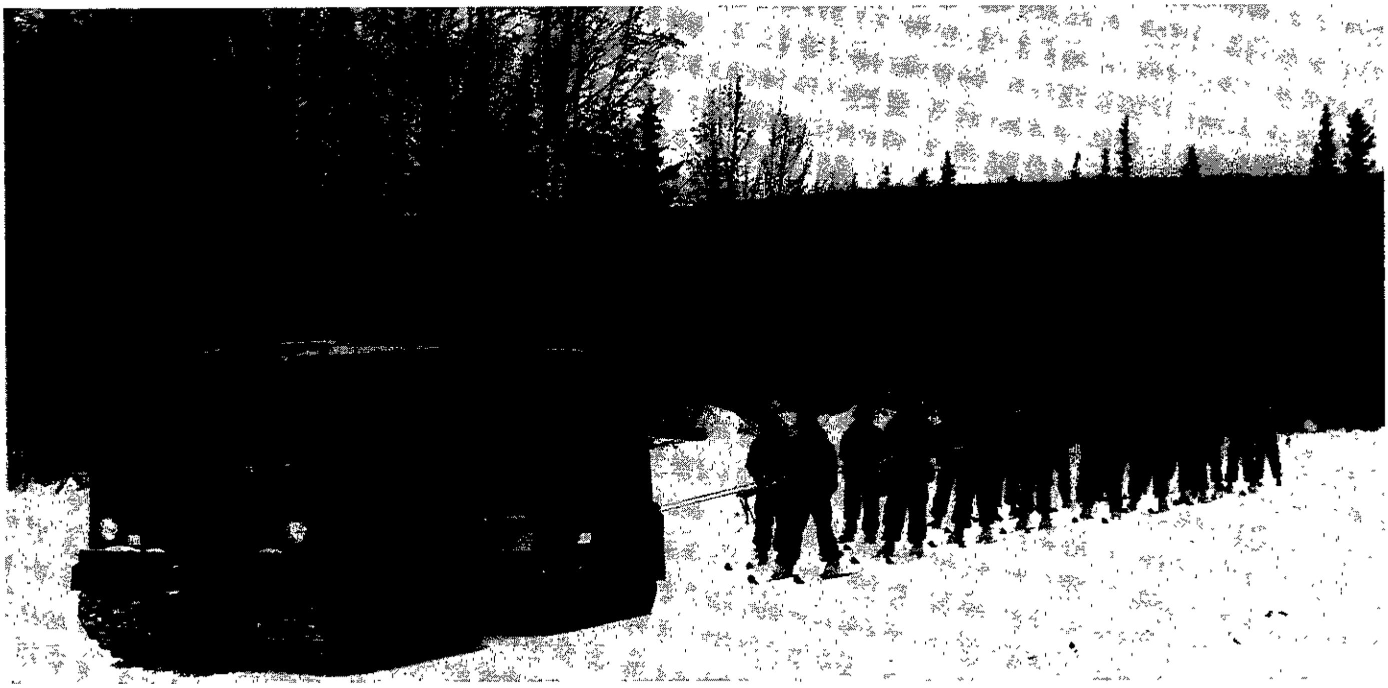
Once supplies reach the base, storage is the problem. Warehouses must be warmed; highly perishable supplies such as medicines require special handling. Water-soluble medicines will freeze. In Korea, for example, medics had to keep morphine inside their clothing so it would be usable when needed. Plasma had to be warmed for two hours before it could be used.

Water and fuel require special storage. In temperatures below 14 degrees Fahrenheit, high charges of static electricity can make fuel-handling dangerous. Food, including MREs (meals, ready to eat), freezes and is difficult to eat without heating.

Because facilities for issue are likely to be limited, warm shelters must be established for waiting areas and break areas. Facilities for maintenance must be warmed; little maintenance can be done in the open. Maintenance demands are greater because the stress on the equipment is greater and



Soldiers secure an A-22 bag that will be slung beneath the howitzer as it is hooked up to a CH-47 helicopter. Such air movements are vital to large-scale offensive operations in cold climates, because ground movement is too slow and too vulnerable.



Small-unit supply vehicles can increase both the range and the speed of infantry units.

repairs take longer. During winter, in the arctic regions, the hours of daylight are shorter and electrical lighting is required. Not getting what is needed at the right place and time can mean terrible suffering and potential disaster.

Effect on Combat Operations

Maneuver depends on trafficability, and "go" trafficability in cold regions requires frozen, dry conditions. Cold temperatures freeze marshes, lakes, rivers, and soil, and dry conditions reduce snowfall. With warm and wet conditions, trafficability quickly becomes a "no go." Wet conditions in winter allow for the accumulation of deep snow, but as temperatures rise, the melting snow and ice create fast-flowing streams, lakes, and marshes. As temperatures hover around the freezing point, alternate freezing and thawing make trafficability difficult to predict. The freezing usually occurs at night, which means movement must also be at night, or early in the morning.

In October 1941, for example, the German Blitzkrieg came to a halt because of impassable Russian roads. Three panzer groups were spread out over 30 miles, giving the Russians their first opportunity to fight on equal terms. The Russian T-34 tank, with its wide tracks and higher hull-to-ground distance came into its own. In January 1942, near Kursk, heavy snowfall stopped the German tanks while the T-34s, having greater ground clearance and lower ground pressure, swept across the flat terrain and destroyed the German tanks.

Also in January 1942, Company G of the German 464th Infantry Regiment, recognizing the effect of deep snow on movement, escaped encirclement by the Russians when they withdrew from a village in three feet of snow over a path they had trampled beforehand.

As another example, on 16 April 1952 in Korea, a hard rain turned the ground into a sea of mud. In July, six days of rain flooded streams and swept away bridges. Landslides from moisture-laden soil blocked some roads and washed others away. Swollen rivers and treacherous roads restricted support and delayed movement into the Punch Bowl area until August. Earlier (in July 1950), such conditions created landslides that closed off coastal roads and slowed the North Korean advance.

To facilitate movement in deep snow, soldiers must travel on skis or snowshoes, or use aircraft. The Finns, experts on skis, achieved great success against the Russians in their 1939-1940 war. During World War II in the far north, each side employed "skiborne" troops.

Mountain slopes in northern areas are usually too steep for vehicles—in Korea, Scandinavia, Alaska, Canada, and much of Siberia. A 45-percent slope is "no go" for tracked vehicles, and a 30-percent slope stops wheeled vehicles. The thick taiga forest limits movement, because the trees are too close together for vehicles to pass and too thick for them to run over. Trafficability is a "no go" if the trees are within 15 feet of each other for tracked vehicles and if they are within 12 feet for wheeled vehicles. Tree diameters greater than six inches for tracks and four inches for wheels create a "no go."

Drainage also impedes cross-country movement. When crossing frozen lakes, ice thickness and vehicle spacing are critical. To support wheeled vehicles weighing four to ten tons, ice should be from 24 to 39 centimeters ($9\frac{1}{2}$ to $15\frac{1}{2}$ inches) thick, and allowable distances between vehicles should increase from 15 to 35 meters. For tracked vehicles weighing 40 to 60 tons, ice thickness should be 63 to 77 centimeters (25 to 31 inches), and vehicle spacing should be 40 to 45 meters. Speed should be three to five miles per hour, and driving should be steady without gear changes. For foot soldiers, five centimeters (2 inches) of ice thickness is required with intervals of five meters between soldiers; for a squad column, 10 centimeters (4 inches) is advised, with intervals of 10 meters.

In northern areas, land navigation is difficult, which complicates combat operations. Compasses provide less accurate readings, because the farther north, the greater the declination. The northern reaches are not well-mapped, and photos may have to substitute. The monotony of the vast flat plains and the deep boreal forest add to the difficulty. The global positioning system, however, can alleviate these concerns.

Reconnaissance is particularly critical. Delays due to unforeseen circumstances can spell disaster during ground reconnaissance. Air reconnaissance is easier, but weather can also limit flying. Aerial photos are often the only way to survey current conditions along a route. For example, fog limited the ability of U.S. soldiers to reconnoiter the island of Attu in the Aleutians during World War II; they thought only 500 Japanese soldiers held the island when, in fact, 2,300 were there. Similarly, on Kiska, another Aleutian island occupied by the Japanese, a U.S. force of 34,000 with three battleships attacked only to find that the Japanese had evacuated the island.

In cold regions, reliance on aircraft alone is risky. Aircraft obviously provide the high-speed movement required for offensive operations, but in winter, as well as in transitional seasons, thick fog can engulf vast areas within minutes. Helicopters need at least one-half mile of visibility during daylight and one mile at night, and fixed-wing aircraft need twice these distances. Fog makes airborne operations hazardous because it conceals drop zones. Such operations require 900-foot ceilings (1,250-foot for training) while air assault operations can go on with as little as 300 feet in flat terrain, 500 in hills. Fog was a continuous hindrance to operations in the Aleutians: In the fall of 1942 the U.S. lost 69 planes, 63 of them to fog and only six to the enemy.

The enemy can also use fog to conceal a ground attack. On the morning of 10 July 1950, ground fog over the Korean rice paddies concealed the North Korean advance. U.S. soldiers shot blindly into the fog. Men on the ridge could hear tanks but could not see them. The next morning four enemy tanks crossed the minefields and were soon in the area of the 3d Battalion, 21st Infantry. The U.S. command post was destroyed. One thousand Koreans enveloped the battalion and reduced it to 40 percent strength by using fog to conceal their attack.

Other problems for air operations are icing and wind. Winds of 30 knots at jump altitude or more than 13 knots on the drop zone preclude airborne operations. Cold temperatures inside aircraft limit the time crews and soldiers can be flown around. A positive note is that the denser air associated with cold temperatures allows for better lift and therefore bigger payloads. Runways can also be shorter than in hot areas.

In spite of the difficulties, aircraft are vital to successful large-scale offensive operations in cold climates, because ground movement is just too slow and too vulnerable. Modern enemy weapons, specifically surface-to-air missiles and air defense guns, threaten air operations and must be suppressed.

Amphibious operations are restricted by wind, because wind increases the height of waves, which is the primary limiting factor. Water temperatures also limit amphibious operations; the water in arctic regions is too cold, even in the summer.

In cold regions, the environment favors the defense, because a unit that moves is vulnerable. The battle cannot be won without offensive action at some juncture, but that action must be lightning quick with limited objectives.

A recommended strategy might be to build a solid defense, attempt to draw the enemy in, and then counterattack. If the enemy can be induced to attack, he is likely to exhaust his resources. On 15 November 1941, the Germans used such a plan when the Russians exploited a snowstorm to conduct a surprise attack on a hill in the glaciated East European plain. The Russians had not been issued winter uniforms, and the temperature fell to 16 degrees Fahrenheit. Promises of vodka and the use of stimulants resulted in initial success; but cold and exhaustion made the Russians vulnerable, and the Germans counterattacked, killing 70 and capturing 60.

Another strategy might be to cut enemy lines of communication, since forces will quickly succumb without fuel and food. Wide sweeping envelopments are too grandiose for this environment. The Petsamo-Kirkenes operation in October 1944, the largest arctic combat operation ever, demonstrated that for an offensive to succeed, the mobility problem had to be solved. The Russians created and maintained a road network. This network, along with properly clothed and equipped troops, brought victory.

Environmental influences determine, in large measure, the outcome of combat in cold regions. The side that best adapts to and uses these influences will be victorious. Wars fought in cold regions have been among the most brutal in history and with incomprehensible suffering and death. Preparation, knowledge, and training are the requisites for success. Commanders who plan operations in cold regions but live elsewhere must understand the environment into which they are sending and leading their soldiers.

The U.S. Army will continue to train in these cold areas because we do not know where and when the next war will be. But if it is in the north, our Army must be ready.

Brigadier General Peter W. Clegg commands U.S. Army Forces, Iceland, and the 187th Infantry Brigade, based at Fort Devens. He was previously Deputy Chief of Staff for Operations, 94th Army Reserve Command. He is a 1965 ROTC graduate of the University of Massachusetts and holds a master's degree from Harvard University.

Colonel Robert H. Clegg commands the U.S. Army Central Security Facility at Fort Meade. He was previously the Director, Joint Imagery Production Complex, U.S. Central Command, during Operations DESERT SHIELD and DESERT STORM. He is a 1969 ROTC graduate of the University of Rhode Island and holds a doctorate from the University of Maryland.