

Urbanization and Megacities: Implications for the U.S. Army

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PUBLISHED BY THE INSTITUTE OF LAND WARFARE
AT THE ASSOCIATION OF THE UNITED STATES ARMY



AUGUST 2019

If war is about politics, it is going to be fought where people live. It will be fought, in my opinion, in urban areas.

-U.S. Army Chief of Staff (CSA) General Mark A. Milley, 8 March 2017.¹

■ Introduction

The strategic environment is defined by rising peer-competitors, increased urbanization and the amplified importance of megacities. More than half of the world's population lives in urban areas. A growing number of people live in megacities, defined as metropolitan areas encompassing more than 10 million inhabitants.² What differentiates megacities is not the one extra citizen that puts them over 10 million; it is their global interconnectedness and strategic importance. Since 2000, the number of megacities has more than doubled to 38 and is projected to double again by 2050.³

Since wars are ultimately decided where people live, the U.S. Army must organize, equip and train to fight and win in megacities. It must also be able to conduct the full spectrum of operations, including: humanitarian assistance and disaster relief (HADR), stabilization, operational raids and non-combatant evacuation operations (NEO). Multi-Domain Operations (MDO) in megacities is critical to the joint forces' ability to defend U.S. interests and to achieve dominance against any threat, at any time.⁴

■ The Evolving Strategic Landscape: The Impact of Urbanization on Army Doctrine

In World War II, 40 percent of combat in Western Europe was in urban areas.⁵ The Army preferred open terrain that advantaged maneuver and fires.⁶ In 1944, the Army developed its first formal urban warfare doctrine, Field Manual (FM) 31-50, as cities gained strategic importance.⁷

House-to-house fighting in Hue, Vietnam, in 1968, demonstrated challenges that the Army expected to face in a potential showdown with the U.S.S.R. in the rapidly-urbanizing European theater. To prepare, the Army developed Military Operations in Built-Up Areas (MOBA) doctrine.⁸

ISSUE

The U.S. Army must adapt to compete with, deter, and if necessary, defeat rising peer adversaries in a strategic landscape defined by urbanization and megacities.

SPOTLIGHT SCOPE

- Highlights the strategic, operational and tactical challenges for Multi-Domain Operations (MDO) in megacities.

INSIGHTS

- Megacity warfare significantly increases the importance of mission command.
- Megacities planning informs each of the Army's six modernization priorities.
- The Army should fully leverage reserve component urban expertise.
- The Army can develop techniques and training for megacity operations by working with industry, academia, agencies with urban expertise and international partners.
- Synthetic training is key to preparing Soldiers and units at all echelons for megacity operations.

The 1972 Munich Olympics massacre spurred the development of urban-specialized, counterterrorist (CT) forces and tactics.⁹ The Army prepared for state-on-state urban combat as well, developing *Military Operations in Urban Terrain* (MOUT) (FM 90-10) in anticipation of a Soviet offensive through the Fulda Gap.¹⁰

The 1993 Black Hawk Down operation triggered an increase in military thought concerning urban operations. In 2006, *Urban Operations* (UO) replaced MOUT, a critical difference being that MOUT was terrain-focused while UO takes population dynamics into consideration. The 2008 Battle of Sadr City showcased the importance of understanding and controlling population dynamics, decentralized decisionmaking and small-unit initiative.¹¹



A U.S. Army Soldier assigned to 10th Special Forces Group (Airborne) provides security during an urban combat training evolution at Panzer Kaserne, Böblingen, Germany, 31 May 2019 (U.S. Army photo by Kenneth G. Takada).

Challenges Facing Ground Forces Across the Spectrum of Operations

Today's strategic landscape contains megacities with widespread social, political and economic influence. Russia and China are improving their formidable anti-access area denial (A2AD) capabilities.¹² Megacity terrain enhances A2AD. Due to Russia and China's strategic importance and their vulnerability to instability, epidemics and terrorism, the Army must be ready for high-intensity conflict as well as lower-intensity operations.¹³ This has implications for readiness, modernization and force structure.

Megacities often contain diverse, interconnected populations and a variety of terrain, including open areas, suburbs, slums, dense urban centers, subterranean networks and coasts. New York City is a prime example; it contains each of these terrains and a cornucopia of distinct communities. Although much of Manhattan is dense urban terrain (DUT), Central Park and much of New York City's other boroughs are not; while Manhattan's population density exceeds 70,000 people per square mile,¹⁴ New York City's average is 4,500.¹⁵ Megacity densities can fluctuate drastically throughout the day and calendar year, necessitating micro-terrain analysis and planning at the neighborhood and even city block level.¹⁶

Strategic and Institutional Concerns

Readiness

Megacities have an outsized influence in global affairs. They are critical to: the flow of information; people and commodities; and to every instrument of U.S. national power. This makes readiness to operate within them a national security imperative for which the Army is inadequately prepared.

Readiness to protect and stabilize megacities requires continuous pre-conflict engagement to gain familiarity with the terrain and interoperability with local actors.¹⁷ This underscores the importance of political-military coordination through a capable diplomatic team that, when possible, ensures host nation support and logistical necessities, including the use of ports of entry, transportation networks and airspace clearance.

Readiness demands strategic planning regarding whom the United States would be fighting and where and how that fighting would be happening. Securing an entire megacity is not practicable, but the Army may need to seize and secure critical terrain, e.g., air and sea points of distribution.¹⁸ It may also need to address chaos in a megacity hit by a cyberattack on critical infrastructure, contamination of the water supply or massive bombardment.

The Army is preparing units for megacities operations by partnering with reserve components, academia, industry and urban first responders. In 2018, U.S. Army Training and Doctrine Command (TRADOC) ran a megacities workshop at Fort Hamilton, New York, that brought together experts in UO to include senior military and first response leadership. Tokyo—the world’s most populous megacity—will host the next iteration of this event. Additionally, Headquarters, Department of the Army G-3/5, conducts a Dense Urban Studies Strategic Broadening Seminar—an experiential learning program for upper echelon commanders to understand critical issues in megacities.

Modernization

Army modernization aims to develop an MDO-capable force by 2028.¹⁹ The need to train for and conduct MDO in megacities informs each of the six modernization priorities that CSA General Mark A. Milley tasked to Army Futures Command.²⁰ In the Fiscal Year 2020 budget proposal, the Army requested \$12.2 billion in research, development, test and evaluation funding and \$21.8 billion in procurement toward the six priorities: Long-Range Precision Fires, Future Vertical Lift, Next Generation Combat Vehicle, Air and Missile Defense, Army Network and Soldier Lethality.²¹



Paratroopers assigned to Alpha Company, 1st Battalion, 508th Parachute Infantry Regiment provide security on a hallway during a nighttime air assault of a notional enemy compound at Fort A.P. Hill, Virginia, 20 March 2018 (photo by Specialist John Lytle).

IMPLICATIONS FOR OPERATIONS IN MEGACITIES

Long-Range Precision Fires

- Fires must be accurate beyond line-of-sight, able to penetrate steel and concrete, able to hit high-altitude targets and destroy subterranean targets.
- Precision is critical to support land units and minimize collateral damage.

Future Vertical Lift

- Skyscrapers and power lines complicate aerial maneuver.
- Advances are needed for urban intelligence, surveillance and reconnaissance (ISR), targeting, sustainment, evacuation and fires.

Next Generation Combat Vehicle

- Vehicles must be able to navigate narrow spaces to provide troops with necessary firepower, sustainment and evacuation.

Air and Missile Defense

- Land forces require protection from enemy airstrikes, artillery and drones.
- Platforms must be mobile and provide on-the-spot protection.
- Cover must be provided for civilians and critical infrastructure, including electric grids and utilities.

Army Network

- A complex electromagnetic environment challenges communication.
- Adversaries will likely disrupt networks with electronic warfare (EW) and cyber.
- Satellite-based navigation and targeting is challenged.

Assured Positioning, Navigation and Timing

- Mobile ad-hoc networks improve units' ability to communicate with each other and improve command and control (C2) in a contested environment.

Soldier Lethality

- Mobile "mouse-holing" capabilities minimize exposure to enemy fire.
- Depression and elevation firing can target enemies in high rises and behind concrete and steel.
- Specialized equipment for subterranean warfare is being developed.
- Equipment for situational awareness, soldier protection and firepower is being improved.

Synthetic Training Environment

- On-demand realistic training is being made available at any location. One World Terrain (OWT) databases simulate actual megacities, including realistic population dynamics.

Force Structure

Current UO doctrine assumes the ability to isolate and shape the environment from the periphery inward.²² This is challenged in megacities where individual neighborhoods connected to subterranean networks can swallow up several brigades. The Army does not have enough divisions to fully isolate and control one megacity.²³ Instead, it must be able to secure specific critical terrain such as power stations, transportation hubs or strategic high ground. In megacities, forces calibrated to the specific operational environment are key. This may require adjusting force composition to readily access a portion of reserve component forces with urban expertise.

The Army's shift in focus from irregular warfare to peer competitors requires moving from a force that is centered on brigade combat teams (BCTs) to one that is centered on echelons above brigade (EAB).²⁴ Dispersed units should be able to leverage the capabilities of EAB, including: long-range fires, engineering, EW and cyber. Because resupply would be difficult, units would need seven days of field sustainment instead of the current three-days.²⁵

Operations

In competition, the Army supports joint force efforts to deter escalation and to defeat an adversary's operations.²⁶ In conflict, the Army supports the joint force in MDO to penetrate and dis-integrate enemy A2AD, exploit freedom of maneuver and consolidate operational success into strategic victory.

Recent non-megacity urban operations highlight the need to match operations to strategy. Israel's decision to target Beirut failed to influence Hezbollah in the 2006 Lebanon War, while its targeting of wealthy Gazan neighborhoods arguably led Hamas to agree to a ceasefire in 2014.²⁷ Knowing



New York Army National Guard Soldiers assigned to Company A, 1st Battalion 69th Infantry, cover enemy movement while training at the New York Police Department's urban training facility at Rodman's Neck in The Bronx, on 6 January 2016. The Soldiers were based at the Lexington Avenue Armory in Manhattan and used the police department training area to practice urban combat skills in preparation for a rotation to the Joint Readiness Training Center at Fort Polk, Louisiana, with the 27th Infantry Brigade Combat Team (U.S. Army National Guard photo by Captain Mark Getman).

where best to apply force is even more critical in megacities where the scale is so much greater.

Megacities contain areas where structural density complicates fires, maneuver, air power and C2 and can render satellites ineffective. Cyberspace is likely to be contested as well. A city's dynamism makes ISR more critical and more difficult to carry out.

Megacities often contain three levels of land domain: subterranean, surface and super-surface. The Army may need to secure subterranean areas so that enemy forces cannot emerge from behind. In a given neighborhood, Soldiers can face "three-block war."²⁸ In one block, Soldiers might engage the enemy at close range. In another, Soldiers might be performing search and rescue operations. Adjacently, they could be attempting to pacify civil unrest.

It is especially difficult to control the flow of information in megacities. Even in smaller urban areas, actions quickly reverberate and can have unpredictable, cascading effects. For example, news of the 2015 accidental U.S. bombing of a hospital in Kunduz, Afghanistan, spread quickly, causing international and domestic outrage.²⁹

Tactics

Megacities provide numerous tactical challenges that must be addressed through doctrine, training and partnerships. Skyscrapers, tunnels and density all challenge fires, maneuver, communication and situational awareness. Due to interconnectivity, tactical actions can have strategic consequences. Soldiers must be fit, smart, well-trained and have specialized equipment to operate in a complex and contested environment.³⁰



Air Force Brigadier General Daniel Caine, Deputy Commanding General of Special Operations, Joint Task Force-Operation Inherent Resolve, walks through the city with residents and Iraqi Security Forces in Mosul, Iraq, 26 June 2018 (U.S. Army photo by Specialist Keisha Brown).

TACTICAL CHALLENGES AND REQUIRED CAPABILITIES

Communication

- It is difficult to communicate among floors of high-rises and at subterranean levels when electronic and cyber capabilities are being contested. A mobile communication network is needed.

ISR

- An ability to see beyond obstacles and inside buildings and tunnels is necessary.

Maneuver

- Vehicles, aircraft and Soldiers need to navigate tight spaces and overcome obstacles.

Breaching

- Equipment to breach concrete and steel is required, as is "mouse-holing," i.e., the ability to move between buildings.

Fires

- Beyond line-of-sight, counter-defilade and high-altitude fires that can penetrate steel and concrete with precision that avoids collateral damage are essential.

Soldier Protection

- Multiple angles of fire endanger Soldiers while subterranean terrain has minimal cover; they need effective shielding.

Sustainment

- Devices to ensure power resupply, such as harvesting energy from car batteries or an electric grid, must be provided.

High-Rises

- High-trajectory fires and communication between levels must be possible.

Subterranean

- Breathing, communication, optics, fires, protection, navigation, breaching and sealing entrances and exits and finding tunnels are all necessary.



Sergeant Dalyss Reed, a rifleman with Kilo Company, Battalion Landing Team 3rd Battalion, 5th Marine Regiment, 11th Marine Expeditionary Unit, maneuvers through a breach hole while conducting an urban platoon assault during a pre-deployment training exercise at Marine Corps Air Ground Combat Center, Twentynine Palms, California, 12 November 2018. Military operations in urban terrain prepare Marines for conditions seen in fierce close quarters battles such as Fallujah and Hue City (U.S. Marine Corps photo by Lance Corporal Dalton S. Swanbeck).

■ U.S. Army Initiatives

Doctrine

The fragility of urban flow, dynamic environments, magnified reverberations, contested communication and confined spaces require small, dispersed units. In MDO, adversaries will jam and spoof C2. This amplifies the importance of mission command—the ability to operate according to a commander’s intent—for all echelons.³¹ Decades of security assistance missions with strict guidelines have made Soldiers hesitant to assume what CSA Milley calls “disciplined disobedience.”³² Officers and noncommissioned officers must not be afraid to take initiative.³³ The notion of the strategic corporal—the junior leader whose decisions in the field can directly impact operations and national strategic outcomes—is highly-relevant to megacities.

Complex terrain and unique population dynamics make understanding the intricacies of each megacity critical to securing strategic objectives.³⁴ Planning and operations require the ability to coordinate with local leaders.³⁵ Intelligence doctrine should encourage gathering information from traditional as well as non-traditional sources.³⁶ In some cases, informal leaders may provide better intelligence than the authorities. Ethnic and religious community leaders might know the ins and outs of their neighborhoods better than anyone.

Organization

A megacity’s terrain requires regular Army units to integrate some capabilities of special operations forces (SOF). Sheer size belies the ability to rely solely on SOF for specialized missions like subterranean operations.³⁷ For example, there are over 4,800 underground facilities in North Korea. Should the need arise, these facilities cannot be secured by U.S. and Republic of Korea SOF alone.

Operations in megacities should combine engineering, armor, infantry and artillery forces.³⁸ Formations must be able to operate across domains. Decentralized units require instant access to capabilities currently residing in battalion and brigade headquarters, including national-level intelligence.³⁹

Platoons and squads may need cyber, EW and engineering capabilities.⁴⁰

Training/Facilities

Well-conditioned Soldiers make better decisions under stress. This is critical in megacities where actions reverberate quickly and mistakes can have strategic consequences. The new Army Combat Fitness Test aims to improve the Army's fitness culture and develop Soldiers and leaders capable of sound decisionmaking under conditions of stress, isolation and exhaustion.

The Army Vision 2028 emphasizes training for high-intensity conflict in DUT.⁴¹ The Army must develop models and simulations (M&S) that realistically simulate dynamic situations and complex dilemmas, including those arising from population factors. Training should inspire innovative problem-solving with multiple paths to mission success.

TRADOC's tactical urban combat simulators require weeks of coordination for a few hours of training.⁴² Soldiers need improved access to UO training to participate in the 25 "bloodless battles" proposed by former Defense Secretary Mattis in the establishment of the Close Combat Lethality Task Force.⁴³

Leaders need realistic training to gain insights into problems that might arise at the operational and strategic level. The Army lacks facilities that can: accommodate formations above the tactical echelon; replicate structural and human complexity; and train coordination across domains. Live megacities training is not feasible. Innovative constructed facilities, like mazes built from shipping containers to mimic underground warfare, hold promise for tactical training, but even the largest facilities can only accommodate tactical echelons and poorly simulate the human element.⁴⁴ Muscatatuck Urban Training Center and the Schnöggersburg Urban Training Center in Germany can, at best, handle a battalion; even that will not yield realistic training if all elements are committed simultaneously. To train appropriately, units must be able to maneuver widely without leaving a built-up and populated complex.

No facility in the world allows flanking, envelopment, deep fires or other elements of such maneuver. It is preferable to focus on smaller unit live training and replicate this at higher echelons through synthetic training.⁴⁵ The Army is prioritizing the development of the Synthetic Training Environment (STE) to this end.

The STE is projected to become operational in 2021. It will combine live, virtual, constructive and gaming elements to enable operational and even strategic-level multi-domain training at homestations, training centers and deployed locations.⁴⁶ STE will allow units to train together virtually, circumventing the need to create a physical megacity mock-up or transport actors to serve as mock civilians and enemy forces. STE's OWT database will provide detailed simulations of real terrain, along with realistic virtualization of a city's population dynamics.⁴⁷ This will give Soldiers both



A Stryker vehicle commander interacts in real time with a Soldier avatar that is operated remotely from a collective trainer. Army Research Laboratory, University of Southern California's Institute for Creative Technologies, the U.S. Army Combined Arms Center and the Program Executive Office for Simulation, Training and Instrumentation are working together to develop a synthetic training environment that links augmented reality with live training—one of several Army Research, Development and Engineering Command efforts that link to the Army's modernization priorities (U.S. Army photo).

advanced knowledge of the terrain and pre-mission repetitions.

Virtual training must be tailored to the conditions at hand. Developing accurate M&S requires getting the inputs right so that simulated terrain, equipment and people will respond realistically. For megacities, this requires close collaboration with UO experts.

Materiel

Soldiers operating in megacities will require key sustainment necessities such as water and power sources, as well as specialized equipment including: vehicles and aircraft that can maneuver in tight spaces; durable networks; counter-defilade fires systems and precise munitions that can penetrate concrete and steel; specialized optics; and breathing, breaching and force protection equipment for subterranean operations. Integrated unmanned systems enhance ISR, communications, targeting, sustainment, evacuation and force protection. A secure communication network that allows joint and international interoperability is critical. Emerging technology like Artificial Intelligence can enable dispersed units to overmatch larger forces.⁴⁸

Leadership/Personnel

Leadership positions increasingly require specialized expertise, especially in complex urban environments.⁴⁹ With the private sector able to offer higher salaries, the Army faces difficulty recruiting and retaining Soldiers with increasingly demanded skills.⁵⁰ The Army recently formed the Talent Management Task Force (TMTF) to address this issue.

Policy

Megacity operations in both competition and conflict requires a whole of government approach. This was a key lesson that the United States learned from the battle for Baghdad, Iraq's largest city.⁵¹ Each megacity is unique and requires the Army to partner with local agencies, community leaders and NGOs (non-governmental organizations) to navigate the complex social-political environment and ensure long-term stability.⁵² International partnerships reduce costs, maximize intelligence, help gain the population's compliance and support potential contingencies from HADR to stabilization, CT/COIN (counterinsurgency) and high-intensity combat.

In urban environments, civilians pose a constant challenge. Many non-lethal capabilities are currently prohibited under the 1993 International Chemical Weapons Convention.⁵³ DoD could recommend that Congress update the stipulations regarding the use of riot control agents—such as tear gas and/or the use of smoke to identify tunnel openings—to increase the Army's non-lethal options.

The Army can prioritize special training and equipment for the units most likely to deploy to megacities should the need arise. This could boost readiness while enhancing planning and doctrine development.⁵⁴



Members of Strike Team 3 conduct security exercises at the Public Safety Training Center in Clarksville, Tennessee. The training included members of the 163d Military Police Company Special Reaction Team, the Montgomery County Sheriff's Office Emergency Services Unit and the Clarksville Police Department. The agencies met to compare civilian and military policing techniques (U.S. Army Photo by Private First Class Lynnwood Thomas).

■ Recommendations

Hone Training and Doctrine

The Army is at a strategic inflection point, shifting from irregular warfare to preparing for large-scale operations against peer opponents.⁵⁵ The Army should continue honing its MDO concept into doctrine and developing synthetic training to prepare for the full spectrum of operations in an increasingly urban strategic environment. Massed formations will be vulnerable to enemy fires; consequently, forward-deployed units will need to be dispersed and able to take initiative.⁵⁶ They will need access to assets traditionally located in the strategic support era.⁵⁷ Training should simulate mass casualties, large units under threat, contestation in all domains, constant movement and population dynamics.⁵⁸ Soldiers at all echelons must recognize their role in the MDO context.⁵⁹

Understand that Leader Development is Key

The Army is considering modifying some promotion requirements to expedite the placement of skilled professionals in positions critical to MDO, e.g., psychological operations, EW and cyber. It should also continue supporting its new TMTF to create more flexibility by allowing smooth transition between reserve and active components—enabling talented Army personnel to gain valuable experience in the civilian workforce and then return to active duty without losing benefits—and allowing civilian experts to enter specialized positions at higher rank.⁶⁰ The Army might consider building urban expertise by establishing an urban warfare school like those for other operational environments, such as the Jungle school in Hawaii and Vermont’s Mountain Warfare school.⁶¹

Leverage the Expertise of Reserve Components

The Army’s reserve components comprise about 55 percent of the Army’s endstrength. Many reserve component Soldiers have career experience relevant to UO; their units are often called upon to carry out HADR operations and evacuations in cities. Their expertise should be utilized along with that of first responders and SWAT teams to prepare active duty units for megacities operations.

Resource Implications

Preparing for MDO in megacities requires partnership with industry and academia and a capabilities-driven acquisition process. Army leadership should emphasize the Army’s unique capacity to synchronize capabilities across domains. Resources should be prioritized toward leadership development, equipment and development of realistic training. The Army recently allocated \$572 million to outfit 26 active BCTs for subterranean operations.⁶² Investment must continue to ensure that Army units are trained and equipped for megacities operations.



Paratroopers assigned to 37th Brigade Engineer Battalion, 2d Brigade Combat Team, 82d Airborne Division, conduct simulated subterranean breaching techniques and chemical reconnaissance testing for chemical agents as part of the battalion’s week-long field training exercise. The engineer battalion also trained using the self-contained breathing apparatus (SCBA) (U.S. Army photo by Staff Sergeant Anthony Johnson).

■ Conclusion

Decades of low-intensity warfare and fluctuating budgets have created gaps that require modernization and reform to maintain overmatch against peer adversaries. As the world urbanizes, megacities are becoming increasingly vital to national security and will likely be the decisive terrain in future conflict. Megacities present new challenges due to their size, complexity and interconnectedness. The Army must be ready to operate across multiple domains, anywhere in the world and whenever called upon—including in megacities.

The Army is rising to the challenge by: honing the MDO concept into doctrine; developing realistic training that fosters mission command through the STE modernization program; and improving leader development and retention through the TMTF. The Army needs a stable budget to modernize without harming readiness and so to defend the nation and its interests for the foreseeable future.



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