FEBRUARY 2026

Hellscape for Taiwan

Rethinking Asymmetric Defense

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CNAS | New Rules

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Acknowledgments

The authors would like to thank the National Security Research Team from the Research Institute for Democracy, Society, and Emerging Technology (DSET) for their guidance and facilitation of the research trip to Taiwan, which helped shape and inspire this report. The authors are grateful to Maura McCarthy, Caroline Steel, and Emma Swislow for their thoughtful editorial feedback. Special recognition is due to Melody Cook and Alina Spatz for designing the outstanding graphics that bring this report to life. Finally, the authors thank Becca Wasser, Jenny McArdle, and David Shlapak for their valuable comments and suggestions that helped improve the quality of this report. This report was made possible with general support to the Defense Program.

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Executive Summary

The question of how Taiwan can effectively deter and, if necessary, defeat a Chinese invasion has become increasingly urgent. For the past two decades, Taiwan has attempted to implement an asymmetric—or "porcupine"—defense strategy. However, significant shortcomings remain. Taiwan must embrace a new way forward should the island democracy hope to repel an attack by the People's Republic of China (PRC). This report lays out a potentially transformative approach to Taiwan's asymmetric strategy: a Hellscape concept to defeat a Chinese invasion.

After four years of warfare in Ukraine, there is renewed appreciation for how commercial technology—when employed effectively—can disrupt established power dynamics.[1] Uncrewed systems offer Taiwan a path to counter the People's Liberation Army's (PLA's) advantages at relatively low cost. The Hellscape concept seeks to deny Beijing its military objective of forced unification, thereby deterring an attack on Taiwan in the first place. By employing resilient uncrewed systems that remain effective despite extensive communications and GPS jamming, a Hellscape concept could prevent the PLA from landing the forces required to conquer the island.[2] Essentially, Taiwan could defeat the invasion at the water's edge.

The Hellscape concept of operations leverages dense, multidirectional fires generated by drones and other uncrewed systems to attrite the Chinese invasion fleet and disrupt the PLA's carefully choreographed amphibious landing. The Hellscape area of operations is divided into four geographical and operational layers.[3] The first layer begins roughly 80 kilometers (km) from the Taiwanese coast and extends 40 km toward the shore. In the outer layer, long-range aerial, sea, and undersea drones disrupt, damage, and destroy Chinese ships while depleting their defensive interceptor stockpiles. The middle layer spans 35 km and ends 5 km from the beach. Within this zone, sea mines slow and channel landing craft, making them vulnerable to one-way attack drones. The final 5-km run to the shore and the landing beaches themselves form layers three and four, where short-range drones attack ships within visual range. In each layer, the density and intensity of attacks would increase dramatically as Chinese amphibious forces approach Taiwan's coastline. Taiwan's maritime strikes depend on layered air defenses, including drone interceptors, to deny the PRC air superiority over Taiwan.

If adopted, the Hellscape concept could strengthen Taiwan's asymmetric defense and guide the nation's approach to drone production, operational concepts, and force design.

Challenges to Implementation and Recommendations

A crucial first step toward actualizing the Hellscape concept is acquisition of large quantities of uncrewed systems by the Republic of China (Taiwan) Armed Forces. Such uncrewed systems could include, but are not limited to:[4]

- Long-range one-way attack (kamikaze) drones
- Uncrewed surface vessels (USVs)
- Uncrewed underwater vehicles (UUVs)
- Multirotor drones
- First-person view (FPV) drones

Additionally, Taiwan should increase and diversify investments in air defense and counter-uncrewed aerial system (C-UAS) capabilities such as:

- Mobile surface-to-air missiles (SAMs)
- Loitering SAMs
- Drone interceptors
- Gun-based drone defenses
- Decoys
- Passive defenses

The Hellscape concept is grounded in Taiwanese self-sufficiency and seeks to identify a theory of victory that is not reliant on the United States. Under President Lai Ching-te, Taiwan has taken major steps to actualize a degree of military-industrial independence by investing in commercial-grade drone production.[5] However, Taiwan's drone industrial base is inhibited by high manufacturing costs due to the need for non-PRC supply chains, coupled with technological dependency on allies like the United States.[6] Taiwan must significantly expand its drone industry and secure reliable supply chains to independently manufacture the drones required for the Hellscape concept.

The authors recommend a dual approach for the continued cultivation of Taiwan's domestic drone production and the rapid acquisition of more uncrewed technology:

- The Lai administration should amend the special defense budget to allocate more funding for domestic drone production. Procurement should consistently favor large quantities of domestically built uncrewed systems over costly platforms such as fighter jets.
- Taiwanese companies should continue to build relationships with European drone manufacturers and expand the emerging non-PRC drone alliance.

Without clear doctrine and rigorous training, however, even a large drone arsenal cannot translate into an effective operational capability. Taiwan appears to be wedded to traditional drone employment concepts, neglecting creative yet simple kill chains that could better exploit asymmetric advantages against a larger adversary. Taiwan also lacks an overarching theory of victory that links its uncrewed systems with other asymmetric capabilities and explains how, together, they could defeat a PRC attack. The Hellscape concept begins to fill this gap but should be tested and refined.[7]

The Hwellscape concept would require Taiwanese defenders to master operations of uncrewed systems across air, sea, and land. The Ministry of National Defense has expanded drone training, but this remains insufficient.[8] Operational concepts and training are interlinked, and Taiwanese forces need a demanding training regime to execute their military plans effectively:

- President Lai should commission the Ministry of National Defense and the General Staff to review existing operational concepts for drone warfare.
- To assist with the development of new drone warfare concepts, the Ministry of National Defense should establish regular "Drone Labs"—structured innovation sessions that bring together career soldiers, conscripted personnel, and technical experts to rapidly prototype, test, and refine drone tactics.

Introduction

Since 1949, the Chinese Communist Party (CCP) has considered the island of Taiwan to be an integral part of the mainland People's Republic of China (PRC), and is committed to unifying with the island through "non-peaceful means" if necessary.[9] For three decades, the PRC has modernized the People's Liberation Army (PLA) to build a military capable of taking Taiwan by force or compelling it to submit to CCP rule.[10] The PLA boasts the largest navy in the world, including sophisticated warships armed with guided missiles and modern amphibious assault capabilities, thousands of ballistic and cruise missiles that can reach Taiwan, and a modern air force that dwarfs the Taiwanese fleet.[11]

The likelihood that the CCP decides to invade Taiwan grows as the cross-Strait military balance of power increasingly favors Beijing.[12] CCP General Secretary Xi Jinping has stated that he expects the PLA to be ready to invade Taiwan by 2027.[13] While this date is simply an internal benchmark, it demonstrates the seriousness of the threat and the strides that the PLA has made toward realizing this goal.[14] Beijing's confidence in its capabilities is evidenced by the fact that over the past several years the PLA has increasingly conducted complex and large-scale military operations around Taiwan in an attempt to pressure Taipei.[15]

The United States has long maintained a policy of strategic ambiguity about whether it would defend Taiwan.[16] Although President Joe Biden repeatedly affirmed that the United States would come to Taiwan's aid in the event of a Chinese attack, President Donald Trump is more equivocal.[17] Trump has accused Taiwan of stealing the United States' semiconductor industry, argued Taipei should be paying Washington for its defense, and demanded the island spend 10 percent of its gross domestic product on its military.[18] The Trump administration's 2025 National Security Strategy (NSS) opposes unilateral efforts to change Taiwan's status, and it emphasizes that the U.S. military is focused on defeating aggression in the First Island Chain, where Taiwan occupies a central position.[19] Notably, the 2026 National Defense Strategy (NDS) makes no explicit mention of Taiwan but reaffirms a "strong denial defense" along the First Island Chain.[20] However, the NSS and NDS also stress that "our allies must step up and spend—and more importantly do—much more for collective defense."[21] By employing tens of thousands of drones as a part of its asymmetric defensive strategy, Taiwan could satisfy the Trump administration's demand that Taipei do more and, more importantly, position itself to stand alone if the United States refuses to intervene.

Cheap drones are the ultimate asymmetric capability because they are small, inexpensive, adaptable, and accessible.

Cheap drones are the ultimate asymmetric capability because they are small, inexpensive, adaptable, and accessible. Ukraine has proven their worth: Drones have enabled a smaller, outgunned force to destroy sophisticated Russian weapons and hold off the larger, better equipped Russian military.[22] In the Black Sea, Ukrainian uncrewed surface vessels (USVs) have sunk large Russian warships.[23] Software-defined small first-person view (FPV) drones operate in jammed environments, outmaneuver defenses, and destroy even heavily armored tanks. Commercial quadcopters provide Ukrainian troops situational awareness and help to aim artillery fire, while larger multirotor drones lay mines, drop bombs, and deliver supplies to the front lines. Ultimately, the presence of drones over the front lines has made going on the offensive incredibly difficult and costly. Like Ukraine, the Taiwanese armed forces can employ drones for similar missions in defense of their nation.[24]

Admiral Samuel Paparo, commander of U.S. forces in the Indo-Pacific, first coined the term hellscape in June 2024, declaring his intention "to turn the Taiwan Strait into an unmanned hellscape" should the PRC invade Taiwan.[25] As laid out by Paparo, "hellscape" is an American strategy inspired by the Ukrainians' use of cheap drones to fend off a larger Russian force. As a first line of defense, Paparo suggests flooding the Strait with uncrewed systems that make the PLA "utterly miserable," and can help "buy time" for other forces to get in place.[26] However, unless U.S. troops are stationed on Taiwan, they would need longer-range drones to counter a PRC invasion—drones that would be more expensive and therefore less numerous.[27] Taiwan is better positioned to employ small, cheap drones in its defense, and thus Hellscape is better conceived as a Taiwanese concept for self-defense rather than an American one. President Trump wants allies and partners to take responsibility for their own defense; for Taiwan, a Hellscape concept embedded in an asymmetric self-defense strategy would do exactly that.

This report seeks to answer several core questions. What could a Hellscape concept for Taiwan look like, and how would it fit within Taiwan's current asymmetric strategy? What capabilities would be needed to create a "hellscape?" How could these capabilities be employed together? Perhaps most importantly, could they stop a PRC invasion force?

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This report presents a starting operational concept for a Taiwanese hellscape that combines uncrewed systems from all domains with other asymmetric capabilities to repel a PRC invasion. By using uncrewed aerial, surface, and underwater vehicles in concert with land-based artillery, mines, and mobile air defenses, Taiwan could create a density of cross-domain fires not previously possible, deny the PRC air and sea superiority, and destroy large numbers of PLA forces. This approach offers a possibility of certainly blunting, if not defeating and, even more importantly, deterring a PRC invasion.

This report is divided into four sections. The first section provides an overview of PRC plans and preparations for an invasion of Taiwan. The second section reviews the literature on Taiwan's asymmetric defense strategy, which currently guides its force development, weapons procurement, and operational planning. The third section outlines the four layers of the maritime and aerial hellscape. The fourth section offers conclusions, identifies potential barriers to implementation, and presents recommendations.

Prospects and Plans for a PRC Invasion of Taiwan

While the CCP would prefer to peacefully unify with Taiwan, it is building a force to provide it with armed options to compel Taipei should cooperation fail.[28] The PLA has outlined several different campaigns for Taiwan, with a full-scale invasion being the most forceful and risky alternative, but also the only one that assures PRC control over the island.[29]

The Taiwan Strait, the 170-km waterway separating mainland China from Taiwan, has proven to be a formidable defensive barrier. To invade, the PRC would need to transport tens—if not hundreds—of thousands of troops with massive quantities of weapons and supplies across the Strait, land them on Taiwan, and organize them for combat—all while under sustained attack. Contested amphibious landings have always been difficult. This is even truer today, as sensors in space, at sea, in the sky, and on the ground can detect and track approaching forces at great distances, while defenders wield long-range weapons with pinpoint accuracy. Nevertheless, the PLA has developed a detailed amphibious doctrine for crossing the Strait and executing a large-scale assault, identifying air, sea, and information dominance as prerequisites for preventing Taiwan's military from mounting a coordinated defense.[30]

In wargames, the war unfolds in three broad phases: large-scale preparatory Chinese strikes, cross-Strait transit and landing, and breakout from the beaches followed by an assault on Taipei.[31]

An invasion would likely begin not with missiles or ships, but in space and cyberspace. The PLA would launch coordinated and simultaneous attacks to blind Taiwan's satellites, sever its digital networks, and jam navigation systems, crippling both civilian infrastructure and military communications before the first shot is fired.[32] Shortly thereafter, the PRC would launch thousands of air and missile strikes on aircraft, ships, missile launchers, radars, and headquarters.[33] This cross-domain barrage would be intended to hobble Taiwan's forces and shatter their morale, leaving any remaining defenders paralyzed or in disarray, thereby enabling PLA ships to cross safely and land with minimal opposition.

To forcibly claim Taiwan, the PLA would need to assemble a large flotilla of ships to ferry tens of thousands of troops across the Strait, overcome prepared defenses, land on the island, and then subjugate it. A contested amphibious assault is an intrinsically complex operation requiring the coordination of multidomain effects to enable a carefully choregraphed landing timed for optimal weather and sea conditions. The PRC would attempt to deceive Taipei about the location and time of an invasion while employing propaganda to undermine the population's willingness to fight.[34] Large Chinese amphibious assault ships would transit the Strait but remain beyond the range of many of Taiwan's coastal defenses, instead deploying smaller landing craft and helicopters to complete the final high-risk approach to the beach. The PLA would concentrate its best troops and most sophisticated weapons at specific landing areas in an effort to overwhelm coastal defenses with "rapid and continuous" waves of troops.[35] This complicated sequence must be repeated many times to establish a lodgment of sufficient strength for the PLA to fight their way off the beaches and ultimately conquer Taiwan.

Concurrent to the amphibious assault, PLA airborne forces would launch airborne assaults to decapitate the government in Taipei, seize airfields, and hold key pieces of terrain.[36] Airborne forces would attack Taiwan's coastal defenders from the rear, helping the amphibious force to fight their way off the beach.

The final phase presents a dual challenge: The PLA must concentrate its forces and move toward the capital to depose the government, while simultaneously establishing the maritime logistics pipeline necessary to sustain its invasion force with ammunition, supplies, and fuel. A secure lodgment provides the PLA with a foothold on Taiwan, but the road to Taipei is far from clear. PLA forces would need to move through canalized mountain passes, cross numerous rivers, and fight their way through dense urban terrain. To march on the capital, the invasion force would need secure and continuous resupply from the mainland, at a scale that far exceeds airlift capacity. To meet the materiel, manpower, and medical support needs of its forces on Taiwan, the PLA plans to augment its military sealift with requisitioned civilian vessels.[37]

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These plans do not exist only on paper. The PRC has acquired many of the capabilities needed for such an attack, and "routinely exercises the military skills that would be employed in an amphibious invasion."[38] However, deficiencies remain. A major shortcoming is the number of landing craft needed to ferry troops the last few miles to the beach.[39] According to one estimate, the PLA Navy (PLAN) has enough amphibious lift to land 19,000 troops in one trip.[40] For comparison, the Allies landed 156,115 troops on the first day of the 1944 Normandy invasion.[41] Ultimately, the PRC may never invade Taiwan if the costs and risks remain prohibitively high. Taipei's asymmetric defense strategy is designed to ensure they do.

The Porcupine Strategy

As the PRC has modernized its military and oriented its forces toward taking Taiwan, Taipei has realized that it cannot defeat the much larger PLA in a conventional conflict, nor can it afford to build a rival force. Somewhat reluctantly, Taiwan has adopted an asymmetric "porcupine" strategy designed to prevent the PLA from quickly conquering the island. Yet this approach as it currently stands is likely to be inadequate against the sheer mass of PLA forces, and Taiwan has implemented it only halfheartedly.[42]

Since abandoning its ambition of retaking the Chinese mainland in the 1990s, Taiwan's defense strategy turned inward, refocusing on territorial defense and deterrence. Taipei aimed to deter PRC aggression by having the ability to defend all of its territory while retaining the capability to punish the attackers.[43] The smaller Taiwanese military planned to achieve these objectives by directly counter-attacking a PLA air and naval assault with its qualitatively superior forces, backstopped by conventional U.S. military power.[44] However, Taiwan can no longer wage a symmetrical fight against the PRC should it try to take the island by force.[45]

Starting in 2008, a growing chorus of U.S. military analysts began advocating for Taiwan to leverage its geography, precision-guided weapons, and the inherent advantages of being on the defensive, to asymmetrically deter or defeat a PRC invasion.[46] Rather than purchasing large, expensive weapons that PLA forces could easily find and destroy, Naval War College Professor William S. Murray urged Taiwan to adopt a "porcupine strategy" built around a "large number of small" mobile weapons that are harder to find and destroy, making the island "prickly" and costly to invade.[47] Easily hidden and relocatable, ground-based short-range weapons, such as coastal defense cruise missiles (CDCMs), attack helicopters, and multiple launch rocket systems (MLRS), Murray argued, would be more survivable against a PLA air and missile attack and inflict significant attrition on an invading force, particularly if coupled with extensive hardening and other passive defenses.

In 2009, the RAND Corporation published a seminal report that lays out a "four rings" defense for Taiwan outlining how asymmetric capabilities could stop a PLA invasion fleet.[48] The first ring uses long-range antiship cruise missiles (ASCMs) to thin the invasion fleet before it reaches shore, while a second ring of dense minefields further slows and damages the surviving vessels.[49] The third ring exploits Taiwan's geography. Few beaches on the western shore can accommodate a large landing force, restricting the number of troops the PLA could unload at once. Mobile Taiwanese units armed with short-range missiles would strike landing craft on their final approach to the beach.[50] In the fourth and final ring, Taiwanese defenders use direct and indirect weapons to decimate disembarking forces.[51]

A 2014 Center for Strategic and Budgetary Assessments (CSBA) report argued that, by preparing for a "guerrilla" defense of Taiwan that aims to deny the PLA air and sea superiority, Taiwanese defenders could protract the conflict, raising the costs so significantly that the PRC would be deterred from attacking.[52] CSBA's "Hard Roc 2.0"

sea denial strategy centers on using midget submarines, fast attack craft with ASCMs, sea mines, and CDCMs to harass and attrite the PLAN.[53] The CSBA strategy and a later 2016 RAND report maintain that Taiwan should reallocate air defense investments away from expensive fighter jets and toward mobile surface-to-air missiles (SAMs) to prevent PLA Air Force (PLAAF) dominance of Taiwanese airspace.[54] Both analyses concluded that investing in asymmetric capabilities would strengthen deterrence, and at a lower cost than Taiwan's planned acquisitions.[55]

For nearly two decades, Taiwan's government refused to accept the implications of the shifting cross-Strait balance of power. Taiwanese defense budgets declined from their Cold War levels, its military shrank, and the government continued to invest its limited resources into small numbers of expensive and sophisticated weapons.[56] However, in 2017, then-Chief of the General Staff Admiral Lee Hsi-min succeeded at shifting Taiwan's defense strategy toward an asymmetric approach with Taiwan's Overall Defense Concept (ODC).[57] Hsi-min explained that the Taiwanese military would no longer seek to "totally destro[y] enemy forces," but instead focus operations on "foiling the PLA's mission of successfully invading and exerting political control over Taiwan."[58] As such, the key objectives of the Taiwanese military are to survive a first strike, convincingly defeat PLAN forces in Taiwan's littoral waters, and defeat the invasion force at the beach.[59] Like in guerrilla warfare, Taiwan would not need to win outright, it would just need to deny the PRC victory.

Despite growing budgets, Taiwan's military remains underfunded for the scale of the challenge it faces and continues to spend the bulk of its defense budget on large, exquisite prestige weapons.

In practice, however, Taiwan's implementation of a porcupine strategy has fallen short. Critics, including senior officials in the Trump administration, have argued that Taipei has "displayed an alarming lack of urgency," and that its "spending and pace of preparations have been woefully inadequate given the awing scale of China's military buildup."[60] Taiwan has failed to mobilize society against the Chinese threat, and it continues to underinvest in defense.[61] Futhermore, the conservative Taiwanese military has inadequately invested in asymmetric capabilities, suffers from chronic personnel shortages and insufficient training, and has underdeveloped defensive plans for defeating PRC aggression.[62]

Regarding defense procurement, the record is more mixed. For instance, Taiwan has acquired several long-range ASCMs, but these missiles are relatively expensive and stockpiles are limited.[63] Similarly, Taiwan has four mine-layer ships, but it is investing in mine-laying capabilities and plans to acquire or modify existing ships, expanding its fleet to 14.[64] While a clear effort, these modest quantities are likely insufficient for effective defensive operations.[65]

Despite growing budgets, Taiwan's military remains underfunded for the scale of the challenge it faces and continues to spend the bulk of its defense budget on large, exquisite prestige weapons. Unable to purchase foreign submarines, Taiwan is building its own indigenous diesel-powered submarine fleet at the cost of a whopping $16 billion USD for eight boats.[66] Taiwan also spent $4.5 billion to upgrade its aging F-16 fleet and in 2019 moved to purchase an additional 66 F-16Vs for $8.1 billion.[67] These jets, which scramble frequently whenever PLAAF aircraft cross into Taiwan's declared air defense identification zone, may have a role in every day deterrence of PRC gray zone activities but are less useful—and less survivable—in a conflict. Taiwan's commitment to expensive weapons leaves few resources for other priorities, such as expanding its force and improving its readiness.

Beyond its equipment problems, Taiwan's military suffers from serious deficiencies in manpower, training, and planning that raise doubts about its ability to resist a larger PLA force. Taiwan relies on a small professional force backstopped by reservists and conscripts, but retention of active-duty personnel remains a persistent challenge, and training standards vary significantly across components.[68] The Taiwanese military also lacks clear doctrine and operational concepts for its asymmetric defense strategy.[69] Without this foundation, military planners struggle to justify procurement decisions, commanders cannot develop realistic training scenarios, and units lack a shared understanding of how they would actually fight. The result is a force that may possess the right equipment but lacks the intellectual framework to employ it effectively.

In short, much more needs to be done to make Taiwan's asymmetric strategy a reality. President Lai Ching-te's historic 2025 budget is a welcome development that will fund additional asymmetric capabilities, but it does not resolve the underlying personnel and organizational deficiencies or the cultural resistance to an asymmetric strategy.[70]

From Porcupine to Hellscape

Taiwan's current approach is unlikely to deter PRC aggression. What Taiwan needs is a new operational concept—one that builds mass, provides operational flexibility, and remains affordable. The answer lies in creating a hellscape: tens of thousands of drones that would make an invasion prohibitively costly.

Drones could augment Taiwan's limited stockpile of expensive weapons with precise, affordable mass that produces cross-domain effects while reducing risk to military personnel by employing uncrewed systems for the most dangerous missions.[71] Hellscape is an operational concept supporting a defense-by-denial strategy that aims to prevent Beijing from achieving its military objective, thereby deterring an attack in the first place. It does so by preventing the PLA from transporting enough troops to Taiwan to conquer the island, using an approach designed to remain effective even amid extensive communications and GPS jamming.[72]

The Hellscape concept focuses on defeating the PLA when it is most vulnerable—during its cross-Strait transit and when its troops are landing. During the initial stages of the war, when PLA forces bombard the island, Taiwanese defenders should focus on survival instead of blunting the attacks. The PRC's massive air force and deep missile stockpiles make interception a costly and likely futile endeavor. Taiwan should accept that it would not be able to stop—or even significantly limit—the damage caused by PLA ballistic missiles, which would quickly saturate Taiwan's missile defenses. Instead, the Taiwanese military should create a robust system of passive defenses including hardening, camouflage, concealment, deception, and mobility to mitigate the effects of the PLA's strikes.

Once the invasion fleet begins to cross the Strait, Taiwan's small mobile forces that weathered the initial air campaign could implement hellscape operations to destroy, damage, or "mission-kill" Chinese ships to slow, if not stop, the invasion. This concept builds on Taiwan's porcupine strategy, amplifying it by incorporating thousands of cheap drones. Since Chinese electronic and kinetic attacks on Taiwanese networks and command-and-control (C2) nodes are likely, the Hellscape concept calls for mass attacks that increase in density closer to Taiwan's shore. It sacrifices efficient use of weapons and prioritization of targets in favor of unrestricted strikes on any ship approaching Taiwan. Drones, therefore, complement Taiwan's existing asymmetric capabilities and could dramatically expand Taiwan's firepower and defensive capabilities.

The Overarching Hellscape Concept: Sinking Chinese Ships and Defeating the Landing

Taiwan's hellscape operations should aim to damage or sink as many Chinese ships as possible in an attempt to cripple the cross-Strait transit, thereby preventing PLA troops and equipment from getting ashore on Taiwan.[73] The concept leverages uncrewed aircraft, ships, and underwater vehicles to create an all-domain gauntlet that fractures the careful choreography and meticulous timing of an amphibious assault and imposes maximum attrition on the invasion force. With this defensive plan, Taiwanese forces on the beaches could then eliminate the relatively modest numbers of PLA forces that make it to the island. Even if the PLA secures a lodgment, relentless drone surveillance and strikes would make any breakout and advance inland extraordinarily difficult.

Building off RAND's four rings strategy, the authors identify four tiers to the Hellscape concept for Taiwan: the over-the-horizon outer layer, the disruptive middle layer, the final run to the shore, and the landing beach.[74]

Figure 1: The Four Layers of the Maritime Hellscape
Taiwan's uncrewed hellscape would begin 80 km from the island's shore. The density of fires would increase as the invading Chinese fleet nears the beach.

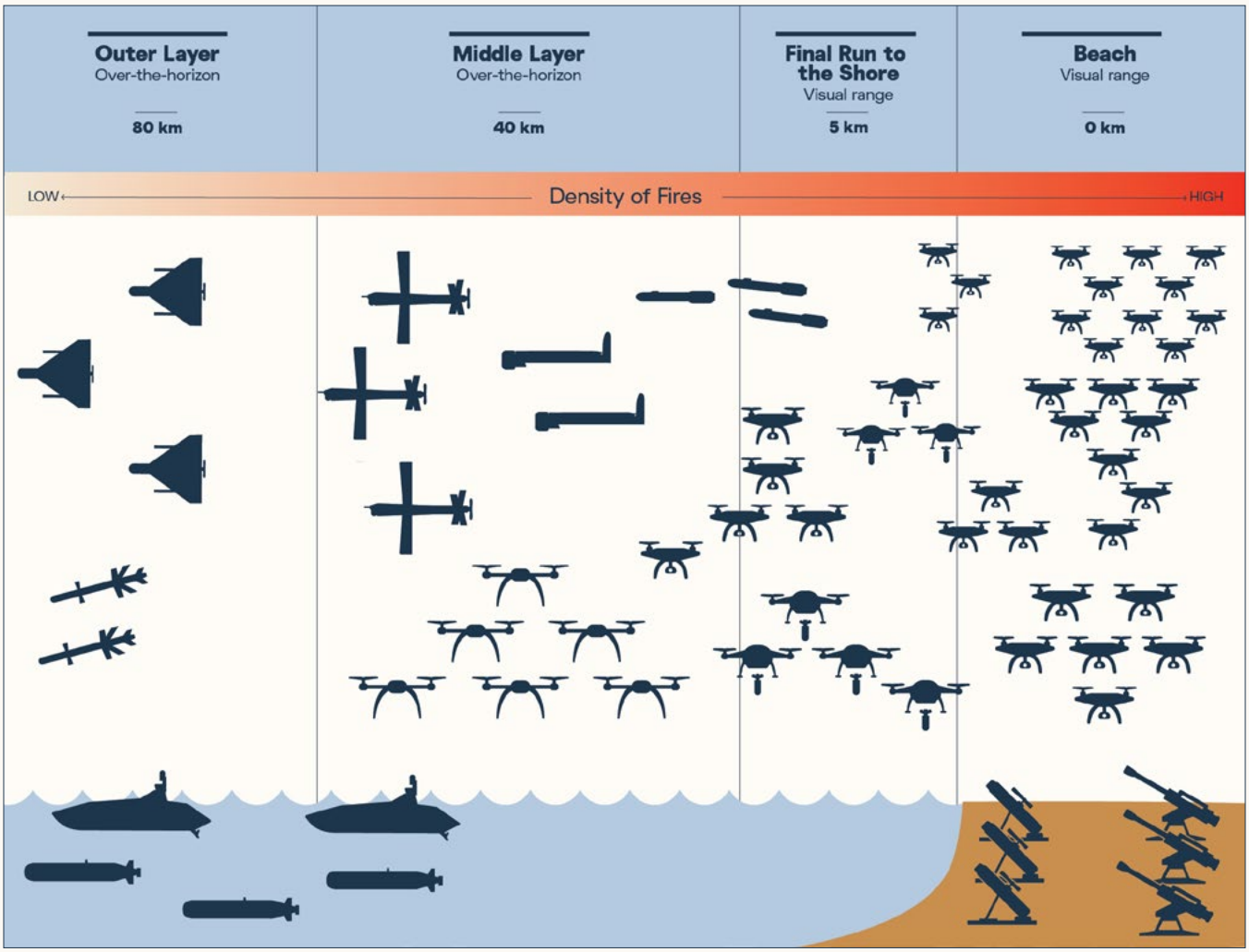
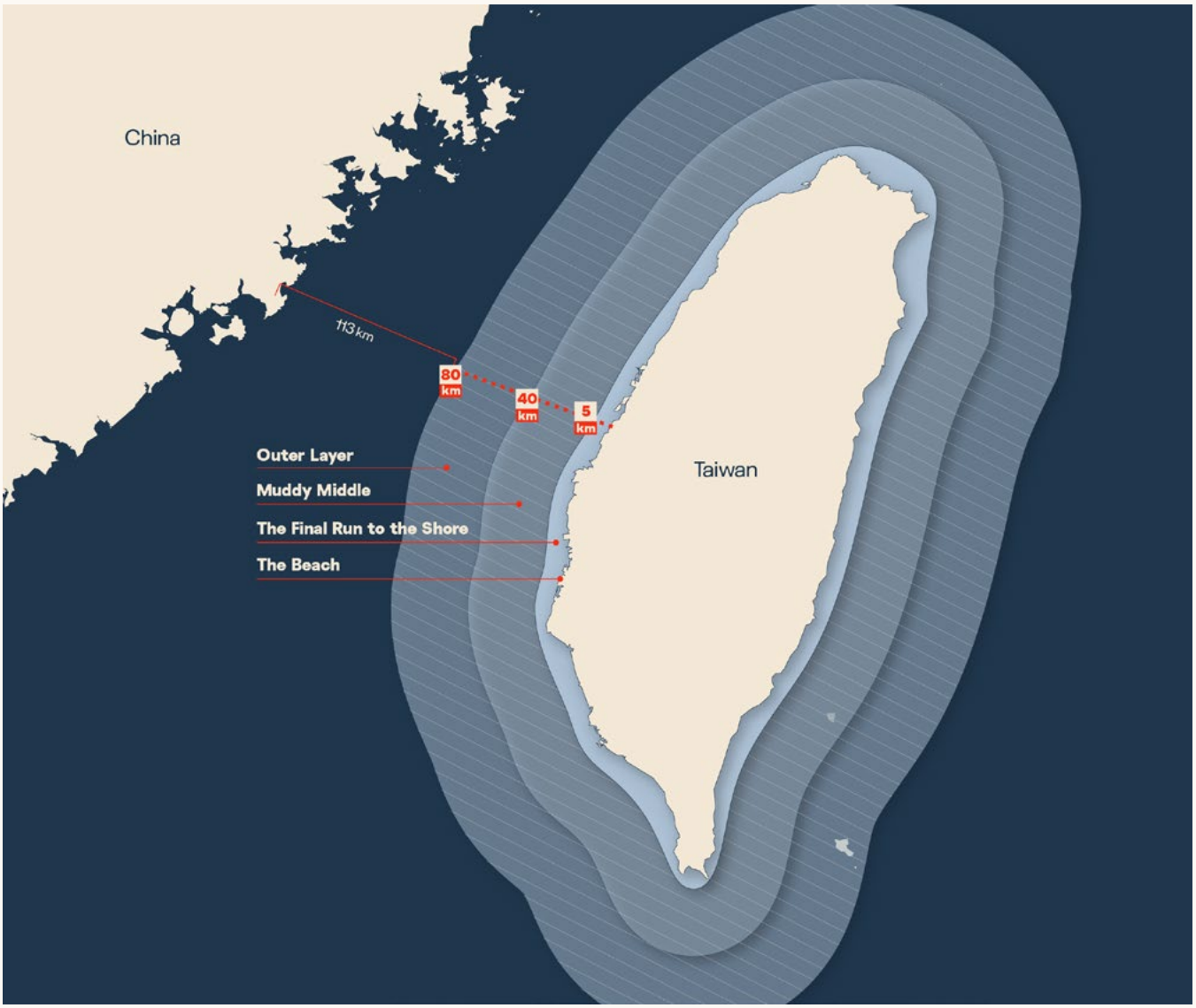


Figure 2: The Geographical and Operational Layers of Hellscape
The Hellscape for Taiwan concept is broken into four geographic and operational layers: the outer layer, the muddy middle, the final run to the shore, and the beach.



The Outer Layer

The outermost layer of the Hellscape concept begins approximately 80 km from Taiwan and extends 40 km toward its shore. During an invasion, Chinese naval forces would mass in this location. The flotilla would be outside the range of all but the PRC's longest-range land-based SAMs, making it a lucrative target for Taiwanese strikes.[75]

As the invasion fleet crosses the Strait, it would likely be surrounded with layered protection: combat air patrols, organic ship defenses, jammers, decoys, and clutter. Fighter aircraft would form the outermost picket, interdicting inbound enemy aircraft or missiles, while warships' missiles and guns would engage any threats that get through. Electronic warfare pods on aircraft and ships would jam navigation and communication signals, degrading the accuracy of incoming long-range missiles.[76] Amphibious ships would try to hide in the crowded flotilla, screened by warships, logistics vessels, decoys, and maritime militia craft.[77] To deceive sensors, Chinese militia ships would likely employ "corner reflectors, false radio signals, false heat sources" to draw fire away from more valuable military vessels.[78]

Taiwan could flood this zone with long-range kamikaze drones, ASCMs, uncrewed underwater vehicles (UUVs), and uncrewed surface vessels (USVs) that would attack any ship they encounter. The disrupted electromagnetic spectrum, coupled with the distance of the fight from Taiwan, means the weapons used in the outer layer must be long range, able to operate in high sea states, and equipped with autonomous navigation and terminal guidance.

Attacks in the outer layer aim to create confusion, disrupt the timing of China's planned attack, deplete air defense interceptors, and damage or sink ships. Even heavily defended destroyers and cruisers have limited numbers of interceptors on board, making them vulnerable to saturation-style attacks.[79] Taiwanese forces do not necessarily have to sink ships to stop the flotilla. Ships rely on advanced electronic systems for sensing, communicating, and navigating. Attacks against these fragile systems could mission kill the vessel, meaning that it cannot complete its assigned operation without significant repair.

Rather than targeting only high value ships from standoff ranges, the Hellscape concept floods the outer zone with weapons that employ their organic sensors and engage any ship that they encounter.

In a hellscape operation, successful long-range attacks would require general intelligence on the fleet's location, speed, and heading, but not precise targeting tracks for individual ships. Preferentially striking high value Chinese targets such as amphibious ships, destroyers, and cruisers would require real time-tracks and long-range communications capabilities, which Taiwan should not count on having available. Rather than targeting only high value ships from standoff ranges, the Hellscape concept floods the outer zone with weapons that employ their organic sensors and engage any ship that they encounter.[80]

Jamming complicates targeting specific ships, but finding the fleet itself is far less demanding. High altitude drones or balloons operating over central or eastern Taiwan could provide initial cues about the incoming flotilla.[81] Additionally, pickets of small UUVs could maintain a perimeter to provide early warning of an amphibious assault.[82] Small UUVs similar to Remote Environmental Monitoring Units (REMUS) and Bluefin-21 could send small burst messages that include the time, location, and direction of the force, and would likely be able to pass basic details of the main attack even in the presence of jamming.[83]

Large UUVs with relatively simple navigation and perception autonomy could be armed with lightweight torpedoes or used as kamikazes to attack ships in the outer ring.[84] These UUVs could be akin to a mine with a ship-count mechanism; they do not target the first ship detected but wait to detonate, increasing the likelihood of striking a higher value ship.[85] Alternatively, UUVs could match magnetic or acoustic signatures to ships or strike objects that have certain markers and pass pre-established thresholds. The UUVs, therefore, do not need to be extremely intelligent weapons to attrite high-value naval assets. Attacks deep within the flotilla would scatter formations and disrupt the PRC's amphibious attack plans.[86]

While underwater drones would likely make first contact with Chinese ships, drone boats and aerial drone attacks would quickly follow. Instead of its crewed ships, Taiwan should deploy small USVs with a variety of payloads to interdict the invasion fleet. Ideally, these drone boats would have a range of roughly 750 km, enabling them to launch from multiple points around Taiwan, including the east coast, and converge on the invasion fleet.[87] While far exceeding the minimum required, the additional range would allow USVs to attack from multiple directions and make it harder for the PLA to find, track, and strike them. USVs could autonomously navigate preplanned routes, using onboard sensors such as cameras and radars to detect and engage targets within designated kill boxes.

A fleet of drone boats carrying diverse kinetic payloads would pose multiple dilemmas to the PLA. If loaded with a minimum payload of 180 kg of explosives, kamikaze USVs could rapidly sneak up and ram Chinese ships, which are not heavily armored, and attempt to penetrate the hull.[88] Given the relatively large payload and the waterline impact point, kamikaze drone boats may be able to sink even large warships.[89] A portion of the USVs could be armed with air-to-air missiles for countering Chinese fighters, helicopters, and drones that will be patrolling the skies.[90] Other USVs might carry laser-guided rockets, lightweight torpedoes, or medium-range loitering munitions. Laser-guided rockets are less expensive and shorter range than missiles or drones but could still damage a ship's fragile superstructure and electronics.[91] Alternatively, USVs could carry two medium-range loitering munitions that could be launched from greater distances but fly at slower speeds. Regardless of the specific armament configurations, a rapid succession of varied threats and USV attack profiles would overwhelm PLA defenses, increasing the likelihood of success.

To operationalize a hellscape defense, Taiwan would also need deep stockpiles of cheap ground-launched attack drones and even cheaper decoy drones to complement its

cruise missiles.[92] Attack drones with a minimum range of 300 km could be launched from various points across Taiwan, complicating identification and targeting of launchers by the PLA. The additional range would enable the drones to fly various flight paths, reach the edge of the operational area (80 km), and loiter for some time while searching for targets. With a 50- to 100-kg warhead, the UAVs would be unlikely to sink a ship but could cause serious damage and inflict mission kill. Some decoy drones could be armed with small warheads, while others remain unarmed. A smaller number of cruise missiles, like the Hsuing Feng II/III and Harpoon, could be fired from mobile shore-based launchers.[93] Mixed salvos with many cheap drones, decoys, and a few cruise missiles could also overwhelm and penetrate PLA air defenses. Facing mixed drone and missile raids, Chinese forces would have little time to distinguish sophisticated threats from decoys, forcing them to engage everything. This would rapidly deplete shipboard interceptors, leaving the fleet vulnerable to follow-on attacks.

Based on the authors' calculations, a single raid consisting of 100 kamikaze drones (similar to the Russian Geran or Iranian Shahead-136) and 50 Harpoon cruise missiles (operating without terminal updates or GPS) could damage an estimated 10 ships.[94] Assuming relatively low reliability and lower performance, drones alone would likely only hit two or three ships. When employed with larger, more capable cruise missiles, however, an additional seven ships could be hit. Fired together, these weapons force PLA defenders to engage the first wave, leaving them out of position and less able to adapt to a different threat profile that follows. As the PLAN fleet is the largest in the world, with more than 140 major surface combatants, a mixed salvo such as the one described above could take out only a small fraction of the invasion fleet.[95] However, repeated waves or larger salvos could damage a significant number of ships, jeopardizing the PLA's capacity to transport the tens of thousands of troops needed to invade the island.

To launch long-range drone and missile attacks on Chinese ships, Taiwan would also need mobile air defenses that pose a credible and sustained threat to PLA aircraft.[96] The PLA could generate at least 100 fighter sorties every two hours, searching for drone and missile launchers across the island.[97] However, without air superiority, the PLA would need to fly larger strike packages with dedicated suppression or destruction of enemy escorts, and minimize flight time over Taiwan, limiting its ability to conduct offensive operations. Unable to loiter over the island, PLA aircraft would struggle find and hit small mobile targets and quickly respond to pop-up threats.[98]

The outer layer of the Hellscape concept aims to significantly disrupt Chinese plans, thin the flotilla of ships, and sap air defenses, thereby making the ships that continue onward even softer targets.

Mobile SAMs using "shoot and scoot" tactics would prevent the PLA from establishing continuous air patrols. Taiwan should seek to conserve its SAMs, using them selectively to create operational windows for its ground troops to strike Chinese ships without fear of air attack. SAM engagements should coincide with strikes on the invasion fleet or be opportunistic shots at high-value targets. After engaging the Chinese aircraft, the SAM unit should quickly relocate, keeping its radar off to mask its location from Chinese forces. Hidden most of the time, Taiwanese SAMs would serve as a force in being, posing a persistent threat that keeps Chinese aircraft at a distance while enabling strikes on the PLA flotilla.

Damaging or destroying an amphibious ship in the first wave has greater impact than a later hit, as ships would need to conduct multiple Strait crossings to deliver the whole invasion force.[99] Taking ships out of operation for several days is sufficient to slow, if not completely stall, the invasion. If Taiwanese forces can coordinate these cross-domain attacks to occur simultaneously or in quick succession, they would likely overwhelm the PRC invasion force. The outer layer of the Hellscape concept aims to significantly disrupt PLA plans, thin the flotilla of ships, and sap air defenses, thereby making the ships that continue onward even softer targets.

The Muddy Middle Layer

The next layer of the hellscape begins 40 km from Taiwan and extends to about 5 km offshore. Remaining under the Chinese fleet's air defense umbrella, most large amphibious ships would halt deep within this zone—close enough to launch landing craft but far enough to stay beyond the range of Taiwan's coastal weapons. The large amphibious ships would flood their well decks to create internal harbors, so smaller landing craft and hovercraft could launch in a predesignated sequence, while helicopters lift off from the flight deck, all continuing toward Taiwan. Once the smaller ships and helicopters leave the vicinity of the fleet, they would be much more vulnerable to Taiwanese strikes, as they are mainly armed with cannons and guns.

In this zone, Taiwan aims to disorganize the landing craft, throw them off their schedule, and attrite the ships with mines and aerial drones. Taiwanese multirotor drones could lay dense minefields that channelize the Chinese fleet, damage ships, and slow them down. Attack drones would hunt Chinese ships navigating deliberately through the minefields, compounding the disruption to the strict timetables and precise choreography of the large-scale amphibious assault.

The decision to mine approaches to likely landing areas should be made early. The Taiwanese navy has specialized minelaying craft as well as frigates, destroyers, and four submarines that could be used to seed minefields.[100] Taiwan may also want to acquire quick-strike mines that antisubmarine warfare and cargo aircraft can deliver during a crisis period.[101]

Once the war begins, PLA aircraft would be patrolling above the Strait, hunting Taiwanese minelaying ships. To meaningfully disrupt the invasion, Taiwan must lay dense minefields and reseed them each time PLA forces clear a path. Uncrewed systems are an obvious solution, as they are harder to detect and reduce the risk to personnel.

Drone boats could seed the shallows with explosives like the Manta (MN-103) sea mine. Small, shore-launched UUVs with preprogrammed navigation could function as mobile smart minefields, disrupting clearance operations by repopulating areas the PLA had already swept.[102] However, weighing between 600 kg and 1,000 kg, Taiwan's current Wanxiang family of mines are too heavy for most drones to deploy.[103] Taiwan should develop a lighter sea mine between 50 and 100 kg, so it could be air delivered by heavy multirotor drones. MLRS offers another option: MLRS-deployed sea mines, which enable rapid reseeding of minefields to sustain the density necessary to impede Chinese ships.[104]

To prevent Chinese jets, helicopters, and drones from picking off Taiwan's minelaying multirotor drones and USVs, Taiwan should develop loitering SAMs, akin to the Iranian 358 and 359 missiles. A rocket booster launches these missiles off the ground toward a general target area and then an air-breathing engine takes over propulsion, enabling the loitering SAMs to patrol a sector and employ optical sensors to search for hostile aircraft.[105] While the 358 is quite slow, it can be launched in advance of minelaying operations to defend airspace and create obstacles—loitering air minefields—that an adversary would have to plan around or neutralize.[106] Before PLA aircraft could hunt for Taiwanese forces, they would need to clear the airspace, which would be dangerous and time consuming and would deplete air-to-air munitions.

The 358-style missile would be effective at countering PLA propeller-powered drones, while the 359 missile is more advanced, with enhanced range and speed enabling it to defend against faster aircraft at higher altitudes.[107] The 359 cannot catch fast-flying fighters, but it could be used against slower flying airborne early warning (AEW) and transport aircraft. The threat could push many PLA aircraft into a cautious standoff posture instead of flying directly overhead, further complicating the detection and tracking of small, mobile Taiwanese units. An aerial minefield could also ambush a PLA air assault or force them to fly longer and more dangerous routes. Aerial minefields would impede PLA air operations, providing cover to Taiwanese forces and freeing them to strike Chinese ships.

Figure 3: The Muddy Middle Layer
In the middle layer, dense minefields augmented and reseeded with uncrewed systems could slow and disorganize the Chinese landing craft.

Alone, air and sea mines could slow, but not stop, a PLA landing. Combined with attack drones, mines could disrupt the Chinese fleet's rigid invasion plan. With PLA airpower suppressed by aerial minefields, Taiwan could launch successful aerial attacks by exploiting the measured pace and predictable routing of the Chinese fleet as it navigates through the minefields.[108] Using primarily medium-range (50–100 km) one-way attack drones, Taiwan could overwhelm the landing craft with salvos of 15 to 20 drones arriving simultaneously or in quick succession from different azimuths. Low-flying drones could

close in on the ships undetected. Landing craft, armed with only guns and man-portable air defenses, lack the radar coverage and firepower of the air defense warships they have left behind. By launching simultaneous drone salvos against different points along the column, Taiwan could inflict significant attrition on the vulnerable landing craft and panic crews into diverting into unsanitized waters—where more mines await.

Final Run to the Shore: Coastal Waters

The third layer of the hellscape is the final 5 km to the shores of Taiwan. At this stage of the fight, Taiwanese forces should be focused on the destruction of incoming PLA landing craft.

The Chinese ships that survive the first two layers of the hellscape must close within visual range and make the final harrowing run to the shore. Due the small landing beaches, PLA landing craft would need to advance in small waves of about 20 ships at a time.[109] Crossing this final 5-km stretch could take about 10 minutes, giving Taiwanese defenders ample time to strike with short-range missiles, rockets, and drones.[110]

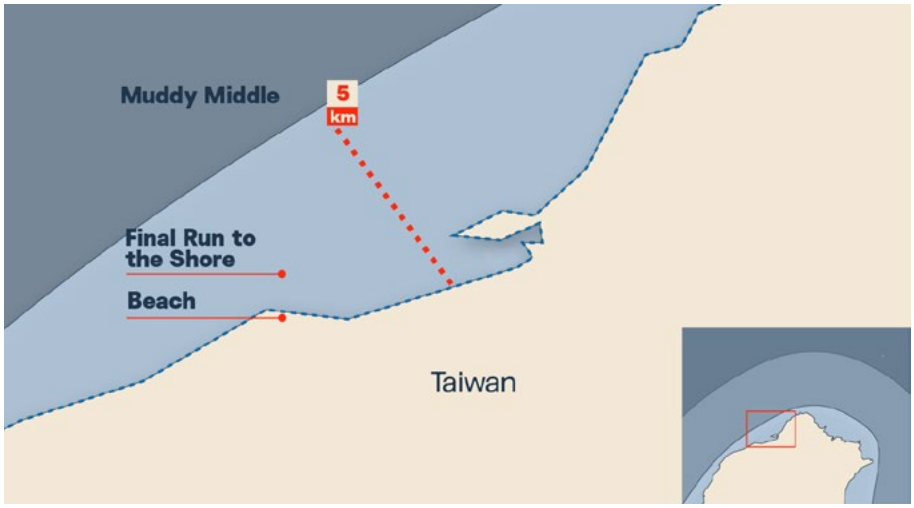
Once the landing craft reach visual range, Taiwanese troops could employ line-of-sight weapons that do not rely on GPS or satellite communications, both of which would likely be unavailable due to PLA jamming.[111] At sea level, Taiwanese soldiers and optical sensors could spot targets at approximately 5 km and visually guide weapons toward landing craft.[112] While PLA standoff jammers would be out of range, the landing force may carry tactical jammers that interfere with the datalinks of small drones. For this reason, Taiwanese tactical drones—FPVs and small quadcopter bombers—should have autonomous terminal guidance that enables them to go the "last mile" and hit their target in a jammed environment.[113] Ukrainian companies have developed simple, cheap, and effective pixel lock solutions in which the operator selects a target, and the drone continues to that point even if the command link is severed.[114] Combined salvos of fast-flying FPV drones and slower quadcopters or multirotor drones for surveillance and bombing would be difficult for the PLA to contend with, as the incoming drones would hold PLA forces at risk from different directions and speeds.[115]

Taiwan could further overwhelm PLA ships by launching very short-range ASCMs and rockets, which are faster than drones and carry larger warheads that can significantly damage landing craft and cargo. The RBS-17, a ground-launched antiship Hellfire missile variant, offers a "fire and forget" capability against ships.[116] At $50,000 to $100,000 USD each, Taiwan can likely afford only limited quantities, making it a high-end weapon reserved for priority targets like landing craft and armored vehicles.[117]

To complement the short-range missiles, Taiwan should acquire precision rockets, such as the American AGR-20 Advanced Precision Kill Weapon System (APKWS), a laser-guided 70-mm rocket offering a 7-km range and 4-kg warhead, a mid-tier weapon between attack drones and a Hellfire.[118] For $15,000 to $20,000 USD each, Taiwan can upgrade inexpensive 70-mm rockets into a versatile direct attack weapon effective against small ships, vehicles, personnel, and drones.[119] At this price, Taiwan could purchase large stockpiles and use them for direct attack and air defense.[120] While multiple rockets would be necessary to disable or destroy a ship or armored vehicle, it still would be a valuable addition to Taiwan's arsenal.

Finding and eliminating Taiwanese strike teams would be difficult. PLA aircraft and drones would search for missile launchers and drone operators, while the PLAN would bombard the beaches to suppress coastal fires. Armed with small, mobile weapons and dispersed across cities and forests, Taiwanese defenders could hide in plain sight. A Hellfire launcher fits on a concealable tripod, while a pickup truck with rockets or drones in the bed looks like any other vehicle on the road. China's targeting problem grows considerably harder if Taiwan invests in decoys, camouflage, and concealment for its missile and rocket launchers.[121] Taiwan should also use its air defenses to create windows

Figure 4: The Final Run to the Shore
Comprising the last 5 km to the shore, it is at this layer that the Chinese fleet would enter line of sight. Taiwanese defenders could employ more traditional and short-range weapons to attrite landing craft.



when Chinese aircraft are driven off, allowing defenders to engage approaching ships.[122]

The Beach: Stopping the Invasion at the Shoreline

Contested amphibious assaults have always exacted a heavy toll. No military has yet faced an opposed landing with an adversary fielding a large number of precision-guided weapons. Prepared defenses coupled with a high volume of fire could hold the PRC invasion at the shoreline and inflict devasting losses with small drones, missiles, and rockets.[123]

In anticipation of PLA troops reaching the shore, Taiwanese forces should emplace obstacles, including dense minefields, on potential landing areas and near beach exits. Taiwan has a small number of beaches suitable for a large-scale amphibious landing, and those are shallow with limited access points. To establish a viable lodgment, PLA forces would need to rapidly clear the beaches to make room for the next wave of units.[124] Therefore, beach exits could become critical choke points, requiring slow, deliberate clearing before PLA troops could safely move inland. Multirotor drones could be used to emplace mines and to drop bombs. If Taiwan acquires something akin to the United States' family of scatterable mines (FASCAM), cannons could also reseed minefields and encumber maneuvers, thereby making it easier for attack drones to pick off PLA soldiers.[125]

> **Prepared defenses coupled with a high volume of fire could hold the invasion at the shoreline by inflicting devasting losses with small drones, missiles, and rockets.**

Once on the beach, Chinese landing craft become stationary targets during unloading, making them easy prey for Taiwanese attacks.[126] As such, Taiwan should focus its larger, short-range weapons—antitank missiles, antiship missiles, rockets, and loitering munitions—on ships. Wrecked vessels create additional obstacles on the beach, while depriving the PLA sealift capacity needed for subsequent crossings.

While the PLA clears mines, Taiwan could employ direct fire weapons—especially small drones—to inflict heavy losses. Artillery would offer a larger volume of fire but should be avoided to prevent inadvertently clearing minefields and opening maneuver room for the PLA. Instead, FPV drones—both with autonomous terminal guidance and wire controlled—and drone bombers should target infantry, while antitank missiles and rockets engage vehicles. Uncrewed ground vehicles (UGVs) armed with machine guns could occupy fighting positions along egress routes, creating overlapping fields of fire.

The PLA forces that land on Taiwan will likely have already suffered heavy casualties. After running the three-ring gauntlet, Chinese landing craft may arrive out of order at incorrect locations, leaving PLA units scattered without critical weapons and logistics support—or even their commanders.[127] Given the PLA's centralized command structure, losing unit leaders could be particularly detrimental, preventing the troops from adapting and coalescing into an effective fighting force.[128] Yet even if some Chinese ships arrive unscathed and on time at their designated beaches, the Hellscape concept would pin Chinese troops there.

To shield Taiwanese drone operators and fire squads from PLA aircraft, Taiwanese defenders need robust short-range air defenses such as mobile antiaircraft guns, man-portable air-defense systems, and drone interceptors.[129] These short-range systems would constitute the final tier of a layered air defense and would offer protection against PLAAF helicopters and drones. The PLA has invested heavily in drones and would rely on them even more if Taiwan's SAMs remain a threat. Ukraine has found that fast, maneuverable drones are cost-effective ways of countering higher-flying Russian attack and surveillance drones. For instance, the Surveyor drone interceptor, which flies up to 175 mph, has downed thousands of Russian Geran drones at the low price of only $15,000 each.[130] Together, these capabilities would make Taiwanese airspace deadly for Chinese aircraft and enable ground forces to execute the Hellscape concept.

Taiwan could defeat a Chinese amphibious assault at the water's edge with the Hellscape concept. By incorporating drones into a layered, asymmetric dense-in-depth strategy, Taiwan could have enough cross-domain precision fires to repel a Chinese invasion.[131]

Conclusion

The current asymmetric "porcupine" strategy Taiwan has pursued for the past two decades is insufficient against the increasingly urgent threat of forced unification presented by the People's Republic of China. The Hellscape concept offers a potentially transformational approach to island defense by leveraging uncrewed systems—perhaps the ultimate asymmetric weapon—to generate high-volume, high-density cross-domain fires against the larger PLA. By flooding the Taiwan Strait with thousands of drones, drone boats, and underwater

vehicles—turning it into a "hellscape" —Taiwan could exploit the vulnerability of the invading Chinese fleet as it crosses the Strait.

Each of the four layers of the Hellscape concept compounds the effects of the previous one, creating cumulative attrition that could halt a PRC invasion at the water's edge. Beginning 80 km from the Taiwanese coast, attacks in the outer layer would comprise of waves of long-range kamikaze drones, ASCMs, and fleets of heavily armed USVs and UUVs. Wholesale strikes against any and all Chinese vessels would inflict widespread damage, deplete air defense interceptors, sow confusion, and ultimately disrupt the careful timing of the PRC's planned attack.

At 40 km, the Chinese landing craft would face dense sea minefields emplaced by Taiwanese UUVs and heavy multirotor drones, while loitering SAMs would create aerial minefields and hunt PLA aircraft. As ships enter the final 5 km to the shore, Taiwanese defenders—now with clear sightlines—could hammer them with FPV drones, rockets, and other short-range systems. Once on the beaches, Chinese troops and landing craft become stationary targets and would be vulnerable to small antipersonnel drones and direct fire weapons. Mining the narrow exits from the beaches would turn PLA efforts to move inland into a costly ordeal.

Successful execution of the hellscape operations previously described would deny the PLA from achieving air and sea superiority—key elements essential for overall victory. Without dominance in either domain, the PLA could not safely transport nor sustain an invasion force large enough to achieve Beijing's objective of forced unification. Hellscape shifts the strategic calculus: The question is no longer whether Taiwan can win a conventional war, but whether China can stomach the operational chaos, massive casualties, and strategic uncertainty that an invasion would bring. By making invasion prohibitively costly and dangerously unpredictable, Hellscape strengthens deterrence and reduces the likelihood that Beijing would launch an attack in the first place.

This new concept, if adopted, could strengthen Taiwan's asymmetric defense and guide the nation's approach to drone production, operational concepts, and force design.

Challenges to Implementation and Recommendations

A crucial first step toward actualizing the Hellscape concept is meaningful acquisition of large quantities of relevant and effective uncrewed systems by the Republic of China (Taiwan) Armed Forces. Such uncrewed systems include, but are not limited to:[132]

- Long-range one-way attack (kamikaze) drones
- Uncrewed surface vessels (USVs)
- Uncrewed underwater vehicles (UUVs)
- Multirotor drones
- First-person view (FPV) drones

Additionally, Taiwan should increase and diversify investments in mobile air defense and counter-uncrewed aerial system (C-UAS) capabilities such as:

- Mobile surface-to-air missiles (SAMs)
- Loitering SAMs
- Drone interceptors
- Gun-based drone defenses
- Decoys
- Passive defenses

What distinguishes the Hellscape concept is its focus on Taiwanese self-sufficiency: It outlines a viable defense that does not rely on the United States. Under President Lai Ching-te, Taiwan has taken major steps to invest in small drone production.[133] According to the Research Institute for Democracy, Society, and Emerging Technology (DSET), Taiwan's drone industry grew nearly 80 percent in value from 2023 to 2024, but the country can produce only an estimated 8,000 to 10,000 small drone units annually.[134] This is a far cry from the 180,000 drones a year that Taipei aims to manufacture by 2028.[135] Taiwan's drone industrial base is hampered by high manufacturing costs—driven by the imperative to source parts outside the PRC—and continued technological reliance on allies like the United States.[136] Meanwhile, Ukraine is producing an estimated 200,000 drones a month—roughly 4.5 million in 2025.[137] Taiwan must significantly expand its drone industry and secure reliable supply chains to independently manufacture the drones required for the Hellscape concept.

The dominant view holds that closer economic and industrial cooperation with the United States, including the procurement of American weapons, best addresses Taiwan's production shortfalls and supply chain difficulties.[138] In December 2025, the U.S. Department of State announced a proposed $11 billion arms transfer to Taiwan, which, if approved, would include various missiles and strike weapons, as well as ALTIUS-600 intelligence, surveillance, and reconnaissance drones.[139] However, the United States is notorious for lengthy production and delivery timelines, leading some Taiwanese lawmakers to feel they have been "fleeced" by these arms deals.[140] Furthermore, as the United States reorients toward the Western Hemisphere, Taiwan would be wise to have an independent capability to produce drones.[141]

The authors recommend a dual approach for the continued invigoration of Taiwan's domestic drone production and rapid acquisition of more uncrewed technology:

- The Lai administration should amend the special defense budget to allocate more funding for domestic drone production.
  - » Of the NT$1.25 trillion budget put forward by President Lai, NT$900 billion is said to be reserved for procurement of U.S. systems, with only NT$300 billion allocated for procurement of Taiwanese-made weapons.[142] Notably, there is not a specific breakdown of proposed spending across various weapons types and programs, and it is thus difficult to offer specific recommendations. Generally, however, spending toward large, exquisite platforms such as fighter jets should be reduced in favor of domestic investment for the procurement of large numbers of uncrewed capabilities.
  - » Previous research has shown that consistent government spending is a key motivator for defense manufacturers to make up-front investments in expanded production capacity.[143] Therefore, not only would this be a direct infusion of capital by the government into Taiwan's domestic drone market, but it would also demonstrate to business leaders that the Taiwanese armed forces will be a consistent customer.
- Taiwanese companies should continue to build relationships with European drone manufacturers and expand the emerging non-PRC drone alliance. In December 2025, Taiwanese and Polish drone industry groups signed a memorandum of understanding to build a "non-China" drone supply chain.[144] Taiwanese drone companies should seek to bring more of the European drone industry into such alliances. Taiwan's manufacturing flexibility and semiconductor expertise position it to be a critical supplier for nations seeking to avoid dependence on China.

Lastly, deterrence also depends on detailed operational concepts and trained forces able to execute them. Without clear doctrine and rigorous training, however, even a large drone arsenal cannot translate into an effective operational capability.

Based on the limited public information available, Taiwan appears to be wedded to traditional drone employment concepts, neglecting creative yet simple kill chains that could better exploit asymmetric advantages against a larger adversary. Current thinking largely relegates drones to surveillance, reconnaissance, and targeting, while strike roles are narrowly focused on short-range antipersonnel and antiarmor missions.[145] Additionally, there is no discussion of uncrewed maritime systems (USVs/UUVs), uncrewed ground vehicles (UGVs), loitering SAMs, or drone interceptors. Equally importantly, Taiwan lacks an overarching theory of victory that links its uncrewed systems with other asymmetric capabilities and explains how, together, they can defeat a Chinese attack. The Hellscape concept begins to fill this gap, employing drones as a lower-cost, higher-volume means of denying air and maritime superiority.[146] Taiwan should test and refine this concept.

The Hellscape concept requires Taiwanese defenders to master operations of uncrewed systems across air, sea, and land. The Ministry of National Defense (MND) has expanded drone training, opening a dedicated center in Tainan, yet instruction emphasizes basic operations of Group 1 and 2 systems rather than advanced employment.[147]

Ultimately, operational concepts and training are interlinked, and Taiwan has the opportunity to approach them as such:

- President Lai should commission the MND and the General Staff to review the existing operational concepts for drone warfare. This review should include mandated consideration of how uncrewed technology could replace or accompany existing capabilities and missions and identify new missions that could be accomplished using uncrewed systems. Additionally, the MND should also release an unclassified version of the report for public viewing. By publicly sharing, the Taiwanese government would signal investment and resolve to the commercial drone industry, hopefully encouraging additional investment in industrial capacity. This also would signal to China that Taiwan is prepared to defend its beaches, strengthening deterrence.
- To assist with the development of new drone warfare concepts, the MND should establish regular "Drone Labs"—structured innovation sessions that bring together career soldiers, conscripted personnel, and technical experts to rapidly prototype, test, and refine drone tactics. This bottom-up approach recognizes that frontline operators often develop the most practical and effective tactical innovations when given the tools, time, and autonomy to experiment. The Drone Labs would facilitate tactical innovation through hands-on experimentation, allow for skills development and proficiency maintenance across the force, and assist senior leaders in identifying of doctrine gaps and equipment requirements.

Appendix

Summary of Uncrewed Systems That Could Be Employed in a "Hellscape for Taiwan" Concept

Hellscape Layer	Type	Ideal Capabilities	Mission
Outer Layer	**Long-range one-way attack (kamikaze) drones**	**Range:** minimum 300 km **Payload(s):** 50–100 kg warhead **Features:** ▪ Autonomous navigation ▪ Terminal guidance	▪ Attack and damage Chinese ships ▪ Deplete and overwhelm air defenses
	Uncrewed surface vessels (USVs)	**Range:** 750 km **Payload(s):** ▪ 180 kg explosive (kamikaze) ▪ Air-to-air missiles ▪ Laser-guided rockets ▪ Lightweight torpedoes ▪ Medium-range loitering munitions (50–100 km) **Features:** ▪ Autonomous navigation of preplanned routes ▪ Onboard sensors (cameras and radars)	▪ Interdict invasion fleet ▪ Counter aircraft and drones with missiles and loitering munitions ▪ Damage ship superstructure and electronics with rockets ▪ Penetrate hulls of non–heavily armored ships
	Uncrewed underwater vehicles (UUVs)	**Range:** 100 km **Payload(s):** Lightweight torpedoes **Features:** ▪ Simple navigation and perception autonomy ▪ Ship-count mechanism ▪ Magnetic or acoustic signature matching	▪ Attack ships deep in flotilla ▪ Function as mobile smart minefields ▪ Attrite high-value naval assets ▪ Provide perimeter early warning ▪ Provide burst messages on fleet location and direction
Middle Layer	**Loitering surface-to-air missiles (SAMs)**	**Range:** 150 km **Payload(s):** N/A **Features:** ▪ Air-breathing engine ▪ Optical sensors ▪ Loitering capability ▪ Rocket-launched	▪ Defend airspace during minelaying operations ▪ Create aerial minefields ▪ Counter Chinese aircraft, drones, airborne early warning, and transport aircraft
	Multirotor drones	**Range:** 80 km **Payload(s):** ▪ 50–100 kg sea mines ▪ Bombs **Features:** ▪ Heavy lift capability ▪ Shore-launched ▪ Preprogrammed navigation	▪ Lay and reseed dense minefields ▪ Drop bombs on Chinese forces ▪ Emplace obstacles
The Final Run to the Shore & the Beach	**First-person view (FPV) drones**	**Range:** about 5 km **Payload(s):** Antipersonnel and antitank munitions **Features:** ▪ Autonomous terminal guidance ▪ Pixel lock technology ▪ Optional wired control	▪ Target infantry and personnel ▪ Strike beached landing craft
	Drone interceptors	**Range:** 20 km **Payload(s):** 3–5 kg explosive **Features:** ▪ Fast speeds up to 175 kmph ▪ Cost-effective	▪ Counter-UAS

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94. This is basic calculation following Shlapak et al., *A Question of Balance*, 115–16. The authors estimate the weapon's reliability, its ability to penetrate and hit the target, the likelihood it hits a new target (versus overkill), and the probability that it disables or sinks what it hits. For the Geran-like drone, the authors assumed considerably lower capability but that 100 were fired resulting in 2.5 ships damaged: .5x.5.x.5x.2x100=2.5 ships. The authors credited the cruise missile with higher performance but only fired 50: .9 x .5 x .5 x .7 x 50 = 7.8 ships damaged.

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96. Taiwan's few long-range SAMs—its Patriot and Tien-Kung systems—will be high-priority targets and while they are movable they are not truly mobile and are likely to be quickly eliminated. In November 2025, the United States issued a contract for the sale of three National Advanced Surface-to-Air Missile System (NASAMS) short-range air defense systems to Taiwan for $689.9 million, to be delivered in February 2031. Taiwan should purchase additional NASAMS batteries as they will form the core of its high-end air and cruise missile defense. Ruslan Pukhov, "Why Taiwan Had to Wait Three Years Just to Order NASAMS, and How Much Longer Production Will Take," Defense Express, April 25, 2023, https://en.defence-ua.com/weapon_and_tech/why_taiwan_had_to_wait_three_years_just_to_order_nasams_and_how_much_longer_production_will_take-16536.html.; Lostumbo et al., *Air Defense Options for Taiwan: An Assessment of Relative Costs and Operational Benefits*, 56–57, 73; and Shlapak et al., *A Question of Balance*, 78.

97. Lostumbo et al., *Air Defense Options for Taiwan*, 58.

98. Lostumbo et al., *Air Defense Options for Taiwan*, 59.

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111. Chinese Y-9LG, Y-8GX-3, and Y-8GX-11; Thomas Newdick, "Our Best Look Yet At China's New Standoff Electronic Warfare Plane," The War Zone, August 30, 2024, https://www.twz.com/air/our-best-look-yet-at-chinas-new-standoff-electronic-warfare-plane.

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116. Also known as AGM-114 B/M. Shlapak et al., *A Question of Balance*, 112–14; "AGM-114 B/K/M/N Hellfire Missile," U.S. Navy Fact Files, last updated September 27, 2021, https://www.navy.mil/Resources/Fact-Files/Display-Fact-Files/Article/2168362/agm-114bkmn-hellfire-missile/.

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118. It likely would travel slightly less distance when fired from the ground versus the air. *2025 ARSGM Industry Days (7-15-25)—Public Release Version*, Higher Gov, July 15, 2025, https://www.highergov.com/document/2025-arsgm-industry-days-7-15-25-fnl-public-release-version-pdf-8cd5b1/; "Hydra-70 Rocket System Industry Day and Request for Information," solicitation 55B322A8ABB24593990C06A22BB8D9E5, SAM.gov, https://sam.gov/workspace/contract/opp/55b322a8abb24593990c06a22bb8d9e5/view; and "APKWS Precision Guidance Kit," BAE Systems, February 13, 2025, https://www.baesystems.com/en-us/product/apkws.

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121. In addition to using the terrain to hide missile launchers' locations and moving them around often, Taiwan may want to invest in remote missile launchers so that if the Chinese do hit one, Taiwan will lose equipment but not soldiers.

122. Lostumbo et al., *Air Defense Options for Taiwan*.

123. The PLA almost certainly would try to capture a port and bring in artificial piers, enabling commercial ships to assist the invasion. Taiwan should prioritize destroying both the vessels and the pier infrastructure with every available short-range precision weapon.

124. If the beaches are too congested, landing craft will have to wait offshore as occurred in Normandy. Gordon A. Harrison, *Cross-Channel Attack* (Washington, DC: Department of the Army, 1951). But in this instance, they will be vulnerable to Taiwanese short-range missiles, rockets, and drones.

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126. RAND assumes that it will take the landing craft one hour to unload. Shlapak et al., *A Question of Balance*, 109.

127. With little to no opposition at sea, the Allied invasion of Normandy experienced similar problems, especially on Omaha beach. Harrison, *Cross-Channel Attack,* 300–321.

128. For more on PLA command and control, see: Wuthnow et al., *Crossing the Strait*, 287–93.

129. For more on drone defenses, see: Stacie Pettyjohn and Molly Campbell, *Countering the Swarm: Protecting the Joint Force in the Drone Age*, (CNAS, September 10, 2025) https://www.cnas.org/publications/reports/countering-the-swarm.

130. Jake Epstein and Chris Panella, "NATO Is Trying Out a 'Drone Killer' Proven in Ukraine Against Russian Shaheds," Business Insider, November 2025, https://www.businessinsider.com/nato-trying-drone-killer-proven-ukraine-against-russian-shaheds-2025-11.

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132. A complete indexing of suggested systems and their capabilities can be found in the appendix.

133. Hong-lun et al., *Drones for Democracy*, 11; "Taiwan to Buy 50,00 Domestically-Built Military Drones by 2027."

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136. Hong-lun et al., *Drones for Democracy*, 12–13.

137. Stefan Korshak, "Ukraine Drone Production Tops 2.5 Million a Year," *Kyiv Post*, February 10, 2025, https://www.kyivpost.com/post/46892; "Ukraine's Drone Output Soars 900%, Producing 200K UAVs a Month," *Kyiv Post*, July 8, 2025, https://www.kyivpost.com/post/55897; and Evan Lerouvillois, "Ukraine Emerges as World Leader in Drone Technology Driven by Battle-Proven Innovation," Army Recognition, November 13, 2025, https://www.armyrecognition.com/news/aerospace-news/2025/ukraine-emerges-as-world-leader-in-drone-technology-driven-by-battle-proven-innovation.

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