

Amphibious Operations in Contested Environments

Insights from Analytic Work

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Amphibious Operations in Contested Environments

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Amphibious operations are intensive combined arms operations that require significant resources and support. They are included in the operational plans of combatant commanders and remain a significant area of investment for the U.S. Navy and Marine Corps. It is, however, also clear that amphibious operations involve the placement of forces into contested areas, the most stressing of which are subject to anti-access/area denial (A2/AD) capabilities.³ Amphibious operations have always assumed the need to overcome an opposing force and to establish a degree of battlespace dominance before attempting operations, but the reach and lethality of modern weapons systems make aspects of amphibious operations particularly challenging today.

This testimony examines amphibious missions and operations, the challenges associated with such operations, and changes in future threats and capabilities. I will consider both items that the Navy and Marine Corps are currently developing and areas where different or additional investment might be appropriate.

¹ The opinions and conclusions expressed in this testimony are the author's alone and should not be interpreted as representing those of the RAND Corporation or any of the sponsors of its research.

² The RAND Corporation is a research organization that develops solutions to public policy challenges to help make communities throughout the world safer and more secure, healthier and more prosperous. RAND is nonprofit, nonpartisan, and committed to the public interest.

³ There are various definitions of A2/AD. *Anti-access* (A2) challenges prevent or degrade the ability to enter an operational area. These challenges can be geographic, military, or diplomatic. *Area denial* (AD) refers to threats to forces within the operational area. In this context, we are speaking of military capabilities impeding the movement of amphibious forces into an operational area, the movement of forces from shipping into an amphibious objective area, and the movement of the landing force once ashore.

Summary of Conclusions

- Amphibious forces offer useful capability in a variety of operational settings, including many in which there is some level of opposing force.
- The most stressing “contested environment,” in which the opposing force has a significant A2/AD capability, will require extensive preliminary effort before amphibious operations can be attempted. These challenges are not unique to amphibious operations, and would affect to some degree any conventional force attempting to project power.
- The Navy and Marine Corps are aware of these challenges and have attempted to improve the ability of their forces to operate in a variety of environments. Improvements include upgraded equipment, new operating concepts, and enhanced training.
- However, there remain capability areas where even projected improvements may not be sufficient and which require either very significant upgrades or major doctrinal changes. These include ship-launched amphibious assault vehicles (AAVs) and organic mine countermeasures.

Amphibious Operations Missions and Capabilities

Amphibious Ready Groups (ARGs), with Marine Expeditionary Units (MEUs) embarked, are normally deploying units of the Navy–Marine Corps team. ARGs have three ships: a big deck amphibious assault ship (LHA or LHD), an amphibious platform dock (LPD 17), and a dock landing ship (LSD 41/49). With the exception of LHAs 6 and 7, all these ships have well decks capable of receiving surface connector landing craft. MEUs are composed of three main elements: a ground combat element Battalion Landing Team; an Aviation Combat Element, composed of transport, fixed, and rotary fire support aircraft; and a Logistics Combat Element. MEUs have a defined set of mission-essential tasks that range from routine theater security cooperation through combat operations in denied areas, up to the level of an amphibious assault.⁴ While provision may be made for escorts, these units are not intended for areas where there is a serious A2/AD threat. These units may be extremely useful in projecting power short of a full amphibious assault, and they do provide a means to put ground forces into areas of interest with logistics and fire support, but they are not equipped to overcome significant opposition—particularly maritime opposition.

An Amphibious Task Force (ATF), with an embarked Marine Expeditionary Brigade (MEB), is a larger force intended to support operations through Joint Forcible Entry Operations. An ATF would include shipping equivalent to three to five ARGs. A MEB is five times larger than a MEU. An ATF-MEB would always be expected to operate with naval escorts, potentially including full Carrier Strike Groups, and the projected environment would generally include some high level of resistance.⁵

Combatant commanders have requirements for ATF-MEB level forces, and indeed the 2005 Sea-Basing Joint Integrating Concept defines the general requirement for ship-to-shore

⁴ Department of the Navy, Headquarters U.S. Marine Corps, “Policy for Marine Expeditionary Units,” Marine Corps Order 3120.13, October 29, 2015.

⁵ Expeditionary Force 21, “Marine Expeditionary Brigade: Informational Overview,” undated.

movement as the ability to move two MEBs ashore in a single period of darkness.⁶ That amounts to the movement of 30,000 Marines, with all required logistics and fire support, from amphibious shipping into operational objectives ashore. This assault echelon would then be augmented by an assault follow-on echelon, which would be moved from out of theater and married with equipment transported in the Marine Prepositioning Force (MPF).

Sequencing Ship-to-Shore Movement

Ship-to-shore movement is intended to put maneuver units in areas where they can best exploit operational and tactical advantages, then support them with a full array of fire support and logistics. Movement takes place out of amphibious shipping to ashore objectives via air and surface connectors, with air providing expeditious delivery and surface hovercraft and transport craft moving heavy lift cargo, such as tanks, artillery, and trucks. Specialized AAVs, which are armored personnel carriers capable of operation on sea and land, bring initial assault elements ashore. Fire support is provided from a variety of sources: close air support from fixed and rotary aircraft initially flying from amphibious shipping, organic fires from tanks and artillery, and naval surface-fire support from ships within range of ashore objectives.

The general sequence would be suppression of enemy shore defenses, followed by movement across the beach by armored AAVs with embarked infantry. This may occur simultaneously with movement of vertical-wing-transported assault elements. Surface-borne movement of armor and transportable artillery would follow, followed by large-scale logistics support. Throughout the movement, fire support elements are made available on call, receiving tasking from a Supporting Arms Coordination Center (which is initially located on a large deck amphibious assault ship but generally transitions ashore). Logistics support is intended to move with the maneuver elements, but both the amphibious ships and MPF will have supplies and sustainment capability to allow sea-based sustainment.

Amphibious forces may be either “administratively loaded” for efficient use of space in normal circumstances, or “combat loaded” to allow fastest sequencing of assault elements as they move ashore. This can affect the available space for loading and may impact the ability to perform sea-based sustainment for longer periods.

Challenges of Operations in a Contested Environment—A2/AD Threats

One of the major advantages of amphibious forces is their ability to use the ocean and coast as operating space and move into areas where the adversary has not prepared defenses. If the adversary has prepared defenses, the challenges can be formidable. Such defenses include:

1. **Antiship missiles and tactical aircraft.** While the ships of the ATF have point defense systems, their escorts have area defense systems, and the embarked F-35Bs have defensive counterair capabilities, adversaries can detect a large formation of ships and launch a large number of weapons over the horizon. The closer ships get to shore, the easier it is for adversaries to detect them and the shorter the ships’ reaction times; the adversary can also use a greater variety of weapons as well. An air and missile threat may

⁶ Department of Defense, *Seabasing Joint Integrating Concept*, Version 1.0, Washington, D.C., August 2005.

also limit the ability to use naval surface fire supports (NSFS), as this requires ships be close enough to the coast to reach targets with naval guns.

2. **Submarines operating in both the open ocean and littoral waters.** Nuclear submarines are fast enough and have sufficient endurance to be a threat to amphibious shipping even as it transits. Lower-speed diesel submarines lack the ability to prosecute targets across a wide area, but they are very difficult to detect and can be a very significant threat to amphibious ships as they slow down to launch and recover surface connectors and to NSFS vessels operating in near-shore fire support areas.
3. **Mines laid in approaches, in shallow water and in the surf zone.** Mines can threaten amphibious shipping, the surface connectors carrying the larger and heavier elements of the assault force, and the actual landing force equipment and personnel as they move ashore.
4. **Air defenses, ranging from sophisticated Integrated Air Defense Systems to short-range shoulder fired weapons and small arms.** These principally threaten transport and support aircraft but may also be used against fire support elements.
5. **Opposing forces ashore who directly oppose the movements of the landing force.** There may be relatively light opposition to movement ashore, but adversary infantry and other ground force elements can pose significant opposition to the landing force once it arrives.

None of these defenses are impossible to overcome, and the amphibious force does retain a number of ways to move forces and can move to multiple objectives. But exploiting these advantages will take considerable flexibility on the part of both the amphibious and the landing force. As a general matter, the more resources devoted to diminishing the threat environment, the fewer resources will be available to support landing forces.

Challenges of Operations in Contested Environment—AAVs

Although there is a programmed upgrade for the AAV, this portion of the amphibious assault remains one of the most challenging to execute. Legacy AAVs had a transit range of one to three nautical miles, and were delivered from a ship equipped with a well deck.⁷ This required the ship to be within close range of the beach, not just within missile range but within the range of shore batteries and even some small arms. This was an issue not just because the ship became vulnerable, but because this clearly revealed the intent of the maneuver. Sea-based platforms would lose their advantage as soon as the adversary understood where the ships would deliver the first elements of the assault echelon. Even with upgrades to the legacy AAV to increase cruising speed, there is still a tradeoff between an hours-long transit time and a near-shore launch.

The Marine Corps had hoped to meet this challenge with development of the “Expeditionary Fighting Vehicle”⁸, which had a threshold range of 25 nm. This program was cancelled due to development delays and costs, leaving Marine Corps with the legacy AAV. The Marine Corps has started development of the Amphibious Combat Vehicle (ACV), which should be more

⁷ “Background on New Marine Amphibious Vehicle,” *USNI News*, July 2, 2013.

⁸ “Background on New Marine Amphibious Vehicle,” 2013.

capable than the AAV and more affordable than EFV. Per the Marine Corps 2011 request for information from industry:

The proposed vehicle must be able to self-deploy from amphibious shipping and deliver a reinforced Marine infantry squad (17 Marines) from a launch distance at or beyond 12 miles with a speed of not less than 8 knots in seas with 1-foot significant wave height and must be able to operate in seas up to 3-foot significant wave height.⁹

However, 12 miles still is well within horizon range of enemy shore defenses. All the issues of telegraphing intention remain. Moreover, if launched at maximum range, the ACV would still require an hour and a half to move from the launch platform to the beach. The likelihood that the adversary will both see the launch and be able to track the ACV is very high.

Aviation-Based Options

Marine Corps aviation assets can reach target areas from well over the horizon and can transport personnel into an objective area in minutes to hours. In a 2015 RAND study on a platform designed to maximize aviation capability at the expense of some surface movement, we showed that ship-to-shore movement by air could move infantry elements ashore more quickly than legacy platforms and provide significant levels of close air support. Parts of logistics support would be delayed, and heavy armor would have to be moved from platforms with well decks. But this concept of operations would allow ships to operate at a greater distance from shore while still supporting ashore objectives. However, there are limitations to any air-based concept.

1. A2/AD capabilities include air defense, and this defense would need to be well suppressed before a landing force could attempt to fly troop transport and support aircraft into an area.
2. While the movement of infantry and other personnel would be rapid, they would be completely dependent on air resupply and fire support. Any disruption in either could have major impact on the ground maneuver element.
3. While surface movement could be reduced to a degree, it still must support the movement of armor and heavy logistics. A suitable beach landing zone would still need to be established, with approach lanes cleared of mines and other obstacles.

While air-based options may help reduce the vulnerability of amphibious ships and increase the maneuver space available from the sea, they do have limitations and should not be regarded as risk free.

The Future of Amphibious Operations

While the U.S. Navy and Marine Corps have not launched an actual opposed amphibious assault since the Korean War, we prepare for many types of operations prepared that are not actually executed. Many of the operations of a major contingency operation are not routinely

⁹ “Background on New Marine Amphibious Vehicle,” 2013.

executed—major fleet engagements, opposed airborne assaults, major tank engagements, defensive counterair—but few would say that these are capabilities that combatant commanders would agree to forego. If nothing else, amphibious forces receive frequent use in missions below the level of major contingency operations. They have not in general been a force behind a glass with a sign saying “open only in the event of war.” With the ability to move tailored and scalable forces ashore, they have proven in many cases to be uniquely useful, as we found in our 2015 study. However, it is true that A2/AD challenges complicate the ability to assemble and move big formations of armed personnel and move them at tactical distances in opposed environments. Some amphibious operations may be simply untenable.

The Reality of the A2/AD Challenge

The ability of even moderately sophisticated adversaries to complicate power projection is undeniable. A nation with a large and capable land-based air force, augmented with a capable air defense network, can make near-land opposed operations nearly impossible. On the other end of conflict, a nation with a fishing fleet numerous enough to crowd an adversary might make battlespace dominance difficult if not impossible. Even a nation capable of sowing a few mines can hamper a more-capable nation’s ability to effectively operate in a particular area.

However, the ability of nations to control the areas immediately around them is not new, and the ability of amphibious forces to overcome difficult conditions has been shown repeatedly. Amphibious forces have several capabilities that may offset some undoubted vulnerabilities, and some other adaptations may also provide additional capability. AAVs remain an area with significant shortfalls, with no obvious program for improvement.

The Program of Record Force

The Navy and Marine Corps recognize amphibious warfare as a key mission and have made investments to address key issues. These range from maintaining amphibious ship force structure to major improvements in Marine Corps aviation. Taken together, these represent a serious attempt to at least maintain the ability to carry out amphibious operations, even in contested environments.

Amphibious Shipping

The Navy is completing construction of the landing platform dock (LPD) 17 class and is set to begin recapitalization of the dock landing ship (LSD) class in 2020, using a hull based on the LPD 17.¹² LHA 8 is programmed in 2024 as a replacement for the first Wasp-class amphibious assault ship and, unlike LHA 6 and 7, it will have a well deck. The Navy is unlikely to reach the purported 2.5 MEB lift requirement that has served as the basis for programming, but it is at least keeping the lift it currently possesses and providing capable replacements for the legacy force.

¹² “Document: Report to Congress on Next Generation LX(R) Amphibious Warship,” *USNI News*, March 20, 2017.

Battlespace Dominance Enablers

The Navy historically has struggled with overcoming littoral threats, particularly mines. The Navy and Marine Corps have both invested in unmanned surveillance capabilities that allow better awareness of potential threats ashore and in the littoral battlespace.¹³ While the mine countermeasures module of the Littoral Combat Ship has been beset by delays and cost overruns, the Navy has developed several unmanned undersea vehicles that have proven effective in littoral operations.¹⁴ These capabilities are not only effective, but also impose far less of a footprint than legacy capabilities.

The Navy is also attempting to improve active air and missile defense through continued deployment of AEGIS and surface-to-air missile upgrades on surface escorts; improved air-to-air missile capabilities to benefit both carrier air wings and the F-35Bs assigned to Marine Air Combat Elements; and integrated fire control systems.¹⁵ The Navy is generally attempting to meet the challenge that near-peer adversaries would impose on power projection from the sea. While these improvements may not make near-shore amphibious operations capable in every environment, they will improve the Navy's ability to operate in environments where the threat is significant but not overwhelming.

Improved Connectors

The Marine Corps has already made significant investments in aviation connectors, including the rotary-wing CH 53K and the MV 22, and its ability to move personnel and cargo ashore rapidly has improved. Surface movement is still needed for the heaviest equipment, but aviation capability does create additional options for moving people and equipment ashore.

The Navy at one point had hoped to completely replace surface connectors with hovercraft variants, but has since determined that a replacement for the legacy LCU class will be required for future operations.¹⁶ This implies that there will continue to be a need to move armor and heavy trucks ashore, even if ways are found to more rapidly build the force ashore through air movements. That appears to be a realistic assessment of continued MEB requirements and a responsible use of well deck space and transportation throughput.

The Expanded Role of Marine Corps Aviation

The F-35B is a fifth-generation, multimission fighter, easily an order of magnitude more capable than the AV-8 it is replacing. The ability of the F-35B to provide support, ranging from defensive counterair to stand-off weapons delivery to traditional close air support, is such that it will transform the way a MEU or MEB might fight. Previously, external assets might provide many of the defensive and long-range strike capabilities of a MEU or MEB, but the F-35B may

¹³ Oriana Pawlyk, "Drone Swarms to Storm Beaches: Marine General," *Defensetech*, October 25, 2016.

¹⁴ Kris Osborn, "Knifefish: The U.S. Navy's New Mine-Killer Is Here," *National Interest*, February 4, 2017.

¹⁵ Megan Eckstein, "Navy Expanding NIFC-CA to Include Anti-Surface Weapons, F-35 Sensors," *USNI News*, June 22, 2016.

¹⁶ Jon Rosamond, "US Navy Awards Design Study Contracts for Future Landing Craft," *Jane's 360*, June 3, 2016.

be able to provide much of this support organically. This represents more than incremental improvement in capability and potentially is a major shift in the role of ARG-MEUs.

Capabilities Not Within the Program of Record Force

The Navy and Marine Corps are well aware of the challenges posed by the A2/AD environment and are realistic about where and how such capabilities might be used. However, even with this realistic view, there are areas where the Navy and Marine Corps need to consider different approaches to ensure that the force is able to operate in conditions more stressing than normal peacetime operations.

Aviation Support Platforms

The Marine Corps found the lack of well deck capability in LHA 6 and 7 to be such a significant limitation that it insisted that LHA 8 include a well deck. A well deck does allow storage and movement of armor and surface-borne logistics, but it interferes with aviation maintenance and logistics support. A RAND study in 2015 examined the idea of a common mobile air platform that can interchangeably be used as a Navy carrier air wing or a Marine Corps MEU support unit. This platform would be larger than an LHA 6 and provides the MEU and MEB with more air capability than the LHA 6 provides. However, it would not have a well deck and any cargo or equipment requiring surface capability would be displaced on to ships with well decks. There would be some delay in moving armor and trucks. However, many aspects of ship to shore movement would be faster due to improved ability to host a larger air combat element, and the concept would allow flexible access to a larger number of fire support elements.

Creative Use of Military Sealift Command Vessels for Support Now Provided by Amphibious Ships

Amphibious ships are military vessels and have self-defense and survivability characteristics that assume they will be placed in the high threat environment imposed by forcible entry operations.¹⁸ However, for other missions now performed largely by amphibious ships, civilian-manned ships could perform the missions adequately and thereby ensure that the amphibious force is available for the role on it can perform. A recently completed RAND study directly explored the support of embassy reinforcement from an expeditionary mobile base. We evaluated the possibility of using a ship operated by the Military Sealift Command to support operations ashore by a Marine Special Purpose Air Ground Task Force, predominantly operating MV22s and bound to a six-hour crisis response. The ship possesses no self-defense beyond crew-served weapons and small arms and so would not be suitable in any significant threat environment, but the study demonstrated that the ship could be used to enable the crisis response mission specifically assigned to a Marine Corps unit.

¹⁸ Deputy Commandant for Combat Development and Integration, *Afloat MAGTF Requirements: Annual Report*, U.S. Marine Corps, December 2012.

Assessment of Amphibious Assault Vehicles

While there appears to be a readily supported rationale for amphibious forces and capabilities, the AAV and its replacements do not appear to be viable in the presence of a robust A2/AD threat. The AAV foregoes all the advantages associated with maneuver from the sea, as it requires the launching unit be close to shore and is itself vulnerable to mining in both shallow water and on the beach itself. While there is doubtless value in providing infantry armored mobility, making AAVs the first element ashore in an assault may create vulnerabilities when other options are available. The Navy and Marine Corps could employ a number of different options, including securing a beach after a vertical assault to then allow the follow-on movement of forces transported by connectors. The AAV replacement in fact need not be amphibious, just capable of transport via amphibious connectors.

Conclusions and a Way Forward

Amphibious forces provide a useful capability in environments that require some level of force but not necessarily complete A2/AD suppression. No force is immune to every threat; no force can operate with impunity in a heavily contested environment. Amphibious forces will not reenact Tarawa or Inchon; airborne forces will likely not reenact Market Garden or the Ia Drang valley; carrier strike groups will likely not reenact the Battle of Midway. Amphibious forces bring virtues of flexibility and scalability that are of considerable value to combatant commanders now and likely into the future. However, it should be clear that amphibious forces likely cannot be employed in the absence of significant effort to shape the battlespace. The previous commandant of the Marine Corps, General James Amos, characterized the Marine Corps as a “middleweight force,” saying specifically

We are light enough to get there quickly, but heavy enough to carry the day upon arrival. We operate throughout the spectrum of threats—irregular, hybrid, or conventional—or the shady areas where they overlap.²⁰

While amphibious operations likely will remain an important addition to national capability, challenges require continued attention and in some cases the development of alternative capabilities. The Navy and Marine Corps have made choices that reflect a highly realistic view of an amphibious force that can operate well and perform vital missions, but whose virtues are more associated with agility and responsiveness than the ability to overcome decisively an opposing force by itself. Marine Corps aviation is on a path to significantly alter what even ARG-MEUs are capable of doing, and it is important to shape the rest of the force to acknowledge this change. An ARG-MEU with F-35Bs and MV-22s is not just capable of local influence, but can project power and provide defense in ways impossible just a few years ago.

Where there are shortfalls in landing force capability, they arise largely from a desire to protect aspects of landing force capability that ensure that the commander has not just capability but self-sufficiency. Such a belief dictates that amphibious assault vehicles with Marines need to be across the beach first to ensure that mounted infantry is available and not relying on aircraft

²⁰ “MILITARY: Gen. James Amos Outlines Vision of Marine Corps,” *San Diego Union-Tribune*, February 8, 2011.

for movement. It also dictates that enhanced aviation capabilities should not be maximized at the expense of the ability to transport tanks and mobile fires ashore; relying on air-delivered sustainment and fire support is not sufficient. While this focus is understandable, given the well-established precedent of giving landing force commanders maximum organic support, it may interfere with an objective assessment of which capabilities ought to be developed to counter future threats.

Navy efforts to overcome A2/AD capabilities in very stressing environments to enable carrier strike group (CSG) power projection will likely make operations with amphibious forces more feasible as a byproduct. Capabilities that suppress enemy air defenses and shore-based strikes work as well for amphibious forces as they do for CSGs, especially if amphibious operations are preceded by significant efforts at battlespace dominance.

However, while the Navy does not necessarily treat amphibious and landing force operations as secondary, it still continues to struggle to deliver capability against a threat that has been its historical nemesis: mines. The Navy continues to counter mines with an array of legacy or long-delayed systems that generally do not even address shallow-water or surf-zone mining. Promising commercially derived systems will likely help defend against mines, but, in general, the Navy is still not addressing what has been a major issue since the aborted assault on Wonsan in 1950, where Rear Admiral Allen Smith commented:

We have lost control of the seas to a nation without a navy, using pre-World War I weapons, laid by vessels that were utilized at the time of the birth of Christ.²¹

Mines are a longstanding issue that cycles through interest and neglect, but in the context of operating in contested environments, even if every other A2/AD threat were eliminated, the mine in itself is sufficient to make every amphibious capability other than air movement irrelevant. It is, moreover, a threat capability easy to acquire and deploy.

While every service views itself as the “kick in the door force” for major operations, the fact remains that many missions involve a measured reaction to lower-level threats. The Navy and Marine Corps offer an ability to carry out operations from a relatively self-sustaining sea base with a variety of different operational capabilities. These require continued emphasis and are in fact the basis for the ability to carry out amphibious operations in contested environments.

²¹ Tamara Moser Melia, *“Damn the Torpedoes”: A Short History of U.S. Naval Mine Countermeasures, 1777–1991*, Vol. 4, *Contributions to Naval History*, Washington, D.C.: Naval Historical Center, 1991.