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14. ABSTRACT

Does the United States Navy have a capability gap with regards to establishing and maintaining sea control in a hostile, littoral environment?

Milan Vego argues that future warfare at sea will predominantly be fought in the littorals. Similar to urban warfare, the littoral environment allows flexible and sophisticated adversaries to apply multiple types of warfare and develop unexpected strategies tailored to the environment and the coastline. Future conflicts may therefore present the U.S. Navy with an adversary that is capable of exploiting the littoral environment to nullify the advantages normally enjoyed by the U.S. Navy.
Concurrently, the U.S. Navy has been unchallenged at sea since World War II and one may argue that the U.S. Navy has in the last decades taken sea control for granted. Sea control is a prerequisite for power projection, and sea control in the littorals demand certain capabilities tailored to the littoral environment. The U.S. Navy lacks these capabilities including the necessary experience, and one may therefore argue that there is a gap in U.S. Navy's ability to establish and maintain sea control in a hostile environment in the littorals. However, Allied nations have the experience to operate in the littorals and the mindset of a coastal state – comparable to future potential adversaries of the United States. In the littorals smaller ships may complement larger ships and thereby contribute to filling the capability gap and solving the challenges of the littoral environment.

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SMALL SHIPS REVIVAL: FROM COLD WAR ANTI-INVASION AND GUERRILLA WARFARE TACTICS TO HIGHLY CAPABLE FORCE MULITPLIER IN LITTORAL AND EXPEDITIONARY WARFARE

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

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However, Allied nations have the experience to operate in the littorals and the mindset of a coastal state – comparable to future potential adversaries of the United States. In the littorals smaller ships may complement larger ships and thereby contribute to filling the capability gap and solving the challenges of the littoral environment.

INTRODUCTION

In the future, war at sea will be predominantly fought in the littorals.
Dr. Milan Vego, Professor at the United States Naval War College.

The writings of Rear Admiral Alfred Thayer Mahan and Sir Julian Stafford Corbett have shaped nation-states' modern view on naval theory. Mahan focused his theory on "command of the sea," the concentration of forces, and decisive battles. Different from Mahan, Corbett saw "command of the sea" as a more relative condition related to time and space, and thus applied the term in a broader sense.[1] Corbett saw "command of the sea" as not an end in itself, but rather a means to produce effects on land.[2] Corbett's theory put emphasis on the importance of the littorals: the area where the sea meets the land.

During the Cold War, the U.S. Navy adopted a blue-water maritime strategy focused on countering the Soviet naval threat.[3] After the Cold War the world changed dramatically, and the U.S. Navy announced a new the concept: "…From the sea," a strategic shift away from blue-water operations to an emphasis on warfighting in the littorals.[4] However, for decades the U.S. Navy has been unchallenged at sea and has conducted more or less unopposed power projection from the sea onto land. One may therefore argue that the U.S. Navy has seen the sea as a permissive environment and has taken sea control for granted.[5] Moreover, one may also argue that the lack of opposition has led to a neglect of generating a true capacity and the capability to establish and maintain sea control in a hostile, littoral environment.[6] The concept of littoral warfare – and its attendant dangers – is not new, but the limitations of blue-water navies in the littorals are still not fully understood.[7] Hence, the thesis of the paper is that the U.S. Navy has a gap in its capabilities that may reduce its ability to establish and maintain sea control in a hostile environment in the littorals. Allied

nations have the knowledge and mindset to operate in the littorals and may contribute filling the capability gap and solving the challenges of the littoral environment.

While there are numerous examples in which coastal navies have defeated larger and more powerful navies, such as the 480 BC defeat of a large Persian fleet which the Greeks had lured them into the restricted waters of the Strait of Salamis, history also provides examples of larger navies conducting successful operations in the littoral.[8] More recent history shows a conflict pattern at sea with a sea power pitted against continental power. During the last two centuries, the principal conflicts have been the Napoleonic Wars, the two World Wars, and one may also argue the Cold War.[9] In each of these conflicts a dominating European continental power has faced a sea power or maritime coalition as the main opponent. In each of these conflicts the sea power prevailed. The outcome was not the continental power's inferior fleet and position, but due to a one-sided continental orientation, leading to the neglect of naval strategy and the neglect of the potential of an asymmetrical relation between sea control and sea denial, which will be discussed later.[10]

It is uncertain that the U.S. Navy will be able to continue to operate uncontested in the future. Threats may arise and develop quickly, especially because of non-state actors. Sea control is a prerequisite to power projection, and future U.S. campaigns may be challenged by highly capable adversaries at sea, which will require the U.S. Navy to establish and maintain sea control in a littoral region in a hostile environment.

Littoral warfare is a joint effort, with each service having the ability to contribute to establishing sea control in the littoral. Long range land-based aircraft can be critical to gaining air superiority and land forces can seize key coastal facilities. Historically, however, sea control has been and remains primarily a naval task. Sea control in the littorals demands

the right tools to fully cope with the environment – sensors and weapon systems; capable ships including maneuverability, speed and stealth; and the human aspects of experience, skills and training.

In the first chapters the discussion will be focused toward the relationship between sea denial and sea control, the nature of the littoral region and the littoral threat in order to show the complexity of the littoral environment and how this may eliminate advantages that a superior blue-water navy usually has on the open ocean.[11] The reason for this is to give a better understanding of a questionable gap in U.S. Navy's capacity and capability for sea control operations in the littorals. The paper will conclude by giving some recommendations on how this gap might be filled. It will focus on the surface warfare aspect of sea control, though it touches on antiair warfare, mine warfare and antisubmarine warfare.

DISCUSSION / ANALYSIS

Sea Control versus Sea Denial

Sea control and sea denial are fundamental naval objectives and concepts, but very different with regards to type of forces needed and the employment of them.

NATO defines *sea control* as *the condition that exists when one has freedom of action within an area of the sea for one's own purposes for a period of time in the subsurface, surface and above water environments*.[12] Essentially, the aim of sea control is to ensure one's use of a given area, and, if necessary, deny its use to the enemy. Sea control therefore contains a conditional element of sea denial.[13]

Sea control is related to power projection. Both amphibious landings and sealift are based on the use of transport ships, which may be exposed to threats from the surface, air or sub-surface. In order to ensure protection against any of these threats, sea control will consequently consist of antisubmarine warfare, antiair warfare, antisurface warfare and mine

countermeasures. In a multi-threat environment, all elements of naval warfare must be required and successfully accomplished. Sea control therefore logically constitutes a set of necessary requirements.[14]

NATO defines *sea denial* as *preventing an adversary from controlling a maritime area without being able to control that area oneself*. In other words, the aim of sea denial is to deny the use of a given area to the enemy. Consequently, sea denial means the use of submarines, aircraft, ships, special operations forces, unconventional[15] systems and platforms, irregular[16] forces and/or mining to limit an adversary's freedom of action. Sea denial will be achieved if these efforts succeed in a way that at least one necessary requirement for sea control is denied or lost. The essence of sea denial is to prevail by either increasing the risk to an unacceptable level or by making a victory too costly.

There exists an asymmetrical relation between sea control and sea denial that may be exploited by an inferior actor, both state and non-state in nature.[17] An inferior adversary with a comprehensive naval doctrine and strategy on sea denial in the littoral may achieve an advantage, similar to what we see in land warfare with regards to guerrilla warfare[18] versus conventional warfare.

The Environment: The Nature of the Littorals

The nature of the littoral environment allows, to larger extent than on the open ocean, the exploitation of the asymmetrical relationship between sea denial and sea control.

The U.S Navy concept *...From the Sea* defines littoral as *the "near land" areas or coastlines of the world. It is comprised of two segments of the battlespace: Seaward – covering the area from the open ocean to the shore, and Landward – covering the area inland from the shore that can be supported and defended directly from the sea*.[19]

The littorals are the place where most of the world's important conflicts are likely to occur.[20] Humans live on land, but they depend on the sea and are therefore clustered in great cities and densely populated areas on the verge between sea and land: the so called littorals.[21] The littoral regions are the marketplace of the world as 90% of all international trade is carried on ships and all seaborne trade originates and ends in the littorals.[22] All resources taken from the sea such as oil, gas, and proteins ends up in the littorals. The importance of the littoral may also be illustrated by the fact that 80% of all countries border the sea and that the littorals provide home to over three-quarters of the world's population.[23] 60% of the politically significant urban areas around the world are located within 100 km from the coast.[24] For these reasons, power projection ashore and achieving national objectives is related to the littoral region, and the littorals should therefore be emphasized to a larger extent by the U.S. Navy.

Operating in a littoral environment may be extremely demanding and takes a different mindset to fight in the littorals. First, even though the coastline may vary from state to state and from area to area, the environment may constitute a threat in itself. Weather, tide, currents, shallow water, shoals, reefs and islets, enclosed areas combined with darkness and the possibility of bad visibility limit maneuverability and make safe navigation particularly challenging. Second, technology has its limitations in the littorals especially of the complexity and confusion created by a cluttered geography and a dense presence of civilians and neutral actors.[25] [26] An example may be radar and infrared blind spots created by coastal geography. Third, the nature of the littoral environment makes guerrilla warfare at sea a possibility. The physical environment combined with factors of time, like short distances, short reaction time and high speed make larger ships extremely vulnerable to attack from

small units using guerrilla warfare tactics.[27] An example of guerrilla warfare at sea may be the ability of small craft to easily hide in the geography and neutral traffic and then swarm from short range with little warning.

The Threat: Hybrid Warfare at Sea

As the flotilla acquired battle power […] the vital, most difficult, and most absorbing problem has become not how to increase the power of a battle-fleet for attack […], but how to defend it.

Sir Julian Corbett

Future conflicts may present the U.S Navy with an adversary capable of exploiting the littoral environment using a comprehensive naval doctrine on sea denial, guerrilla warfare at sea, and hybrid warfare. An inferior adversary thereby uses asymmetrical responses to nullify the advantages normally enjoyed by blue-water navies on the open ocean.[28]

Hybrid threats may be defined as *any adversary that simultaneously and adaptively employs a fused mix of conventional weapons, irregular tactics, terrorism, and criminal behavior in the battlespace to obtain their political objectives*.[29] Essentially, the littoral environment allows flexible and sophisticated adversaries to apply multiple types of warfare and develop unexpected strategies to fit one's goals tailored to the littoral environment.[30]

Similar to urban warfare: topography, geography, bathymetry, and civilian activity may conceal a coastal states movement of aircraft, ships, submarines and land-based vehicles. This may in turn allow the coastal state to strike at a time and space of own choosing, conduct coordinated attack, and ambush from hiding positions close to the coast and offshore islands with the purpose of accomplishing surprise, maximizing effect, and constraining enemy maneuver and freedom of action.

Affordable systems and platforms, even in large numbers, may easily be acquired to fit the strategy of sea denial. Many small, fast-moving threats complicate the effort of

destroying enough of them to prevent a successful enemy attack.[31] These systems and platforms are expendable compared to the very capable, yet extraordinarily expensive ships of the U.S. Navy, but capable of inflicting severe damage on much larger combatants.[32]

A coastal state may create a sophisticated multi-layered defense. Early warning of an impending attack and detection and tracking of enemy activity may be done easily with simple systems and platforms combined with modern, inexpensive technology. The threat may include a mix of conventional, unconventional, and irregular forces: coastal fortresses, mines, aircraft, land-based missiles, fast patrol boats with missiles and torpedos, diesel-electric submarines, and swarming fast craft armed with missiles, small arms, or explosives. Small surface vessels and mobile land-based missile sites may change positions quickly, and, just like insurgents, operate autonomously and survive off the land without the need for naval bases.

Iran is an example of a coastal state which has steadily built up maritime capabilities tailored for sea denial operations.[33] [34] The Iranian Navy and the Revolutionary Guard together have the ability to project power using highly mobile conventional and unconventional resources that can attack from any direction and in all three dimensions.[35] Their capabilities include a significant missile threat: mobile land-based missiles, sea launched missiles (C-802) carried by fast attack craft and air-to-surface missiles (C-801K).[36] Iran also possesses a minelaying capacity and in the early 1990s the Iranians acquired Kilo-class submarines from Russia.[37]

The Persian Gulf is an enclosed sea with shallow water, which restricts maneuverability of submarines and larger naval ships. However, Iran also has a long coastline with limited offshore islands and islets to conceal ship and aircraft movements,

which makes the coastline itself vulnerable to attacks from the sea.[38] An importance question though is whether Iran has a comprehensive naval doctrine of sea denial as described above.

The U.S. Armed Forces: Their Capabilities and Concepts

[…] relying solely on better technology would rob warfare of its "art". It would make one's forces vulnerable to an opponent who, while technologically inferior, thinks better and faster and uses his smaller forces more creatively, perhaps asymmetrically.

Milan Vego, Professor United States Naval War College

Sir Julian Corbett stated in his book *Some Principles of Maritime Warfare* that a Navy had three mutually exclusive, mutually reinforcing components; the battle fleet, cruisers and a flotilla of small craft in large numbers.[39] This is especially true in littoral warfare. The physical environment of the littorals, the potential threat, and the enemy's strategy entails deploying forces into a littoral region in order to guarantee sea control and to build a clear picture of the situation.[40] In the littorals simple rules like size, low signature, draft, speed, maneuverability, and height of weapons systems and sensors matter and may play a major role.[41] Littoral warfare therefore require a differently structured naval force: a balanced force including smaller ships composed of patrol boats and corvettes (150 – 1500 metric tons) that complement larger ships to accomplish the variety of naval tasks and missions.[42]

U.S. Armed Forces' Capabilities

Littoral warfare and sea control are joint efforts and shortcomings in one service may be balanced by another service.[43] The U.S. Armed Forces have a variety of capabilities that may contribute in the littorals. These include air and space systems and platforms, which provide the United States with an extreme capacity with regards to surveillance, reconnaissance, and targeting. Fixed-wing aircraft, helicopters and UAVs have the ability to

detect and track small surface targets day and night and in bad weather.[44] Ground forces may seize naval bases, missile sites or airfields that may contribute to establishing sea control.

However, the use of other services raises the question of whether the same limitations for technology, fire power, air power and space apply in littoral warfare as we have seen in urban and irregular warfare. The solution in ground warfare is a shift back toward more reliance on the human aspect of leadership and the highly trained and skilled infantry soldier where modern technology is an enabling factor more than the sole solution. In other words, modern technology cannot fully replace the need for small ships and their extreme capabilities in the littorals.[45]

While aircraft are indispensible complements to surface vessels in gaining and maintaining sea control in the littorals, they cannot fully replace surface combatants. First, ships have more endurance than aircraft. Second, ships may apply measures that aircraft cannot to accomplish mission including the use of soft power and non-lethal means. Third, in the littorals naval presence on the sea may be necessary to accomplish certain tasks especially against smaller, fast moving targets, such as protection of shipping, choke point control/denial etc.

The U.S. Navy lacks a balanced force necessary to establish and maintain sea control in a hostile, littoral environment. The U.S. Navy is building new ships that are meant to operate in the littorals: the smaller 3500 ton littoral ship (LCS) and the larger 14564 ton DDX destroyer.[46] Both the DDX destroyer and the LCS are too large for a cluttered and dynamic littoral environment.[47] The LCS is a low signature, high-speed vessel with firepower and advanced sensors capable of covering all dimensions. The ship is designed especially to fill a number of crucial mission capabilities gaps in the littorals.[48] The technologically advanced

DDX is a multi-mission ship with emphasis on land attack, antiair warfare and antimissile defense. As earlier discussed, sea control is a prerequisite for power projection and one may argue that the size of the DDX and the LCS, the number that are planned and the cost of the ships may prevent both of them from closing the capability gap with regards to sea control in the littorals.[49] One may also question whether the DDX has a limited surface capacity because the ship is not fitted with surface-to-surface missiles, which will make the ship vulnerable against enemy combatants with weapon range that exceeds the 57mm guns that are meant to cover antisurface warfare.[50]

Technology cannot replace doctrine, tactics and the human factor. The complexity of the littoral environment and littoral warfare demands not just the right type of systems and platforms, but also the necessary tactics, experience, and mindset. Thus, the most important question is whether the U.S. Navy of today has the right mindset and the experience with regards to operating the LCS and the DDX destroyer effectively in the littorals.

U.S. Armed Forces' Concepts

Proposed concepts like *Operational maneuver from the sea* (OMFTS), *Ship to objective maneuver* (STOM), and *Sea Basing* assume sea control in order to produce effect on land. Additionally, none of the concepts will fully solve the challenges of the littorals or reduce the significance of military operations in the littorals.

OMFTS and STOM suggest that the difficulties inherent in the littorals may be avoided by high speed landing craft and airlifting of forces directly to the objective or to the shore.[51] The war in Afghanistan showed the potential of this concept when, in 2001, U.S. Marines were airlifted from the Indian Ocean and into Afghanistan several hundred nautical miles in-land. Airlifts are perfect for raids and to lift in capable, small forces.[52] The bulk of

material for sustainment, heavy equipment and 90% of the U.S. Army, however, are still dependant on sealift and the access of a seaport of debarkation (SPOD) or a large beachhead.[53]

Sea Basing is the enabling concept for OMFTS and STOM. It suggests the establishment of an offshore stationing area of large amount of equipment and material for rapid deployment toward the shore.[54] The stationing area may be moved further offshore to mitigate risk, but this must be weighed against weather and sea state, the length of sea lines of communication (SLOC) to protect, and the transit time for sealift, airlift and air support assets. However, once established, *Sea Basing* is relatively stationary and thus easy to target by potential enemies with long-range missiles and submarines. Additionally, the pirate activity in the Gulf of Aden shows that even unconventional threats have a reach several hundred nautical miles offshore and may constitute a threat to the concept of *Sea Basing*.

RECOMMENDATIONS

The Norwegian Traditions and Legacy

A comprehensive theory of littoral warfare should be the bedrock on which operational doctrine is developed.

Milan Vego, Professor United States Naval War College

An operational concept contains, according to Milan Vego, an outline on how to employ one's forces for accomplishing operational or strategic objectives.[55] Such an operational concept must be derived from peacetime exercises and be fully tested during peacetime. More important for blue-water navies are to require cooperation from allied nations that may have expertise and capabilities in the littorals; mine countermeasure (MCM) capabilities, and smaller corvettes and fast attack craft.[56]

Allied nations like Norway have the expertise of operating in the littorals, and may contribute to filling the U.S. Navy's gap in littoral warfare doctrine and solving the challenges of the littoral environment. During the Cold War, the Norwegian Navy developed a comprehensive anti-invasion strategy including guerrilla warfare tactics to resist a superior Soviet Navy. The multi-layered anti-invasion and sea denial strategy may be characterized as defensive, but with several offensive elements in it. The naval platforms and systems were therefore tailored to the environment and consisted of submarines, fast patrol boats (FPB), mines and coastal fortresses. The FPBs were specialized in high speed navigation in extremely confined waters using nothing more than optical and passive means and methods. Their ability to exploit the environment to conduct tactical movements in a hostile environment made them extremely difficult to detect and track. Another specialty was their ability to provide mutual support when moving through leap-frog tactics and conduct coordinated attacks to accomplish surprise and maximum effect. In other words, the Norwegian Navy also has the mindset of smaller coastal states similar to potential adversaries of the United States.

Figure 1: The Norwegian Skjold-class
Full load: 270 t
Length: 47.5 m (156 feet)
Beam: 13.5 m (44 feet)
Draft on cushion: 0.9 m (3 feet)
Draft off cushion: 2.3 m (7.5 feet)
Maximum speed: 55 knots +

Times have changed and the knowledge and the experience of operating within the Norwegian extreme littorals has now been further developed and evolved by the Norwegian littoral warfare community. The result is the employment of fully interoperable, highly capable surface corvettes (see figure 1) that may be a force multiplier and a facilitator in littoral and expeditionary warfare.[57] [58] The

operational art of this idea is essentially to counter the enemy's sea denial operations by applying their own asymmetric approach against them.

Operational Idea

[…] They [Norwegian Fast Patrol Boats] have contributed to RMP and the reconnaissance effort in advance of landings. […] Another strength has been their flexibility and independence of command. […] They have filled a gap in the protection of a static force typical to amphib ops, proving that their performance is absolutely necessary to these operations.

Com Fr Amphib TG of the NATO Reaction Force-8 after Exercise Brilliant Midas 2006

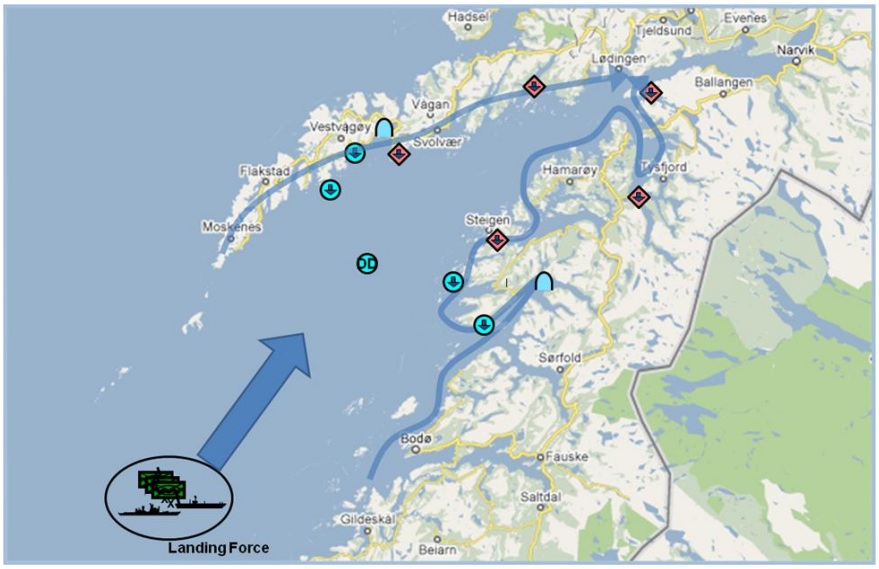

Figure 2: Infiltration operations to find and destroy enemy forces as part of sea control

Smaller littoral combatants similar to the Norwegian Skjold-class may contribute to operational maneuver and operational fires on shore-based installations and enemy surface sea denial capabilities as part of shaping and sea control operations (Figure 2).[59] Weapon systems, sensors and tactics are tailored for close range combat and the littoral environment.[60] Smaller littoral combatants may therefore deploy covertly into a littoral region using low signature and night time capacity to interdict, find and destroy enemy surface combatants and shore-based installations.[61] [62] Smaller littoral combatants may also

infiltrate the littoral region for intelligence purposes, or in support of special operations forces.

Smaller littoral combatants may infiltrate a littoral region in order to deny or block enemy sea denial operations as part of sea control, providing access to, and protection of amphibious landing forces (Figure 3). Smaller ships may be employed covertly to establish attacking positions in chokepoints, straits, and entrances to friendly amphibious operating area in order to deny the enemy access to friendly amphibious operating area. Essentially, one employs the forces to counter sea denial before the sea denial itself is a reality.

Both enemy and friendly ships are most vulnerable when moving. Hence, smaller littoral combatants should be employed at an early stage in order to establish concealed attacking positions to achieve surprise and maximize effect on advancing enemy surface combatants. Up-threat attacking positions allow friendly littoral combatants to destroy an advancing enemy before one's own amphibious forces are within the enemy's maximum weapon range.

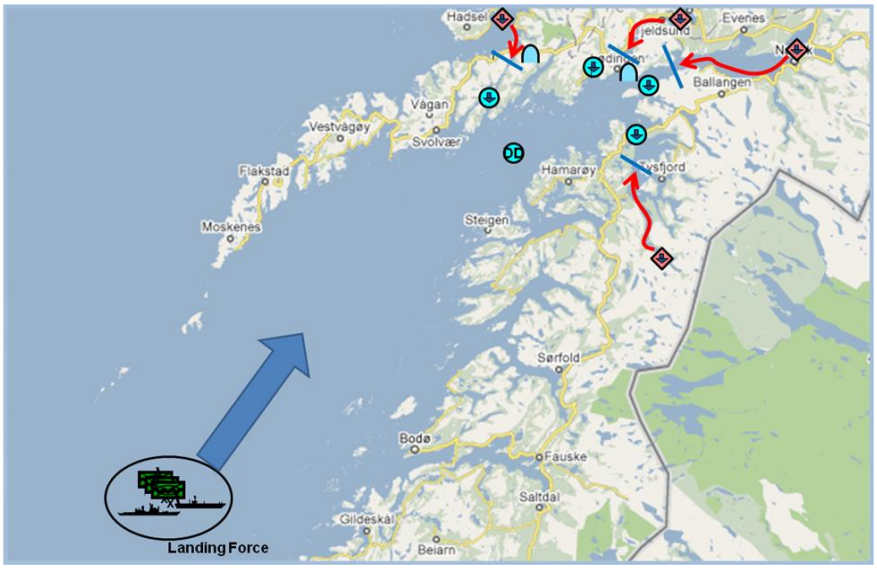

Figure 3: Up-threat screening/blocking operations to counter sea denial

Smaller littoral combatants are highly capable of providing protection to high value units such as MCM vessels, aircraft carriers, and amphibious landing ships as part of sea control (See figure 4). Amphibious landing ships and MCM vessels are usually operating close to shoreline and are particularly vulnerable because of the slow and static conduct typical to MCM operations and amphibious operations. Enemy conventional forces or camouflaged irregular forces blended in among civilian traffic, may pose a significant threat to these types of operations, and the forces must therefore be protected. Protection may be necessary both during transit and during operations. The protection by smaller littoral combatants may be done either up-threat, by close protection, or a combination of both. Up-threat patrolling allows screening of potential threats and defeating of identified threats as early as possible. The characteristics of a warship such as the Skjold-class with regards to tempo, high maneuverability and flexibility allow the ship to take action rapidly if a situation or threat occurs. The crew's experience, endurance, weapon systems, night capacity, seagoing capabilities and command and control (C2) system make them more suitable than rhibs and small boats.

Figure 4: Simple illustration of how the Skjold-class may contribute to protection of high value units

The last section provides good tactical examples of how the characteristics of the Skjold-class and tactics designed for the littorals may be used to good effect in order to reduce the threats from mines, torpedos and missiles. Many missile systems have maximum and minimum ranges and limitations when ships are operating close to the shoreline.[63] The missile threat may therefore be reduced by operating inside the minimum range and close to the shoreline. The Norwegian Skjold-class also has a very low signature and an extremely shallow water capability that more or less mitigate the threat from torpedos and mines.

Skjold-class ships working in pairs with support from aircraft or helicopters for surface search and a larger ship or aircraft providing air cover will increase their effectiveness and reduce the risk when operating in a hostile, littoral environment. Air cover may reduce the air threat as helicopters and aircraft are usually the greatest threat toward the Skjold-class in the littoral. Skjold-class ships working in pairs with support from a helo may provide mutual support and cover a greater area in a shorter amount of time.

The Skjold-class and similar ships usually have a small crew and a limited amount of fuel which will limit the ships' endurance and increase the need for rest and replenishment especially in high-intensive operations.

CONCLUSIONS

(…) The [Norwegian] FPBs proved to be assets of great value in various types of warfare. They were very efficient multi-purpose force multipliers.

Admiral Palomino

Com SP MARFOR and Com NATO Reaction Force-8 during Exercise Brilliant Midas 2006.

This paper has examined the relationship between sea denial, sea control, and power projection, the nature and importance of the littoral region and the potential threat that one may face in littoral warfare. Additionally, the paper has looked at what may be a gap in U.S.

Navy's capabilities with regards to littoral warfare and how allied nations may fill the gap an contribute in solving the sea control challenges in littoral warfare.

The nature of the littoral environment allows to a larger extent than on the open ocean the exploitation of the asymmetrical relationship between sea denial and sea control and to develop new, unexpected strategies. Future conflicts may therefore present the U.S Navy with an adversary capable of exploiting the littoral environment using a comprehensive naval doctrine on sea denial, guerrilla warfare at sea and hybrid warfare, and thereby nullify the advantages normally enjoyed by the U.S. Navy and other blue-water navies on the open ocean.

Allied nations like Norway have the experience to operate in the littorals and the mindset of a coastal state. During the Cold War, Norway developed a comprehensive anti-invasion strategy including guerrilla warfare to resist a superior Soviet invasion force. The multi-layered sea denial strategy had several offensive elements in it, which today are highly relevant in sea control operations in the littorals. Allied nations of the United States, like Norway, have tailored platforms and the expertise which may be a force multiplier and fill U.S Navy's gap with regards to littoral and expeditionary warfare and doctrine.

The littoral environment varies from state to state and from area to area. Some states are easy to access because of sandy beaches with no offshore islands. Other states have an extreme shoreline with high mountains and thousands of islands, islets and shoals, which are well suited for sea denial and guerrilla warfare at sea. It is unclear where the U.S. Armed Forces will operate in the future. The U.S. Navy must therefore prepare for the worst-case scenario and make sure that its forces are trained and equipped to solve any challenges that they may face in the littorals.

NOTES

[1] Corbett, *Some Principles of Maritime Strategy*, 103-105
[2] Ibid, 15-16
[3] Murphy, *Littoral Warfare: Adapting to Brown-Water Operations*, 65
[4] Carey, *Power Projection for the New World Disorder*, 43.
[5] Jane's Navy International, *Redefining naval doctrines*, 1
[6] Arthur, *Patrol craft can maintain littoral sea control*, 70.
[7] Addison Jr and Dominy, *Got Sea Control?*, 1
[8] Ibid
[9] Svortdal, *Mining – the Asymmetric Approach*. Lecture given at Royal Norwegian Naval Training Establishment, May 2006
[10] Ibid
[11] Vego, *Two Sides of the Same Coin:Littoral Warfare and Expeditionary Warfare* , 8.
[12] NATO Glossary of Terms and Definitions (short title: AAP-6).
[13] Svortdal, *Mining – the Asymmetric Approach*, Lecture given at Royal Norwegian Naval Training Establishment, May 2006
[14] Ibid
[15] **Unconventional warfare:** A broad spectrum of military and paramilitary operations, normally of long duration, predominantly conducted through, with, or by indigenous or surrogate forces who are organized, trained, equipped, supported, and directed in varying degrees by an external source. It includes, but is not limited to, guerrilla warfare, subversion, sabotage, intelligence activities, and unconventional assisted recovery. Department of Defense, *Dictionary of Military and Associated Terms (Short title: JP 1-02)*
[16] **Irregular warfare:** A violent struggle among state and non-state actors for legitimacy and influence over the relevant population(s). Irregular warfare favors indirect and asymmetric approaches, though it may employ the full range of military and other capacities, in order to erode an adversary's power, influence, and will. Department of Defense, *Dictionary of Military and Associated Terms (Short title: JP 1-02)*
[17] Svortdal, *Mining – the Asymmetric Approach*, Lecture given at Royal Norwegian Naval Training, May 2006 Establishment
[18] G**uerrilla warfare:** Military and paramilitary operations conducted in enemy-held or hostile territory by irregular, predominantly indigenous forces. Department of Defense, *Dictionary of Military and Associated Terms (Short title: JP 1-02)*
[19] Kelso II, and Mundy, *...From the Sea. Preparing the Naval Service for the 21st Century*, http://www.globalsecurity.org/military/library/policy/navy/fts.htm (accessed 22 Apr 2010)
[20] Krulak, *Operational Maneuver from the Sea*, 3
[21] Ibid
[22] International Maritime Organization, *International shipping*, 2, http://www.marisec.org/worldtradeflyer.pdf (accessed 22 Apr 2010)
[23] Krulak, *Operational Maeuver from the Sea*, 3
[24] Vego, *Littoral Warfare: Characteristics, Operational Concepts and Technical Requirements*, 8
[25] Vego, *Two sides of the same coin: Littoral Warfare and Expeditionary Warfare*, 8
[26] Thalassocrates, *Anti-Ship Missiles Tactics for Littoral Warfare Scenarios*, 91.
[27] Vego, *Littoral Warfare: Characteristics, Operational Concepts and Technical Requirement*, 10
[28] Vego, *Introduction to Naval Warfare*, 7
[29] Hoffman, *Hybrid Threats: Neither Omnipotent Nor Unbeatable, 3*
[30] Krulak, *Operational Maneuver from the Sea*, 2
[31] Hughes, *Take the small boat threat seriously*, 105
[32] Arthur, *Patrol craft can maintain littoral sea control*, 71.
[33] Talmadge, *Closing Time: Assessing the Iranian Threat to the Strait of Hormuz*, 85.
[34] Davis, *Iran's Strategic Philosophy and Growing Sea-Denial Capabilities*, 20.
[35] Anonymous. *Littoral Warfare-Things happen in seconds*, 20
[36] Ibid

[37] Jane's, *Fighting Ships 2009-2010*, 369
[38] Vego, *Littoral Warfare: Characteristics, operational concepts and technical requirements*, 9.
[39] Corbett, *Some Principles of Maritime Strategy*, 111-127.
[40] Vego, *Littoral Warfare: Capabilities and assets required*, 23.
[41] Vego, *Littoral Warfare: Characteristics, operational concepts and technical requirements*, 12
[42] Worthington, *Littoral needs a specific ship*, 90
[43] Vego, *Littoral Warfare: Characteristics, operational concepts and technical requirements*, 11
[44] Vego, *Littoral Warfare: Capabilities and assets required*, 23
[45] Arthur, *Patrol craft can maintain littoral sea control*, 70
[46] The Official Website of the United States Navy, *Destroyers – DDG*, http://www.navy.mil/navydata/fact_display.asp?cid=4200&tid=900&ct=4 (accessed 22 Apr 2010)
[47] Vego, *Littoral Warfare. Characteristics, operational concepts and technical requirements*, 12
[48] Kreisher, *Littoral Combat Ships (LCS)*, 28.
[49] Worthington, *Littoral Warfare needs a specific ship*, 91.
[50] The range of the 57 mm guns planned for the DDX destroyer is according to BAE Systems maximum 17000 meters.
BAE Systems, *57 mm MK 110 MOD 0 Naval Gun System.* http://www.baesystems.com/ProductsServices/l_and_a_sea_mk110.html, (accessed 25 Apr 2010)
[51] Murphy, *Littoral Warfare: Adapting to brown-water operations*, 69
[52] Vego, *Two sides of the same coin: Littoral Warfare and Expeditionary Warfare*, 19.
[53] Join Military Operation Department, *Joint Operational Logistics*, Lecture given at Naval War College 31 Mar 2010
[54] Gentry, *Sea Basing: Evolutionary naval doctrine and military transformation*, 1-2
[55] Vego. *Joint Operational Warfare: Theory and Practice*, I-11
[56] Vego, *Littoral Warfare: Characteristics, operational concepts and technical requirements*, 11
[57] Nitschke, *Littoral Warfare: A new name for an old mission?*, 20
[58] Olsen, *The Norwegian Navy of Tomorrow will have more Flexibility, operational availability, Rapid Reaction Capability and be more Sustainable*, 12
[59] Arthur, *Patrol craft can maintain littoral sea control*, 71.
[60] Naval Technology.com. *Skjold Class Missile Fast Patrol Boats, Norway*. http://www.naval-technology.com/projects/skjold/ (accessed 25 Apr 2010)
[61] Ibid
[62] Olsen, *The Norwegian Navy of Tomorrow will have more Flexibility, operational availability, Rapid Reaction Capability and be more Sustainable*, 14
[63] Thalassocrates, *Anti-Ship Missiles Tactics for Littoral Warfare Scenarios*, 91.

BIBLIOGRAPHY

Addison Jr, Victor G and Dominy, David. "Got Sea Control?" *Proceedings Magazine* 136, no 3 (Mar 2010)

Anonymous. "Littoral Warfare-Things happen in seconds." *Sea Power* 40, no 8 (Aug 1997): 19-20.

Arthur, Richard C. "Patrol craft can maintain littoral sea control". *United States Naval Institute. Proceedings* 125, iss 8 (Aug 1999): 70-71.

BAE Systems. 2010. *57 mm MK 110 MOD 0 Naval Gun System.* http://www.baesystems.com/ProductsServices/l_and_a_sea_mk110.html. (accessed 25 Apr 2010).

Carey, Merrick. "Power Projection for the new World Disorder". *Sea Power* 41, no 9 (Sept 1998): 43-46.

Corbett, Julian S. *Some Principles of Maritime Strategy*. Annapolis, Maryland: Naval Institute Press, 1988

Davis, Dale R. "Iran's strategic philosophy and growing sea-denial capabilities". Marine Corps Gazette 79, no 7 (Jul 1995): 20-22.

Department of Defense, *Dictionary of Military and Associated Terms (Short title: JP 1-02)*, 12 Apr 2001.

Gentry, Robin G. *Sea Basing: Evolutionary naval doctrine and military transformation*. Carlisle: U.S. Army War College, 2004

Hoffman, Frank, *Hybrid Threats: Neither Omnipotent Nor Unbeatable*, Working Paper, Newport, RI: U.S. Naval War College, 2010.

Hughes Jr, Wayne P. "Take the small boat threat seriously". *United States Naval Institute. Proceedings* 126, iss. 10 (Oct 2000): 104-106.

International Maritime Organization (IMO), *International shipping, 2006,* http://www.marisec.org/worldtradeflyer.pdf. (accessed 22 Apr 2010).

Jane's, *Fighting Ships 2009-2010*, Surrey, UK: HIS (Global) Limited, 2009

Jane's Navy International. "Redefining Naval Doctrines". *Jane's Navy International* 104, iss 10 (Dec 1999): 1.

Joint Military Operation Department, *Joint Operational Logistics,* Lecture/Seminar given at Naval War College 31 Mar 2010.

Kelso, II, Frank B. & Mundy Jr. C.E., *…From the Sea. Preparing the Naval Service for the 21st Century, 1992,* http://www.globalsecurity.org/military/library/policy/navy/fts.htm. (accessed 22 Apr 2010).

Kreisher, Otto. "Littoral Combat ship (LCS)". *Naval Forces* 30, iss 2 (2009): 26-31.

Krulak, Charles C. *Operational Maneuver From the Sea (OMFTS): A Concept for the Projection of Naval Power Ashore.* Washington: Headquarters Marines Corps, 1996

Lynn, Robert A. "Littoral Warfare during World War II". *Marine Corps Gazette* 80, no 8 (Sept 1996): 97.

Murphy, Frank J. "Littoral Warfare: Adapting to brown-water operations". *Marine Corps Gazette* 77, No 9 (Sept 1993): 64-73.

North Atlantic Treaty Organization, *NATO Glossary of Terms and Definitions (Short title: AAP-6),* 1 Apr 2008.

Naval technology.com, *Skjold Class Missile Fast Patrol Boats, Norway, 2010,* http://www.naval-technology.com/projects/skjold/. (accessed 25 Apr 2010).

Nitschke, Stefan. "Littoral Warfare". *Naval Forces* 26, no 3 (2005): 16-28.

Official Website of the United States Navy. 2010. *Destroyers – DDG.* http://www.navy.mil/navydata/fact_display.asp?cid=4200&tid=900&ct=4. (accessed 22 Apr 2010).

Olsen, Kjell-Birger. "The Norwegian Navy of tomorrow will have more flexibility, operational availability, rapid reaction capability and be more sustainable!" Naval Forces (2002): 12-16.

Svortdal, Otto, *Mining – the Asymmetric Approach*. Lecture given at the Maritime Warfare Course at the Norwegian Training Establishment at Naval base Haakonsvern, Bergen, Norway, May 2006.

Talmadge, Caitlin. "Closing Time: Assessing the Iranian Threat to the Strait of Hormuz". *International Security* 33, iss 1 (Summer 2008): 82-117.

Thalassocrates, Alcibiades. "Anti-Ship Missiles Tactics or Littoral Warfare Scenarios". *Military Technology* 27, no 8/9 (Aug/Sept 2003): 91-96.

Vego, Milan, *Joint Operational Warfare: Theory and Practice,* Newport: US Naval War College, 2009.

Vego, Milan. 2010. *Introduction to Naval Warfare (NWC 1032),* Joint Military Operations paper, U.S. Naval War College, Jan 2010

Vego, Milan. "Littoral Warfare: Capabilities and assets required". *Naval Forces* 27, iss 5 (2006): 20-33.

Vego, Milan. "Littoral Warfare: Characteristics, operational concepts and technical requirements". *Naval Forces* 29, iss 4 (2008): 8-17.

Vego, Milan. "Two sides of the same coin: Littoral Warfare and expeditionary warfare". *Naval Forces* 29, iss 5 (2008): 8-19.

Worthington, George R. "Littoral Warfare needs a specific ship". *United States Naval Institute. Proceedings* 129, iss 1 (Jan 2003): 90-91.