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U.S. Navy Operations in Littoral Waters 2000 and Beyond

Commander Tim Sloth Joergensen, Royal Danish Navy

THE WORLD CHANGED DRAMATICALLY in 1989–1990, and America's national security policy changed as well. U.S. strategy shifted from a focus on a global threat to a focus on regional challenges and opportunities.¹ This shift meant a change from blue-water warfare to brown-water, or littoral, operations.²

Much has been written about this shift and its implications for the U.S. Navy and Marine Corps. Some analysts have seen the change as leading to a completely new type of warfare, while others have viewed the shift as of lesser importance and not necessarily bringing dramatic change for the Navy or Marine Corps. Both opinions might have truth in them, but before deciding what changes will have to be made it may be worthwhile to look around the world and see whether other navies have valuable experience in the littoral warfare area.

Most of the populated areas in the world lie relatively close to the coast, and consequently many navies have operated in the littorals for centuries and are used to naval warfare in this environment. Blue-water fleets like the U.S. Navy and the Royal Navy have traditionally seen littoral warfare as something they could do with one hand behind their back—because they are good at blue-water warfare. They have viewed littoral operations as simple and easy. In earlier days this was partly true, in that the coastal navies trying to defend the littorals were

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mainly small and weak. Technology has changed this dramatically. Today littoral warfare is three-dimensional; it has aspects that are much more demanding than the blue sea, and it involves environments that favor the defender and the weak. If the U.S. Navy and Marine Corps want to be successful in this type of warfare, they need to learn from services having experience in it. Navies with characteristics similar to such forces might one day be on the other side in a conflict.

"No nation currently has the power to prevent U.S. naval forces from dominating anywhere at sea, from establishing and maintaining local control of any littoral area when needed, or from projecting power ashore whenever called on to protect U.S. interests."³ This statement is undoubtedly true, but (and although its author later modifies his point of view) it misses the point completely. American society of the 1990s is not willing to accept heavy losses of its soldiers in a regional conflict or to take responsibility for inflicting heavy collateral damage in a limited war. The American way of war is, and will be in the future, to minimize casualties and collateral damage. That is another reason why it is necessary to study littoral conflict in detail in order to produce better ways of conducting this type of warfare.

The Coastal Navy of Today and Tomorrow

The coastal navies of the world today do not all look the same. This is due partly to geographic and climatic reasons, partly to differences in development and hence economic capabilities, and partly to historical emphasis, or lack of emphasis, on naval warfare. Nevertheless, there are factors, weapon systems, ship types, and so on that are essential to all coastal navies. How might an ideal coastal navy look today, and ten years in the future? What kind of technology will be used, what types of platforms will be deployed, and how will operations be carried out and integrated?

Submarine Warfare. Diesel-submarines are operated by many navies, among them twenty-one so-called "Third World" countries.⁴ Littoral areas are ideal for the operation of small submarines, and diesel boats are generally much smaller than their nuclear brothers. The shallow water in littoral areas "will influence the use of not only sonars and sonar buoys but also other sensors such as those for magnetic anomaly detection. The weapons available to the antisubmarine warfare (ASW) force will be restricted by the depth, and their consumption will increase along with the number of false contacts caused by higher ambient sea noise, raypath bendings and reflections, and bottom debris. In addition, in the shallow-water zone close to shore, fresh water from estuaries mixes with the ocean water, creating unpredictable layers with gradients not seen in the oceans."⁵ In short, the littoral environment favors the small diesel submarine.

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The quality of the diesel boat itself has improved dramatically during recent years, and it will probably increase much more during the next decade. Such submarines are notably quieter (even when snorkeling) today than they used to be; passive sonar ranges in excess of fifty miles are not unusual with noisy targets. Technology continues to improve their sensors and also their command and control systems. The main weapon system is still the torpedo, but wire-guided and homing torpedoes now have ranges of more than fifteen miles, and this figure will certainly increase in the future.⁶

The traditional diesel submarine has several weaknesses—among them slow speed, short submerged endurance, and small crews. Several submarine producers have, however, introduced air-independent propulsion systems, which will undoubtedly become standard in most future submarines. Already allowing low-speed cruising for more than ten days without snorkeling, such propulsion largely eliminates one of the major weaknesses of the nonnuclear submarine compared to the nuclear craft.⁷

Mine Warfare. Since their invention in the nineteenth century, mines have been seen as the weapon of the poor. Mines have traditionally been cheap to produce and easy to use; they can be laid by a wide variety of platforms, including submarines, surface warships, merchant ships, and aircraft. The mine has, furthermore, the political advantage of being perceived as fundamentally a defensive weapon, one that only threatens an opponent if he sails into the minefield. The mine can, however, be a very effective weapon, as was shown in the Persian Gulf between 1987 and 1991, when Iranian and Iraqi mines inflicted \$125 million damage on three U.S. warships.⁸

Complexity of modern mines has increased their cost considerably, but they are still very cheap weapons with an enormous effect. We must expect that they will be used in a large majority of future conflicts in littoral waters. More than thirty countries are engaged today in the development, manufacturing, and marketing of naval mines. The basic types are still the moored mine and the ground (or bottom) mine, with magnetic, acoustic, or pressure target-detection devices. Some new types of target acquisition methods have also been investigated. These exploit the underwater electrical field generated by a ship, the distortion it causes of the gravitational field, the shadowing of light by a target passing overhead, and the reduction in background noise as a vessel passes between noise sources and the sensor.⁹

Mines produced today are far more sophisticated than they were just ten or fifteen years ago, whatever their type. The modern multi-influence mine is controlled by digital signal processors, and its programs can be changed minutes prior to laying the mine. The mine of today can be programmed to compare the different signatures of a target, in order to activate either for any target that passes it; or for a specific class of, say, landing ships; or even for a specific ship

of a specific class. Recordings of the signatures radiated by different ships are used to do this, and these recordings can be made in peacetime. This increased target discrimination capability also makes it possible to program the mines to allow friendly units to pass directly through one's own minefields without the mines detonating. This possibility, as far as is known, has not yet been exploited in a conflict, but it might be during the next decade, and it would certainly change surface warfare in littoral waters dramatically.

Developments in modern mines have also complicated countermeasures. Old-fashioned minesweeping is no longer adequate. The only technique that is capable of countering the mine threat today is minehunting, wherein each mine is individually located and destroyed by either divers or even remotely controlled vehicles. New techniques for locating mines are being investigated; among these are helicopter-mounted lasers able to detect moored mines. Mine countermeasure operations are generally very time-consuming and require well educated and trained personnel as well as modern and expensive equipment.

Fast Patrol Boats. The modern fast patrol boat (or patrol craft, missile boat, fast attack craft, or whatever other name might be used) is among the weapon platforms least understood by the blue-water navies. Even today it is quite common to meet naval officers who still believe that these vessels are similar to the motor torpedo boats (MTBs) of World War II. Nothing could be further from the truth.

The fast patrol boat (FPB) of today is a very capable unit. Most of them are built specifically for surface warfare, but variants are also capable of antisubmarine warfare and mine warfare. The modern FPB is armed with exactly the same types of weapons as are carried by frigates and destroyers; therefore it has fundamentally the same destructive power as these much larger ships. FPBs also have sophisticated sensors, comprising radars, low-light-level television, infrared, electronic support measures (ESM), laser systems, etc.¹⁰ They have modern data links and communication systems. The FPB is, of course, fast, and the newest types have stealth features. The FPB also has weaknesses, however: it is vulnerable due to its small size, it has limited anti-air warfare capabilities (although this area has been much enhanced during recent years), it has limited command and control facilities, and it has short endurance.

The FPB of today and of the future is and will be a versatile and economical platform capable of performing many different tasks, including patrolling in peacetime, minelaying, combat, and in some cases even mine countermeasure operations.

Coastal Defense. Coastal defense consists, in this context, of coastal gun and missile batteries. Gun batteries have been used for generations, and they continue to contribute significantly to the defense of certain littoral areas,

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whether the guns are fixed, heavily fortified, or mobile. The number of coastal gun batteries is, however, diminishing.

Coastal missile batteries can also be either fixed or mobile, and they use generally the same missiles as do ships. The greatest advantage for the defender possessing coastal missile batteries is probably that they present a completely different type of threat to the attacker. The attacker will have to locate not only the defender's ships and submarines at sea but also batteries on shore, a very different environment to search. Coastal missile batteries get their firing data from a variety of sources—ships at sea, helicopters, fixed-wing aircraft, or sensors of their own, such as radar or ESM. For navies already possessing shipborne surface-to-surface missiles, it is relatively easy and inexpensive to acquire coastal missile batteries. Today approximately thirty countries have either coastal gun batteries, coastal missile batteries, or a combination thereof.¹¹

Air and Antiair Warfare. Most coastal navies do not have a naval air force. Cooperation with the regular air force is, however, generally well established in naval operations, and air forces regularly train for combat air patrol (CAP) missions, for defense of the navy, and for attacks on naval targets.

Shore-based surface-to-air missile (SAM) batteries will regularly be employed close to the coast to cover naval operations, such as minelaying, or simply to protect naval units in the area. Coastal navies generally do not have long-range SAM systems on board surface ships, and the air defense of naval units or naval task groups is therefore normally not as well integrated or coordinated as in blue-water navies.

Integrated Defense of a Littoral Area. Most coastal navies in existence today consist, and will continue to consist well into the next century, of the ships and weapon systems mentioned above. Some might have new types of units as well. However impressive each system might be in itself, it is the integration of the local environment and all these components that can make a coastal navy a formidable opponent, even for a force that on paper looks much superior. How does a coastal navy integrate these systems, and what is the effect of doing so?

Integration can, of course, be done in many ways, depending on the area, the available systems, the training standard, etc. One way of doing it, if the attacking opponent were the U.S. Navy, might be as follows.

The coastal defense would be built in layers, of which the outermost would be the submarines. The limited number available would be positioned in order to maximize the threat to the U.S. Navy. That means they would be deployed in choke points on the supply route or along the sea lines of communication, threatening the U.S. prepositioning vessels or the big ships carrying army equipment. They would also be placed close to the coast and the most probable landing areas, keeping a low profile while preparing to attack the assault force, and taking advantage of the shallow-water environment. Submarines might also

be used for offensive mining of key harbor entrances in the region (in order to prevent reinforcements from reaching those ports or friendly forces from operating easily from them) and in defensive mining near anticipated U.S. avenues of attack.

Furthermore (despite the existing surveillance systems) it might in the future be possible for modern and very quiet air-independent diesel submarines to operate in, close to, or off the major U.S. continental ports used as departure points for the new, huge transport and supply vessels.¹² The submarines might either choose to stay in the area in order to attack targets of opportunity or during peacetime lay dormant mines in the major traffic channels.

The next layer could involve coordinated attacks by the air force and by long-range missiles fired from either naval units or coastal batteries (in this scenario, that would mean between sixty and 150 nautical miles from the coast). Depending on the air force's weapon systems, the coordination could be in time (meaning that all weapons would hit the enemy at once), in waves, or in target areas. The aim of the coordination would be to saturate the U.S. air defenses or to concentrate the attack on specific parts of the U.S. force. Target data would be provided by friendly merchant ships or fishing vessels (using the Global Positioning System and reporting by mobile phones); submarines; airborne, shore-based or shipborne ESM or radar systems; or fixed wing aircraft or helicopters with data links. FPBs would be camouflaged in harbors or along cliffs or loiter near the shoreline during this phase.

The next layer would consist of minefields laid previously by submarines, minelayers, FPBs, civilian ships, or aircraft. The fields would be protected by fixed-wing aircraft, shore-based SAM and surface-to-surface missile batteries, surface units, and submarines. The aim would be to present simultaneous threats from all directions, making it impossible for the U.S. Navy to concentrate on mine countermeasures. Most of the mines would be directed specifically against the units in the landing force, but some would be aimed at the mine countermeasure forces and the screening units. The minefields would be positioned in such a way that they enabled friendly units to move on interior lines without danger, thereby facilitating the concentration of forces for further attacks. Part of this layer could also be small craft or speedboats armed with guns or rockets. These units would concentrate their attacks on a few enemy units, ten or twelve boats or more against one frigate or destroyer, making defense extremely difficult.

The last layer would be the coastal gun batteries, army units on the coast, naval units with shorter-range weapons, helicopters, and fixed-wing aircraft.

This layered defense would be coordinated by data link and radio communication, but primarily on the basis of previously agreed plans and standard

operating procedures—in order to minimize communication and the effect of U.S. jamming.¹³

Strong and Weak Aspects of Coastal Navies. Coastal navies have several strong aspects. The most important is probably the synergistic effect obtained through coordinated operations. This demands experienced and well trained crews and peacetime exercises to refine the war plans. Another strong point is the weapon systems. These are basically the same as used by blue-water navies, although the individual units are much smaller. Good knowledge of the local area and the environmental conditions is also an essential strong point—such as, of water layers and radiowave propagation in specific areas. Time to prepare the defense in peacetime gives the opportunity to optimize minefields, prepare positions in which FPBs can lie in wait for surprise attacks, and so forth.

Although modern technology and the environment in many ways favor the defender of a coastal area, the coastal navy also has some weaknesses. The most serious weakness is probably air defense, which relies heavily on cooperation with a nation's air force. FPBs today remain especially vulnerable to air attacks, by both fixed-wing aircraft and helicopters. (This might, however, change in coming years, as more and more FPBs are equipped with SAM systems.) Another weakness is the limited size of each naval unit, which makes them vulnerable to attacks and hits but also, because redundancy is limited, to breakdowns of equipment. Small crews limit endurance, especially as many craft are one-watch ships, meaning that the whole crew is always on duty when at sea. Limited size also makes it difficult to manage complicated situations, as each crew member has several functions. For instance, it is very difficult for them to fight off simultaneous air, surface, and subsurface attacks.

U.S. Littoral Operations after 2000

Operations in the littoral will continue to be essential after 2000. It is unlikely that the U.S. Navy will face a “peer competitor” before well into that century. This implies a need for both the U.S. Navy and Marine Corps to develop specific littoral warfare capabilities aimed at conducting warfare in the shallow-water areas of the world successfully and with only limited casualties. At the same time they must pursue research and development to stay ahead of developing peers.

The specific littoral warfare capabilities needed can be developed in any of several ways depending on the area of warfare. In this respect the old saying should not be forgotten, that to be able to understand and counter a threat one should be able to pose the threat oneself. In the submarine warfare case this means being able to operate small submarines if one wishes to be able to oppose them. The U.S. Navy therefore must, in descending order of preference, either develop its own coastal submarine force of modern small submarines, lease

modern submarines from an allied navy, or cooperate very closely with an allied navy having this capability.

The mine warfare area presents a particularly difficult problem, as was seen during the Persian Gulf War, where rather old-fashioned Iraqi minefields severely hampered the operations of the amphibious forces.¹⁴ In order to be able to carry out "operational maneuver from the sea" in littoral areas, it is necessary to be able to destroy enemy minefields quickly—much more quickly than any navy is able to do today.¹⁵ The U.S. Navy and the Marine Corps have several related research projects in progress, and there are plans for interim solutions until a final one is found; the problem seems, however, to be so severe for present and future operations that far more resources should be transferred to it. Here again, it is necessary to be able to lay modern mines in order to be able to counter enemy mining operations and minefields. The U.S. Navy must, therefore, either initiate new mine development programs or join programs begun by allied navies.

The FPB threat and coastal missile batteries are also problems. Almost all of the ships in the U.S. Navy are far too big and expensive to risk in operations before these threats are nullified. The best way to counter FPBs today is with missile-armed helicopters or other FPBs. The U.S. Navy no longer possesses FPBs (the *Cyclone* class is a patrol vessel, not a fast patrol boat), but it has begun to arm helicopters with missiles. With the expected development of longer-range SAM systems for FPBs, however, new, long-range air-to-surface missiles will be needed for the helicopters; furthermore, it must be envisaged that several helicopters will be lost. To have one or two ships, each with one helicopter, enter a littoral area with an FPB threat could therefore lead to a fatal outcome, wherein first the helicopters are shot down and then the ships themselves are engaged with missiles. Anti-FPB warfare must be waged with overwhelming force, taking advantage of one of the FPB's weaknesses, its poor ability to counter several threats at the same time. The long-term solution could be to develop a helicopter for surface warfare and to reintroduce the FPB in the U.S. Navy—or at least to expand exercises with allied navies possessing them.

To win the littoral battle it is not enough to possess the right platforms; one must also be able to take advantage of one's own strengths and exploit the opponent's weaknesses. The U.S. Navy must use its superior command and control facilities and maintain its technological lead. This can be done by executing very fast and complex operations with advanced platforms, making it impossible for the enemy's coastal navy, with its limited command and control facilities, to keep track of what is happening and to coordinate its operations. Such operations cannot, however, be carried out in wartime if they are not exercised in peacetime and against proper simulated opposition. The U.S. Navy can accomplish this in two ways: either develop a coastal navy of its own and

carry out national exercises, or use the existing Nato alliance, several of whose navies in both northern and southern Europe are among the best coastal navies in the world today, and exercise with them.

Exercises at sea are, however, only one way of enhancing the littoral warfare capabilities of the U.S. Navy today and tomorrow. It is also essential that the young officers and the potential leaders of tomorrow fully understand this type of warfare. This can be accomplished by exchange programs and by having foreign littoral-warfare experts from coastal navies teach, advise and take part in the planning of exercises and operations. Finally, littoral warfare operations can be improved by taking advantage of the emerging simulation technology. Almost all Nato countries have tactical training centers; these centers could be connected in a network, enabling large-scale simulated operations, with the real experts supervising the progress of the players.

No navy in the world today has the perfect coastal navy, with all the needed resources and capabilities, and probably no navy will be in that position ten years from now. Nonetheless, it is essential for the U.S. Navy to study the potentials of such a force in order to be able counter it. The U.S. Navy is by far the strongest and best equipped fleet in the world today, and it will remain so at the start of the next century. The shift from blue-water operations to littoral operations has changed some of its priorities and will continue to do so in the years to come. There is, however, no reason to invent the wheel once more, to start from scratch, when so many allied navies have specialized in this type of warfare for generations. The U.S. Navy should take advantage of this fact on all levels, thereby easing the transition and accomplishing it at minimal cost. If the U.S. Navy takes full advantage of its long-standing alliances, it might be not only the leading blue-water navy ten years from now but also the best in the "brown waters."

Notes

1. U.S. Navy Dept., "... From the Sea: Preparing the Naval Service for the 21st Century" (Washington, D.C.: 1992), p. 2.
2. In this article "littoral" means the coastal waters around the world, including both the sea itself and the shoreline used by the belligerents to conduct their attack and defense.
3. Frank J. Murphy (Lt. Cdr., USN), "Littoral Warfare: Adapting to Brown-Water Operations," *Marine Corps Gazette*, September 1993, p. 66.
4. K.T. Madsen (Cdr., Royal Danish Navy), "Fighting the Beast," U.S. Naval Institute *Proceedings*, August 1996, p. 28.
5. Ibid.
6. Ibid., p. 30. See also Frank Rosenius [RAdm., Commander in Chief, Royal Swedish Fleet], "Comment and Discussion," U.S. Naval Institute *Proceedings*, August 1997, p. 22.
7. Rosenius, p. 22.
8. Scott C. Truver, "Naval Mine Countermeasures," *International Defense Review*, 9/1995, p. 54.
9. David Foxwell, "Naval Mine Warfare: Unfunded and Underappreciated," *International Defense Review*, 2/1993, p. 125.

10. Due to their small size, FPBs are often able to take advantage of a duct existing between five and ten meters from the surface. This duct is common in littoral waters and can produce extreme radar ranges for an antenna in the duct.

11. Massimo Annati, "Coastal Defence: Issues and Solutions," *Military Technology*, 2/95, p. 26.

12. The size and enormous capacity of the new ships might lead to the result that the loss of a single ship fully loaded with army equipment might jeopardize an entire operation for a long time.

13. For an overview of the capabilities of advanced integrated coastal defense systems, see Yedidia Ya'ari (RAdm., Israel Navy), "A Case for Maneuverability," *Naval War College Review*, Autumn 1997, p. 125.

14. Glenn W. Goodman, Jr., "Breaching Unseen Barriers," *Armed Forces Journal International*, November 1995, p. 40; and Edward J. Walsh, "Navy and Marines Focus on Achilles' Heel: Shallow-Water Mines," *Armed Forces Journal International*, August 1993, p. 35.

15. "Operational Maneuver from the Sea," *Surface Warfare*, July/August 1996, pp. 7-13; and Murphy, p. 69. For a convenient summary of Operational Maneuver from the Sea (OMFMS), see Mark W. Beddoes, "Logistical Implications of Operational Maneuver from the Sea," *Naval War College Review*, Autumn 1997, esp. pp. 33-35.

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Call for Papers The American Military Experience in Asia, 1898-1998

The Wisconsin Veterans Museum and the Big Ten Consortium of the Society of Military History announce a special conference to commemorate the one-hundredth anniversary of major American military commitments in the Asia-Pacific region. The conference will honor Professor (Emeritus) Edward M. Coffman of the University of Wisconsin at Madison, former president of the Society.

The conference will be held 23-25 October 1998 at the new Monona Terrace Community and Convention Center, Madison, Wisconsin. There will be a lecture by Stephen E. Ambrose, professor emeritus of history at the University of New Orleans. (For registration and conference information: Dr. Richard H. Zeitlin, Director, Wisconsin Veterans Museum, 30 West Mifflin St., Madison, Wis., 53703, tel. 608-266-1009, <eitlin@mail.state.wi.us>.)

The conference will focus on the cross-cultural, international impact of American armed forces in the Asia-Pacific area. Papers that deal with military-military relations, civil-military relations, occupation and pacification policies, and coalition warfare are especially encouraged. Paper proposals are due by **1 March 1998**. (For program and papers information: Dr. Brian Linn, Department of History, Texas A&M University, College Station, Texas, 77843-4220, fax 409-862-4314, <blinn@acs.tamu.edu>.)