

Conflict Beneath the Sea in 2020

By Mark R. Shulman

Dr. John P. Craven, then serving as Chief Scientist, Department of the Navy Special Projects office, and Chief Scientist of the Deep Submergence Systems Project, 30 years ago forecast an era in which the United States would exploit the sea beds, and concluded that "history, law, technology, and the principles of sea power have been parochially invoked to state the case for 'inner space' The test of time, or even more quickly the test of analysis may demonstrate the hypothesis faulty and the assumptions rashly made. The challenge of the deep ocean may not be the most important international problem of the last half of this century; but it may be."

Those words appeared in his *Proceedings* article, "Sea Power and the Sea Bed," (April 1966, pages 36-51) Today, hindsight answers Craven's rhetorical question: It was not, but it may still be.

Most of the world lies beneath the sea; a long generation from now, we could be looking at a myriad of uses for this world. If so, we will almost undoubtedly be looking at a new kind of naval warfare contesting for its control. We could, in short, see the end of the Mahanian view of the seas as a medium for transit and a place of counter-force operations; the seas will be revaluated. Much as they were during the age of sail and of wealthy fisheries, the seas will become a place of value themselves. They also are likely to become a medium for counter-value warfare in the next century.

Strategists traditionally have divided the world into land, sea, air, and, recently, cyberspace. If pushed, land-war specialists will note subsurface elements of land war such as access to and control of underground resources, as well as trench mining and tunneling. Air war specialists quickly will acknowledge several regimes: low altitude, high altitude, low space, high space, and deep space. The seas generally are divided into two or possibly three arenas: surface, subsurface, and deep sea. (The new information warriors have too many media to discuss in this brief essay.)

Most naval analysts, however, acknowledge that within a generation, a definition of the seas will include the shelf surfaces, the deep sea beds—and what lies below them. Nonetheless, the vision expressed in Michael Vickers's recent paper, "A Concept for Theater Warfare in 2020" (U.S. Department of Defense Office of Net Assessment), foresees a world virtually unchanged. Only the

weapons will be new—or improved. The paradigm of war at sea will be the same as that expressed by Alfred Thayer Mahan a century ago—the seas as highways, a reasonably good assessment for the technical capabilities of the 19th century. To control these highways, he noted, man traditionally had fought counter-force wars. The U.S. Navy adopted Mahan as the prophet who could justify the largest, most powerful battleships designed to win counter-force actions on the high seas. These behemoths, and their aircraft carrier successors, have controlled the seas for a century.

Mahan described what he considered immutable laws of the seas, but he based his theories on a flawed interpretation of history: a world completely dominated by nation-states competing in a zero-sum game. One's gain was another's loss. Mahan wrote, after all, in an era of high tariffs and increasingly strengthening states, when piracy had been eliminated and large trading companies owed their existence to particular state regimes.

Free trade has been disproving part of his axiom for at least half a century, and competition is making people wealthier. Evidence is accumulating that states are losing some of their hegemony as the only important international actors.

The seas, however, also are changing. Where island nations such as Britain, Japan, and the United States (which is both an island and a continental nation) have long used the seas as trade highways, in the 21st century, states bordering the earth's oceans will plow the seas for their own value. Because of its immense size, and because its southern portion does not border on any great powers, the Pacific is the ocean most likely to be exploited. Many of the new maritime states on its rim, including Japan, South Korea, Taiwan, Singapore, and Indonesia, have large populations and technical expertise.

Japan—with its tremendous financial resources—is the most likely to lead the pack. Other competitors might include China or Russia, either as whole countries or as maritime-oriented rump states. Finally, non-state actors also may drive change, be they multinational corporations or mafia-like pirate groups heavily armed and only vaguely affiliated with patron rogue states.

Initially, sea bed exploitation probably will focus on shelves such as those around the Spratly Islands in the South China Sea, which already are hotly con-

tested. From there one can easily envision development of subsurface regions across the seas and, eventually, even of the deep sea beds. Each stage of this frontier will increase the likelihood that naval warfare will include major counter-value components.

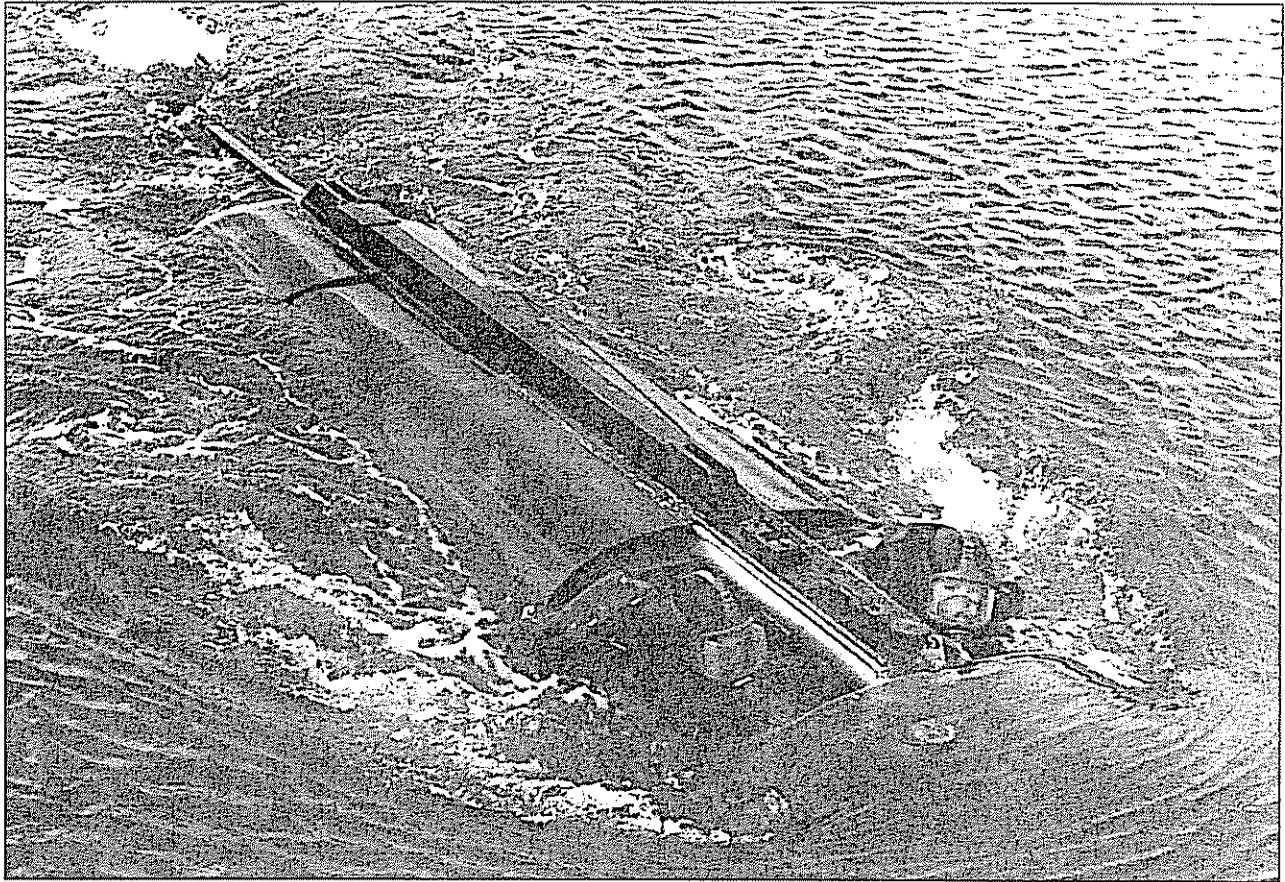
Given new hardening technology, developments in micro-engineering, near-Malthusian population growth, environmental decay on the globe's surface, loss of the ozone layer, and the proliferation of weapons that threaten every surface dweller's existence, I suspect that the seas will be exploited in the coming century. Although current technologies make such exploitation prohibitively expensive at this time, they offer virtually unlimited potential for mining, power generation, fresh water and oxygen generation, food production, and safety.

Considering that man will not be able to survive at great depths in great numbers for extended duration prior to 2020, exploitation remains feasible. Man easily could move to the shelves at depths of 200 feet without pushing our current technological capabilities very far. Beyond that, 2020 might well see robotics-based exploitation of the deeps.

Several areas offer promise:

Mining The seas have long provided petroleum and more recently natural gas. They could just as readily provide gold, silver, uranium, and other minerals. Presently, mining is not economically feasible, but it could become so if we developed safe, secure, and reasonably inexpensive stations planted on the bottom. Mining techniques for precious ores might range from an advanced version of panning to a sea-bed version of strip-mining. Large-scale exploitation could not really begin, however, without inexpensive power: breathing at these depths would require a helium-rich atmosphere that would itself require tremendous amounts of energy simply to maintain tolerable temperatures in such frigid waters. Even if man does not venture there for long periods, the lands beneath the seas might offer safe, secure places for robots to store nuclear, biological, or chemical waste.

Power generation Presently, there is some hope for generating unlimited power from tidal power or waves—perhaps best exploited not by waves lapping against the littoral but by tides or currents. Furthermore, power may well be generated by geothermal heat that surges beneath the sea bed. It could conceivably



T. BOLAN

also be generated by the harvesting of microbiological organisms such as those that create their own light in the oceans' darkest recesses.

Food The sea has long provided fish and mammals for human consumption. Increasingly, the seas are being used as incubators to nurture fish, kelp, and even plankton artificially. In the future, submerged racks could anchor kelp farms that stretch hundreds of leagues across the sea. Some day, deep sea stations may become self-sufficient or even capable of exporting food stuffs to hungry surface dwellers.

Water and air. Over the centuries, humans have gone to war for access to drinking water. Today—whether polluting it, pouring it on lawns, sprinkling it in fountains, hoarding it behind dams—even the wealthiest societies now pay dearly for fresh water. Today's submarines generate fresh water using a relatively expensive desalinization process. Larger submerged stations would permit inhabitants to use the more space-demanding—but less expensive—reverse-osmosis process.

The competition for fresh air may become even more fierce in the coming century. Yet the seas offer unlimited supplies if one can build the machinery and keep it secure.

Safety As well as providing a likely place for storing toxic waste, the seas

may provide the kind of security that some people might seek in a world that has seen the proliferation of weapons of mass destruction, of electromagnetic pulse weapons, and of a degraded environment; one bombarded by solar radiation no longer screened by an ozone layer, lacking oxygen because the rain forests are gone—and one increasingly lawless.

I am not suggesting that man will return to the sea as his natural habitat, but there is a strong argument to be made that the oceans of the future will cease being merely a medium for counter-force warfare.

What will naval warriors need then? The first weapon system probably will resemble an attack submersible with deep-sea capabilities. It could be manned or unmanned. Its arsenal would not require any great technological leaps. In fact, torpedoes would not require such large warheads for the same effect, as the deadly shockwave effect increases at great depths.

The second major system innovation, inevitably, will be defensive—some kind of 21st century fortress. But the sheer magnitude of the underwater world (and the probable application of stealth technology) may force attackers to develop different approaches. Rather than attacking with weapons, they will attempt to make the region uninhabitable. Arsenal

These U.S. Navy SEALs and their SEAL Delivery Vehicle (SDV) are part of the technology that may open up the seas in the near future.

may well include the brilliant mines discussed by naval analyst Michael Vickers in "A Concept for Theater Warfare in 2020," a working paper used at the Air War College. Blockades will be established, much as they always have been, to isolate the stations from the rest of the world. As Vickers remarks, war at sea will increasingly resemble war on land.

The sea will become an arena of counter-value warfare in addition to that of the counter-force wars that have dominated its surface for four centuries. Advantage will go first to those most pressed to seize it. From there, it may well go to the most ruthless, for the sea is unforgiving.

Mr. Shulman is a student at Columbia Law School. Most recently, he was associate professor of conflict and change of the Air War College, Maxwell AFB, Alabama. He wrote *Navalism and the Emergence of American Sea Power, 1882-1893* (Naval Institute Press, 1995) and is co-editor with Michael Howard and George Andreopoulos of *The Law of War: Constraints on Warfare in the Western World* (Yale University Press, 1994).