S-2

Options for the Pakistan Navy

Commander Muhammad Azam Khan, Pakistan Navy (Retired)

We have unresolved issues, a history of conflict and now the Cold Start doctrine. Help us resolve these issues. We want peaceful coexistence with India. India has the capability and intentions can change overnight.

GENERAL ASHFAQ P. KAYANI, THE CHIEF OF ARMY STAFF, PAKISTAN

Around noon on 26 July 2009, Gurushuran Kaur, the wife of the Indian prime minister, broke a single coconut on the hull of a submarine in the fifteen-meter-deep Matsya dry dock at Visakhapatnam (also known as Vizag).[1] The occasion marked the formal launch of India's first indigenously built submarine, a six-thousand-ton nuclear-powered ballistic-missile submarine (SSBN) known as *S-2*—also as the Advanced Technology Vessel (ATV) and, more commonly, by its future name, INS *Arihant* (destroyer of the enemy).[2] The launch ended for India a journey stretching over three decades since the inauguration of the ATV program and including an eleven-year construction period.[3]

The submarine is intended to form a crucial pillar of India's strategic deterrence. Successful trials and integration of *S-2*'s systems will establish the final leg of India's nuclear weapons delivery triad, as articulated in the Indian Maritime Doctrine and substantiated in the Indian Maritime Military Strategy Doctrine.

The launch is an extraordinary development for the littorals of the Indian Ocean region, including Australia and South Africa, but especially for Pakistan. It is germane to the military nuclearization of the Indian Ocean and noticeably dents the strategic balance; it has the potential to trigger a nuclear arms race.[4] *S-2* will also enhance India's outreach and allow New Delhi a comprehensive domination of the Arabian Sea, the Indian Ocean littoral, and even beyond.[5]

Commander Khan's twenty-three years of commissioned service included thirteen years at sea as a surface warfare officer and several command and staff appointments. He saw action in the first Gulf War, serving with the United Arab Emirates navy. He is a graduate of the Pakistan Naval Academy class of 1973 and of the Pakistan Navy War College and National Defense College, Islamabad. He holds a master's in war studies (maritime). Since his retirement in 1998 he has extensively contributed to Pakistani as well as overseas periodicals and media. He is currently a research fellow at the Pakistan Navy War College.

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Costing US$2.9 billion, the ATV project was a joint effort involving the Indian Navy and several government agencies and private organizations.[6] India's nuclear submarine is the world's smallest of its type yet will pack a megaton punch. The boat is driven by a single seven-bladed, highly skewed propeller. Special anechoic rubber tiles (to reduce the risk of detection by sonar) coat the steel hull.[7] A similar technology was previously used in the Russian Kilo-class submarines.[8] (Russian help in designing the ATV has long been an open secret; there are also reports of Israeli, French, and German imprints on the project.)[9]

But more than design or fabrication of hull, it was the downsizing and mating of the ninety-megawatt (120,000 horsepower) low-enriched-uranium-fueled, pressurized light-water reactor that kept the submarine in the dry dock for more than a decade.[10] The reactor and its containment vessel account for one-tenth (nearly six hundred tons) of the boat's total displacement. The hydrodynamics of a vessel with a tenth of its weight concentrated in one place posed a formidable naval engineering challenge indeed, one that plagued the program.

Before being commissioned as INS *Arihant* in late 2011 or early 2012, *S-2*—serving as a technology demonstrator, a test for future boats of the class—will have to obtain appropriate certification in three crucial areas: stealth features, adequacy of the reactor design, and missile range. The first key test will involve meticulous calibration of *S-2*'s underwater noise signature, which will determine the degree of its invulnerability to detection and therefore its suitability as a ballistic-missile platform. This process may necessitate extensive trials, adjustments, and design modifications—if not for *S-2,* certainly for its successors.[11] The second vital area requiring attestation will be to determine the reactor's fuel cycle—that is, the frequency of replacement of the fuel rods. Being of a first- or second-generation technology, with a shorter fuel cycle, the *S-2* reactor fundamentally affects the boat's performance as an instrument of deterrence.[12] The replacement of fuel rods is an intricate operation requiring a submarine to be taken out of its operational cycle for an extended period. The net result will be that either the submarine's patrol areas will remain restricted (fairly close to base) or its endurance (deployment period) will be curtailed.

The third assessment of *S-2* will entail test-firing and validation of missile parameters. The platform is currently configured to carry a Pakistan-specific, two-stage submarine-launched ballistic missile (SLBM), the Sagarika (Oceanic), expected to become operational after 2010.[13] This nuclear-capable missile, powered by solid propellants, is a light, miniaturized system, about 6.5 meters long and weighing seven tons.[14] *S-2* will have to accommodate missiles not only of greater (intercontinental) range but in greater numbers if it is to have a deterrent value against China. That would require further underwater launches and flight trials for the follow-on units of the class.[15]

NUCLEAR DOCTRINE AND THE INDIAN NAVY

The Indian Navy began strongly advocating nuclear-related programs at sea in the wake of the 1998 nuclear tests, and for a valid and legitimate reason—the need for an invulnerable nuclear capability to undergird a posture of "no first use." At a press conference in 2002, the Indian Navy chief held that "any country that espouses a no first use policy (as India does) must have an assured second strike capability. All such countries have a triad of weapons, one of them at sea. It is significant that the Standing Committee on Defence of the twelfth Lok Sabha [lower house of the Indian Parliament] had advised the government 'to review and accelerate its nuclear policy for fabricating or for acquiring nuclear submarines to add to the (nation's) deterrent potential.'"[16]

When in January 2003 the major elements of India's official nuclear doctrine were brought into the public domain, the Indian government stressed the building and maintenance of a "credible minimum deterrent," along with a posture of "no first use."[17] Nuclear retaliation to a first strike was to be "massive and designed to inflict unacceptable damage." Significantly, however, the 2003 statement did not reiterate the 1999 draft nuclear doctrine's aim of building a nuclear triad, although all three armed services were keen to deploy nuclear-capable weapon systems.[18]

If the Indian Navy was disappointed at the lack of official sanction for its submarine-based nuclear deterrent, it tried hard not to show it. Still, the ATV project was under way, with funding and guaranteed political support from the government. It could therefore be concluded that this notable doctrinal silence might have been an attempt not to alarm the international community about India's multidimensional nuclear program.[19]

India's Monroe Doctrine

More than ever, India today demonstrates a striving for regional and global eminence. In elucidating India's Maritime Military Strategy, the former Indian Navy chief Arun Prakash pleaded with Indians to keep it "'etched in [their] minds that should a clash of interests arise between India and *any other power, regional or extra-regional* . . . the use of coercive power and even conflict remains a distinct possibility.' Such 'Kautilyan' statements lend credence to [the] notion of a forward-leaning India that increasingly inclines to hard power solutions to regional challenges."[20]

In their nation's novel bid for sea power, Indians look for inspiration to the Monroe Doctrine, the nineteenth-century U.S. policy declaration that the New World was off-limits to new European territorial acquisitions or any reintroduction of the European political system.[21] An identical philosophy for India was first proclaimed by Prime Minister Jawahar Lal Nehru in a speech in 1961

justifying the use of force to evict Portugal from Goa: "Any attempt by a foreign power to interfere in any way with India is a thing that India cannot tolerate, and that, subject to her strength, she will oppose. That is the broad doctrine I lay down."[22] Nehru's statement was in fact a veiled warning to all external powers against any action anywhere in the region that New Delhi might perceive as imperiling the Indian political system. His injunction against outside interference laid the intellectual groundwork for a policy of regional primacy, without meddling by or influence of external powers. Though at the time it was impossible for India to confront the imperial powers militarily, each succeeding generation in India has interpreted and applied this foundational principle, according to its own appraisal of the country's surroundings, interests, and power.

While the success or otherwise of India's Monroe Doctrine can be debated, it has remained an "article of faith for many in the Indian strategic community" and now seems to have entered the Indian foreign-policy lexicon.[23] The Monroe Doctrine itself being an intensely maritime concept (the influential nineteenth-century sea-power theorist Alfred Thayer Mahan was an outspoken disciple), India has made huge strides in expanding its sea power in recent times. In the process, New Delhi has largely shed its continental way of thinking and reoriented itself to look beyond the nation's shores.[24] Thus today, in the words of President A. P. J. Abdul Kalam, "The economic growth of this region depends on the heavy transportation in the Indian Ocean particularly the Malacca strait. Navy has an increasing role to provide necessary support for carrying out these operations."[25]

Advancing the Monroe Doctrine

Regional prominence requires India to develop a robust and self-sustaining domestic military industrial and technological complex, one that removes dependence on overseas sources. Such an infrastructure must be fully able to sustain the fleet twenty-four hours a day, seven days a week, and 365 days a year. In that direction, India's strategic partnership with Washington, including the civilian nuclear deal, is likely to be of great assistance over time. In the short term, however, and taking advantage of the presence of the U.S. Navy, which effectively reduces its own burden, the Indian Navy projects a fleet comprising three carrier battle groups.[26] As Admiral Madhvendra Singh, chief of staff of the Indian Navy, declared on 14 October 2003, "Fulfilling India's dream to have a full-fledged blue-water Navy would need at least three aircraft carriers, 20 more frigates, 20 more destroyers with helicopters, and large numbers of missile corvettes and antisubmarine warfare corvettes."[27] These battle groups could be organized into a single fleet, depending on New Delhi's tolerance for risk and the Indian Navy's ability to keep the fleet in a high operational state.[28] Six new and

a few older-vintage destroyers, twelve new and a few old frigates, corvettes, patrol craft, and five new tank landing ships (LSTs) are likely to feature in such an order of battle.

All the new Indian Navy warships, including its projected carriers, will be much more formidable than their predecessors.[29] The Indian Defence Ministry has furthermore recently approved three billion dollars to strengthen the navy's littoral war-fighting capabilities.[30] The move represents a push for a larger presence in the Indian Ocean but may also be a response to a more active Chinese presence there.

In the long term, a self-sufficient Indian Navy ably backed by a domestic defense industrial complex may feature six to nine carrier task forces and more than a dozen nuclear submarines. In the meantime, the Indian Navy is likely to continue expanding its undersea nuclear deterrent, manifest in fleet ballistic-missile submarines, with nuclear-powered attack submarines (SSNs), though able to operate throughout the Indian Ocean basin and beyond, taking lower priority.[31]

IN PERSPECTIVE: PAKISTAN'S NUCLEAR POLICY

Henry Kissinger argues, "The persistence of unresolved regional conflicts makes nuclear weapons a powerful lure in many parts of the world—to intimidate neighbors and to serve as a deterrent to great powers who might otherwise intervene in a regional conflict."[32] Unlike India—whose nuclear program is widely believed to be status driven—Pakistan's nuclear policy is entirely security driven, and it is India-centric. The national discourse on the direction, aims, and objectives of nuclear policy are, however, veiled and mainly confined to official circles. Accordingly, public debate is very generic, in contrast to India's voluminous material in print on the subject.[33] The decision not to enunciate publicly a comprehensive nuclear doctrine reflects in part the fact that Pakistan sees no political or status utility in nuclear capability, but rather a purely defensive, security related purpose.

"Pakistan's threat perceptions stem primarily from India, at the levels of all-out conventional war, limited war, and low intensity conflict. Within the nuclear framework, Pakistan seeks to establish deterrence against all-out conventional war."[34] In other words, Pakistan's nuclear deterrence is directed against not only a possible Indian nuclear attack but a conventional one as well.[35] Among key characteristics of Pakistan's nuclear policy are maintenance of a minimum level of nuclear deterrence, retention of a first-use option, and reliance on ground and air delivery (aircraft and missiles).[36] Sea-based delivery means are appreciably missing.

Like NATO, Pakistan continues to keep its options open on "no first use," but has declared willingness to use nuclear weapons as a weapon of last resort. "No first use" declarations have never been the basis of determining the true posture of any nuclear-weapon state. If they were, New Delhi would have accepted the position of China on this issue as well as the latter's assurances of nonuse of nuclear weapons against non-nuclear-weapon states.[37]

In late 2001, Pakistan declared four broad conditions under which Islamabad might resort to use of nuclear weapons, as described by Lieutenant General Kidwai of the Strategic Plan Division (the secretariat of the National Command Authority):[38] a "space threshold," should New Delhi attack Pakistan and conquer a large part of its territory; a "military threshold," if India destroyed a large part of Pakistan's land or air forces; an "economic threshold," were India to pursue the economic strangulation of Pakistan; and finally, should India push Pakistan into "political destabilization or [create] a large scale internal subversion."[39]

The Pakistan Navy and Pakistan's Nuclear Program

The May 1998 tit-for-tat nuclear tests by Pakistan in the Ras-Koh mountain range in the Chagai district of Balochistan restored the strategic balance in South Asia.[40] The period that followed saw the quarrelsome neighbors expand their respective arsenals, improve their command and control infrastructures, and strive for better CEP (circular error probability), greater mobility and faster reaction time for missiles, and higher yield as well as better yield-to-weight ratios for the warheads.[41]

Significantly, no efforts to develop a sea-based nuclear capability and thus expand the survivability of nuclear forces have ever surfaced in Pakistan's policy making. The principal reason for this is perhaps historical "baggage"—a fixation on Afghanistan, in search of strategic depth as against a geographically larger India. But 9/11 was a rude awakening that such a policy was not only unsound but no longer tenable. By then precious time (1998–2001) that could have gone toward developing undersea deterrence had been lost.

The "military threshold" postulation in Pakistan's declared nuclear philosophy surmises the destruction of a large portion of Pakistan's "land and air components" as an inducement to go nuclear. The destruction of a major component of naval forces, however, remains unstipulated. Three deductions could be reached: that the navy continues in its usual low priority in the overall national security calculus, that the possibility of international reaction has precluded a clear articulation of the naval component, and that the naval case is included in the threshold of "economic strangulation."

But the term "economic strangulation" is broad and can be interpreted in various ways. Pakistan being an agrarian economy, a prolonged disruption or

drastic reduction in the flow of cross-border rivers by India could impinge on crop yield, triggering widespread unrest, destabilization, and a possible confrontation.[42] But a far more perilous scenario, one that could cause economic strangulation more quickly, resides at sea.

The Pakistan Navy: A Sentinel of Energy and Economic Security?

Pakistan's commerce, like India's, is intrinsically seaborne. More than 95 percent of Pakistan's trade by volume, 88 percent by value, is transported by sea.[43] Three sea lines of communication support Pakistan's maritime trade, viz., from the Far East, the Red Sea, and the Persian Gulf. These arteries carry both imports and exports. The imports include edible oil, tea, sugar, wheat, and other value-added foodstuffs. During the last fiscal year (FY), $3,662,000,000 was spent on food imports alone.[44] Much of Pakistan's oil also comes over the sea. The Gulf, through which the country's annual oil imports are shipped, constitutes the nation's energy lifeline. With a 5 percent annual growth rate, Pakistan's oil imports are likely to reach 22.2 million tons during FY 2010–11.[45]

During FY 2008–2009, the ports of Karachi and Qasim collectively handled imports of 24.4 million tons of dry cargo and 20.9 million tons of liquid-bulk cargo, totaling some 45.3 million tons. The sum of exports at these ports during the same period was 18.3 million tons. In addition, the ports handled 1.9 million TEUs' worth of containerized cargo.[46] All in all, Pakistan's critical overall dependence on sea-based imports is a good deal greater than India's. India's superiority over Pakistan being most pronounced in the maritime field, a blockade of Karachi could seriously imperil the country's economy and the war-fighting potential in two or three weeks.[47] Given all this and the role the Pakistan Navy is expected to play, it is not difficult to deduce where one must expect Pakistan's economic and energy security sensitivities—nay, economic threshold—to dwell.[48]

THE THRESHOLD AND CREDIBILITY ISSUES

According to Indian analysts, of the four threats that Pakistan has identified as capable of invoking nuclear response, only two—territorial loss and military destruction—have credibility. To them, it is difficult to make nuclear escalation credible against the other two (economic strangulation and national destabilization). Consequently, they maintain, India might now focus on the latter two and opt for controlled military pressure across the Kashmir Line of Control.[49] The thinking of Indian leadership also reflects a presumption that should there be an escalation in tension between India and Pakistan, New Delhi would have the unconstrained support of the international community.

These postulations are deeply flawed. Tension related to water resources is already heating up; Pakistan has complained that India is holding back the waters

of rivers flowing from Indian-administered Kashmir. Left unresolved, in due course the issue will be clubbed together with the Kashmir dispute.[50] Any reduced water flow would then be perceived as a ploy to put additional pressure on Pakistan; the response would be equally unmeasured and misdirected.[51] Likewise, tampering with Pakistan's sea-lanes could work safely only to an extent. Any large-scale internal unrest on account of food shortages or effective cessation of commercial activity due to blockage of fuel supplies through Karachi would most certainly engender a response beyond a certain point. Once public pressure mounted, Pakistan's chief security stakeholders would be bound to react. In a state of panic or nervousness, a freakish response could not be ruled out.

A destabilized state in Pakistan's main urban centers would be a godsend for the lethal cocktail of militant groups hoping to reenact "26/11" (as the 26–29 November 2008 terrorist attack in Mumbai is known). The existing imbroglio in Karachi is an apt example. Perennially simmering with ethnic and sectarian violence, the metropolis now hosts one of the world's largest Pashtun concentrations. Scores of Taliban and al-Qa'ida insurgents fleeing Malakand, South Waziristan, and now Helmand have found sanctuary there.[52] The recent arrests in Karachi of some top leaders of Afghan Taliban and al-Qa'ida (including those of Mullah Baradar and Ameer Muawiya by Pakistani and American intelligence forces) are demonstrations of this fact.[53]

The 26/11 attack lifted off from the shores of Karachi. Its alleged perpetrator, Lashkar-e-Taiba (LeT), is now a formidable terror enterprise, endeavoring to compete with al-Qa'ida. It has relations with factions of the Taliban and several other *jihadi* outfits.[54] The organization is also believed to have developed the capacity to launch sea-based operations. According to reports the founding leader of LeT, Hafiz M. Saeed, wanted by India for involvement in the Mumbai attacks, has suddenly resumed his activities, mouthing venomous anti-India slogans and promising to liberate Kashmir.[55] Also, with tens of thousands of fishing boats, small craft, and other unregulated commercial traffic plying continuously along the coasts of Sindh, Makran, Gujrat, and Maharashtra, coastal security in the area is deeply exposed, despite efforts on both sides since 2008.[56] Making the most of volatility and coastal vulnerabilities, Karachi-based insurgents could orchestrate a new terror assault on India, to provoke a reprisal.[57]

That the international community will always back New Delhi against Pakistan is, however, a misplaced notion. India may well take a leaf from the recent NATO Military Committee meeting in Brussels, where Pakistan not only scored a military/diplomatic triumph but effectively truncated India's strategic gains in Afghanistan.[58]

IS COERCION WORN OUT?

Since the overt exhibitions of their nuclear potentials in 1998, Pakistan and India have returned from the brink on three occasions. The years since then have also been studded with diplomatic standoffs. The Kargil conflict in 1999 remained a local affair, with the two armies and air forces battling it out on and over the frozen peaks. The Indian Navy too played a role as an instrument of coercion. In June 1999, its Western Fleet was reinforced with elements from the Eastern Fleet, prompting Pakistan Navy to go on full alert. A beefed-up Indian Navy force later conducted exercises in the northern Arabian Sea. Also—the lone Indian carrier, INS *Viraat,* being in refit—trials of the use of a containership deck as a platform for Sea Harrier aircraft were carried out in Goa. The aims of these exercises were to demonstrate the buildup of the Indian Navy's strength to the Pakistan Navy and to display its assets and readiness for all-out conflict. Between 21 and 29 June 1999 the Indian Navy deployed missile ships and corvettes in a forward posture. Expecting economic blockade, the Pakistan Navy escorted national oil tankers and commenced surveillance sorties along the coast.[59] International pressure and a 4 July accord in Washington finally constrained Pakistan to withdraw to its original position.[60]

In December 2001 an attack on the parliament in New Delhi induced India to amass four-fifths of its armed forces along the borders with Pakistan. Islamabad reacted in kind.[61] The two sides remained "eyeball to eyeball" for almost ten months before India decided to stand down.

In the aftermath of the 26/11 Mumbai attacks, the Indian leadership was seen spitting fire, threatening Pakistan with a punitive action. News of possible surgical strikes by the Indian Air Force deep inside Pakistan, against the major urban center of Lahore and nearby Muridke, site of the headquarters of LeT, was rife. The incident also brought to a halt the peace process that had begun in June 1997. The tense period saw Indian generals enunciating provocative new military doctrines and its army conducting "Cold Start" exercises on the borders. Yet all this failed to draw the intended concessions from Pakistan.[62] India may have received a nudge from Washington, but by now, after fourteen long months, the prolonged face-to-face was having a telling impact on both sides. Coercion had run out of steam, reached a tipping point. New Delhi indicated willingness to resume parleys.[63]

It is clear that repeated application of coercion is rendering the instrument ineffective. Both sides maintain their critical territorial-cum-ideological standpoints, stemming mainly from the Kashmir issue. Pakistan is not going to allow its own subjugation, and the Pakistan Army is not going to yield to Indian demands on issues that it deems central to the nation's ideology.[64] For its part, and

for reasons of politics and regional clout, India must point to Kashmir unrest as externally abetted and all terror attacks as radiating from Pakistan. The persistence of the respective stances of each side is further reinforced by the fact that the risks and consequences of nuclear escalation have not yet sunk into the collective minds of the two societies; nuclear devastation still remains largely an abstract concept. As a result there is no effort to deal with the issue of nuclear-war risk, independent of the Kashmir issue.[65] There was no comparably dangerous territorial stake for the nuclear adversaries of the Cold War.

THE OPTIONS

Pakistan's security situation is precarious, and the future is not bright. On one hand, the differences between Washington and Islamabad that lately irked and angered the latter now seem to be thawing.[66] But on the other, New Delhi's strategic interests being "exactly aligned" with those of Washington, India is getting extensive mileage out of Pakistan's current predicament.[67] Despite the recent diplomatic successes, then, Pakistan's choices, if it is to address strategic asymmetry and ensure the survivability of its nuclear forces, are contracting rapidly.

Pakistan's existing means of delivering nuclear strikes are susceptible to air and missile attacks. The Indian air defense system—potentially including the Prithvi Air Defence capability and the upcoming U.S.-Israeli-Russian Ballistic Missile Shield—reduces the possibility of penetration by either missiles or fighters.[68] The option of missiles with multiple warheads also is open to debate. For now, the dispersal of the nuclear arsenal poses a question mark. The cutting-edge technologies in the Indian inventory—surveillance means like IRS satellites and the MiG-25, the day/night-capable Israeli surveillance satellite RISAT, along with platforms like the Phalcon AWACS, Su-30 aircraft, etc.—put its value in question.

Nonetheless, the recent parleys in the Conference on Disarmament in Geneva on a Fissile Material Cutoff Treaty (FMCT) threaten to freeze the imbalance in the stocks of these materials of Pakistan and India to the distinct advantage of the latter. New Delhi gains from the Indo-U.S. nuclear deal and a consequent Nuclear Suppliers Group waiver that has allowed India to conclude agreements with countries Russia, France, and more recently the United Kingdom to supply it with nuclear fuel.[69] Pakistan's resource imbalance, geographic disproportion (differences in landmass), and now the launch of *S-2* provide India a convincing capacity to strike all over Pakistan from the deep south while ensuring the survivability of its own forces.[70] In the absence of Pakistani potential to deliver a nuclear riposte, an economic threshold would certainly be reached in days if Pakistan's sea-lanes, particularly from the Persian Gulf, were to be obstructed.

Second Strike on board Conventional Submarines: The Agosta 90B

In October 2008, the chief of staff of the Pakistan Navy claimed that his service was capable of deploying strategic weapons at sea.[71] The details as to how strategic or nuclear weapons would be deployed and whether Pakistan had developed a capability to launch missiles from submarines were not disclosed. But it is widely speculated that work on arming the Pakistan Navy's conventional submarines with nuclear-tipped missiles has been going on now for quite some time. A sea version of the Babur cruise missile is thought to have been developed by the country's strategic organizations. If that is true, Pakistan would not be the first country to arm conventionally powered submarines with such a capability. Israel's 1,900-ton *Dolphin*-class, German-origin submarines are believed to be part of the country's second-strike capability. They provide Tel Aviv the crucial third pillar of nuclear defense complementing the country's much vaunted land and air ramparts.[72]

Pakistan Navy's Agosta 90B, or *Khalid*-class, attack submarines (SSKs) carry crews of highly skilled and professionally trained officers and men. The submarines, designed by DCN (now DCNS) of France, are a version of the Agosta series, with improved performance, a new combat system, and AIP (air-independent propulsion) for better submerged endurance. A higher level of automation has reduced the crew from fifty-four to thirty-six. Other improvements include a new battery, for increased range; a deeper diving capability of 320 meters, resulting from the use of new materials, including HLES 80 steel; and a reduced acoustic signature, through the installation of new suspension and isolation systems.[73]

Three Agosta 90Bs were ordered by Pakistan in 1994. The first, *Khalid* (1999), was constructed in France; the second, *Saad* (2003), was assembled at the Naval Dockyard (Karachi); and the third, *Hamza* (2008), was constructed and assembled in Karachi. These submarines are equipped with diesel-electric propulsion and the MESMA (Module d'Énergie Sous-Marin Autonome) AIP system.[74] The diesel-electric plant consists of two SEMT-Pielstick 16 PA4 V185 VG diesels, providing 3,600 horsepower, and a 2,200-kilowatt electric motor driving a single propeller.

Pakistan is the only country bordering the Indian Ocean to have acquired AIP submarines. The two-hundred-kilowatt MESMA liquid-oxygen system increases significantly the submerged endurance of the submarine at four knots.[75] It consists essentially of a turbine receiving high-pressure steam generated by a boiler that uses hot gases from the combustion of a gaseous mixture of ethanol and liquid oxygen.[76] The AIP suite causes an 8.6-meter extension of the original 67.6-meter hull, increasing the boat's submerged displacement from 1,760 tons to 1,980.[77]

The Agosta 90B is equipped with a fully integrated SUBTICS combat system. SUBTICS processes signals from submarine sensors and determines the tactical situation by track association, fusion, synthesis, and management, as well as trajectory plotting. This track management allows appreciation of the surface picture by the commander and consequent handling of weapons-related command and control functions.

The Agosta 90B submarine has four bow-mounted 1Q63 A Mod 2 torpedo tubes, 533 mm in diameter, and carries a mixed load of sixteen torpedoes and missiles. The boat can also fire tube-launched SM39 Exocet subsurface-to-surface missiles, capable of hitting targets out to twenty-seven nautical miles (fifty kilometers) away. The sea-skimming missile has inertial guidance and active radar homing and travels at 0.9 Mach.[78] Target range and bearing data are downloaded into the Exocet's computer via SUBTICS. The boat can also launch the DM2A4 wire-guided, active/passive, wake-homing torpedo, adding a new dimension to its firepower. Targets up to forty-five kilometers away can now be engaged.

In the short term (within five years), Pakistan Navy *Khalid*-class submarines with their cutting-edge technology could be armed to carry nuclear-tipped cruise missiles. Several formidable challenges would, however, have to be overcome. Missile installation and subsequent integration with the onboard combat system, as well as with the nuclear command-and-control infrastructure (C4I network), could be daunting tasks.[79] The combat system, meant for conventional weapons, may require major changes to accommodate nonconventional weapons. During operational deployments a Pakistan Navy submarine carrying nuclear weapons would be under the operational control not of Commander Pakistan Fleet, as in existing practice, but of the National Command Authority.

Perhaps a greater challenge would be ensuring foolproof communications between the submerged submarine and the shore-based command. An electromagnetic pulse following a nuclear burst would disrupt the earth's electromagnetic spectrum, resulting in a partial or complete breakdown of communications, including shore–submarine. The problem is compounded by the absence of domestic communications satellites. A very-low-frequency (VLF) communications system can provide an answer, to some extent.[80] A sustained program of tests and trials would be needed to develop a robust communication system that can sustain such a contingency.

The submarine's crew, obviously specially selected, would also require extensive training in handling all kinds of unforeseen events, developing standard operating procedures and planning ways to minimize uncertainty on board in the absence of communications.[81] Test firings of missiles will be required to ensure crew confidence as well as weapon-systems credibility.

Numerous issues of a technical as well as an operational nature will thus have to be addressed at each tier to integrate the vessel fully into national strategic forces. Close cooperation and coordination between the Development and Employment Control committees under the National Command Authority and strategic organizations like the Kahuta Research Laboratories, the National Engineering and Scientific Commission, the Space and Upper Atmosphere Research Organization, the Pakistan Atomic Energy Commission, the Maritime Technology Complex, and the National Development Complex will also be essential at every step. These organizations will have to rise above intra-establishment rivalries and jealousies that could get in way of smooth and timely achievement of milestones.

A word of caution may be in order here. The Pakistan Navy once enjoyed a sharp edge over the Indian Navy's conventional submarines, like the Soviet-designed Foxtrot-class boats, which were noisier than the French submarines operated by Pakistan. But the Indian Navy has not only been catching up but is now on the verge of surpassing Pakistani submarines. Its French Scorpènes are supposedly a generation ahead of the Agosta 90B.[82] On a positive note, however, the recent introduction of advance platforms like the SAAB Erieye airborne early warning and control system and Il-78 refuelers by Pakistan Air Force, besides bolstering Pakistan's strategic capability both on land and at sea, will significantly strengthen the nation's air defenses.[83]

Employing the P-3C

The P-3C Orion long-range maritime-patrol aircraft (LRMP) has a proven maritime surveillance and reconnaissance record that dates back to the Cold War. Several old and new versions of the aircraft continue to serve in more than eighteen countries, including the United States. It is a turboprop, multidimensional aircraft commonly known to the naval community as an "airborne destroyer."

The Pakistan Navy first acquired P-3Cs in 1991. The present inventory is suitably modernized and equipped with cutting-edge sensors and weapons to track, identify, and hunt surface and subsurface targets. The aircraft can carry a mixed payload of eight Harpoon missiles and six torpedoes, besides mines and bombs. It has endurance in excess of eighteen hours and can operate as low as three hundred feet, making its detection quite difficult.

In the recent past, the Pakistan Navy brokered a fresh deal with the United States for eight refurbished P-3Cs. In addition to improved sensors, a digital tracking system, electro-optical and infrared sensors, a chaff dispenser, an electronic support measures (ESM) suite, and sonobuoy detection system, the new batch of P-3Cs is to be fitted with inverse synthetic-aperture radar (ISAR). ISAR is a state-of-the-art radar that provides a dual advantage. First, it eases the

identification problem by displaying a target's silhouette, a physical image, which improves the overall effectiveness of tracking and attacking. The other advantage is variable power output, which makes ISAR difficult to identify via ESM.

Following the Mumbai terror attacks, the Indian Navy too concluded a deal with the United States for eight of a new type of LRMP—the Multi-Mission Maritime Aircraft (MMA, or P-8 Poseidon, the successor to the P-3C). The Indian Navy is currently operating older-generation LRMPs, Russian Il-38s and Tu-142s. The jet-driven Poseidon will be suitably converted for anti-surface-vessel and antisubmarine roles. The prototype is, however, not likely to roll out before 2012, after which its true capabilities would be known.

The P-3C is a mainstay of the Pakistan Navy's offensive arm. With its advanced weapon and sensor outfit, it gives the Pakistan Navy a clear qualitative edge over the Indian Navy's LRMP capability—at least for now. Thanks to its load-carrying capacity, altitude advantage, and other aerodynamic characteristics, the P-3C could be armed with land-attack missiles or strategic weapons. This modification, however, would require specialized equipment—currently a grey area in the Pakistan Navy. A suitably equipped P-3C could serve as a powerful backup to an undersea second strike on board Agosta 90Bs. A well-thought-out employment strategy could render the P-3C a potent constituent of the nuclear triad.

The Medium and Long Terms (beyond Five Years)

The absence of any opposition by the United States or the rest of the international community to the prolonged and sustained Russian assistance to India in the development of a sea-based nuclear deterrent potential was conspicuous. That is not all; the now-shaping Indo-U.S. nuclear deal has never caused any uproar in the West or among the Nuclear Suppliers Group. Besides raising concerns on proliferation, the deal significantly undercuts the efficacy of the Nuclear Non-Proliferation Treaty.[84] This provides Pakistan enough justification either to *lease* nuclear submarines or eventually development its own, or both.[85] It is not a question of matching nuclear weapon for nuclear weapon but about preserving stability and ensuring the survivability of nuclear forces. The national maritime objectives and tasks assigned to the Pakistan Navy may not warrant a nuclear submarine in its inventory, but maintenance of deterrence, particularly in the evolving geopolitics of the Indian Ocean region, certainly does merit consideration of it.

In China, the People's Liberation Army Navy (PLAN) is currently involved in one of the world's most ambitious submarine expansion and construction programs. It includes acquisition of conventional submarines, like the Russian Kilo

(SS), and the construction of the Jin-class (Type 094) SSBN and the Shang-class (Type 093) SSN. These submarines are expected to be much more modern and capable than China's aging older-generation boats.[86]

In 1983 the PLAN built an eight-thousand-ton Xia-class SSBN, reportedly armed with twelve JL-1 missiles with a range of a thousand miles. The submarine twice test-fired its missiles but never ventured beyond China's regional waters. The new Type 094 Jin, which will replace the single Xia, will carry between ten and twelve JL-2 SLBMs.[87] However, the PLAN has major handicaps in its limited capacity to communicate with submarines at sea or expose these platforms on strategic patrols.[88]

The once slowly expanding military ties between Beijing and Islamabad have now matured into a strategic partnership, as is evident from local production of the JF-17 Thunder multirole fighter, the Al-Khalid tank, and F-22P frigates. This partnership is further evidenced by the PLAN's regular participation in the large multinational AMAN series of exercises hosted by the Pakistan Navy. Pakistan's strategic community and Beijing could plan the training and subsequent lease of a nuclear-powered submarine. The PLAN's Xia submarine could be an appropriate start. A pool of selected Pakistan Navy officers could be trained to operate an SSBN, with theoretical/academic work ashore followed by operational training at sea and finally a strategic deployment. Though such a plan seems ambitious and the PLA Navy's SSBNs rarely prowl far, this remains a viable choice that would serve the two countries well strategically.[89]

Deterrence is not a passive concept; it must be stepped up in proportion to an adversary's increases in arsenal or delivery means. For reasons all too well known, Pakistan's principal security perceptions will remain India-centric. To keep deterrence credible, the indispensability of continuously bolstering Pakistan's nuclear assets, including delivery means, cannot be overstressed. The international community would react sharply were Pakistan to field a sea-based nuclear deterrent, given the country's security situation and fears of radicalization (real or imaginary) in Western minds.[90] Timing, therefore, is crucial. Pakistan is currently too dependent on the American and multilateral financial institutions for keeping its economy afloat, and that situation is not likely to alter for the next few years. But if the issue is not addressed, Pakistan's hard-earned nuclear stability may erode beyond recovery.

The role of armed forces was once to win a war if diplomacy had failed; in the nuclear age their role is to prevent warfare from breaking out.[91] Despite being on the wrong side of history, Pakistan has no option but to take some hard decisions.

NOTES

The views expressed are those of the author and not of the Pakistan Navy or Pakistan Navy War College, Lahore.

1. For the Indian "Cold Start" doctrine, see Walter C. Ladwig III, "A Cold Start for Hot Wars? The Indian Army's New Limited War Doctrine," *International Security* 32, no. 3 (Winter 2007/08), pp. 158–90. In the epigraph, General Kayani is explaining why he is India-centric, at the Annual NATO Military Committee meeting, Brussels, in February 2010.
2. "PM Launches INS Arihant in Visakhapatnam," *Times of India,* 26 July 2009; "Deep Impact," *India Today,* 3 August 2009, p. 48; and *Jane's Defence Weekly,* 5 August 2009, p. 6. The correct current designation of the Indian Navy Advanced Technology Vessel is *S-2,* according to a former Indian Navy chief. The vessel will become INS *Arihant* only upon commissioning, in due course. See Admiral Arun Prakash (Ret.), "A Step before the Leap: Putting India's ATV Project in Perspective," *Force* (September 2009), available at www.maritimeindia.org/.
3. "India Finally Launches ATV," *Jane's Defence Weekly,* 5 August 2009, p. 6.
4. See "India N-sub to Trigger Arms Race," *The Nation,* 28 July 2009, available at www.nation.com.pk/.
5. "Second Strike Challenges," *Daily Times,* 11 September 2009, available at www.dailytimes.com.pk.
6. A billion dollars were spent in 2005 alone. See Eric Margolis, "India Rules the Waves," U.S. Naval Institute *Proceedings* (March 2005), p. 66.
7. "SSK Kilo Class Attack Submarine, Russia," Naval-technology.com.
8. See "The Secret Undersea Weapon," *India Today,* 28 January 2008, p. 52.
9. "India's Nuclear Sub," *The Nation,* 28 March 2007, available at www.nation.com.pk/.
10. The compact light-water reactor has been variously mentioned in documents as being of 80, 83, 85, and 90 MW capacity.
11. Work on two more *Arihant*-class SSBNs is already under way. See also Prakash, "A Step before the Leap."
12. The U.S. Navy has twenty-five different types of submarine reactors and is running the ninth generation since the first was developed and put in use in 1954 on board USS *Nautilus.* See ibid.
13. U.S. Air Force, *Ballistic and Cruise Missile Threat* (Wright-Patterson Air Force Base, Ohio: National Air and Space Intelligence Center, April 2009), p. 23.
14. "Sagarika Missile Test Fired Successfully," *Hindu,* 27 February 2008.
15. Capable of carrying twelve tube-launched ballistic missiles, *S-2* is planned to be initially armed with 700 km Sagarika (K-15) ballistic missiles, which can carry a payload of 500 kg. The follow-on versions of the submarine are expected to carry the 3,500 km K-X intermediate-range ballistic missile (IRBM), with multiple warheads. The ultimate goal is to arm these submarines with the three-stage, 5,000 km Agni III SL (the submarine-launched version of the Agni III IRBM).
16. Arpit Rajain, *Nuclear Deterrence in Southern Asia, China, India and Pakistan* (New Delhi: Sage, 2005), pp. 243–44.
17. The 4 January 2003 press release was titled "Cabinet Committee on Security's Review of the Operationalization of India's Nuclear Doctrine."
18. Rahul Roy-Chaudhury, "India's Nuclear Doctrine: A Critical Analysis," *Strategic Analysis* 33, no. 3 (May 2009), p. 409.
19. Rahul Roy-Chaudhury, "India and Pakistan, Nuclear-Related Programs and Aspirations at Sea," in *South Asia's Nuclear Security Dilemma: India, Pakistan, and China,* ed. Lowell Dittmer (New Delhi: Pentagon, 2005), p. 82.
20. Quoted and glossed in James R. Holmes, Andrew C. Winner, and Toshi Yoshihara, *Indian Naval Strategy in the Twenty-first Century* (New York: Routledge, 2009), p. 36 [emphasis supplied by Holmes, Winner, and Yoshihara]. Kautilya, a court adviser around 300 BC, is famous today as the author of what

some consider an ultra-Machiavellian work of political science, *Arthasastra* (see, among others, *Pakistan Defence,* www.defence.pk/forums/). In the statecraft and formulation of foreign policy, Indian strategists now lean heavily on Kautilyan philosophy.

21. In December 1823, spurred by a dispute over Russian territorial claims in the Pacific Northwest, President James Monroe informed Congress "that the American continents, by the free and independent condition which they have assumed and maintain, are henceforth not to be considered as a subject for future colonization by any European powers" (text available at www.ushistory.org/)—that is, were off-limits not only to Russia but to all imperial powers. Monroe further declared that the United States would "consider any attempt on [any European government's] part to extend [its] system to any portion of this hemisphere, as dangerous to our peace and safety." In the late 1800s, the economic and military power of the United States enabled it to enforce this "Monroe Doctrine." The doctrine's greatest extension came with Theodore Roosevelt's 1904 Corollary, which inverted the original meaning of the doctrine and came to justify unilateral American intervention in Latin America. To this day, the U.S. Navy continues to serve as the implementing instrument of this policy overseas.
22. See James R. Holmes and Toshi Yoshihara, "India's 'Monroe Doctrine' and Asia's Maritime Future," *Strategic Analysis* 32, no. 6 (November 2008), p. 998.
23. Ibid., p. 1000.
24. See Vice Admiral P. S. Das, "Coastal and Maritime Security: Two Sides of the Same Coin," *Indian Defence Review* 24, no. 1 (January–March 2009), p. 127.
25. See "Address by the President, Naval Fleet Review, Visakhapatnam, 12 February 2006," *Indian Defence Review* 21, no. 1 (January–March 2006), p. 8.
26. "Power Struggle," *Jane's Defence Weekly,* 23 December 2009, p. 22.
27. Quoted in Stephen J. Blank, *Natural Allies? Regional Security in Asia and Prospects for Indo-American Strategic Cooperation* (Carlisle Barracks, Pa.: Strategic Studies Institute, September 2005), p. 23, available at www.carlisle.army.mil/ssi.
28. See also Holmes and Yoshihara, "India's 'Monroe Doctrine' and Asia's Maritime Future," p. 1003.
29. For instance, the Type 15A frigates now nearing completion at Mumbai (Mazagon Dockyard) are expected to be equipped with sixteen vertical-launch Brahmos cruise missiles. In addition, some warships are also due to be equipped with the U.S.-supplied Aegis radar system. As a powerful platform for force projection, the forthcoming Indian Navy carriers—INS *Vikramaditya* (ex–*Admiral Gorshkov*) and the indigenous carrier designated the "Air Defence Ship" (ADS)—will carry on their decks an array of sixteen to eighteen MiG-29Ks, six to eight Ka-31 antisubmarine and airborne-early-warning helicopters, and a number of antisurface helicopters. This will allow the Indian Navy to maintain a strong presence along both the eastern and western coasts. See Donald L. Berlin, "India in the Indian Ocean," *Naval War College Review* 59, no. 2 (Spring 2006), pp. 79–80.
30. "Experts: India Must Counter China in Littorals," *Defense News,* 12 January 2009, p. 14, available at www.defensenews.com.
31. See Holmes and Yoshihara, "India's 'Monroe Doctrine' and Asia's Maritime Future," pp. 1003–1005.
32. Henry A. Kissinger, "Our Nuclear Nightmare," *Newsweek,* 16 February 2009, p. 30.
33. See Naeem Salik, *The Genesis of South Asian Nuclear Deterrence: Pakistan's Perspective* (Karachi: Oxford Univ. Press, 2009), p. 230.
34. Shireen M. Mazari, "Understanding Pakistan's Nuclear Doctrine," *Strategic Studies* 24, no. 3 (Autumn 2004), p. 5.
35. Ken Berry, *The Security of Pakistan's Nuclear Facilities* (Barton, ACT, Australia: International Commission on Nuclear Nonproliferation and Disarmament, August 2009), p. 12.
36. See also Zafar Nawaz Jaspal, "Assessment of Indian and Pakistani Nuclear Doctrines," in *Arms Race and Nuclear Developments in South Asia,* ed. Pervaiz Iqbal Cheema and Imtiaz H. Bokhari (Islamabad: Islamabad Policy Research Institute, 2004), p. 88.

37. See Mazari, "Understanding Pakistan's Nuclear Doctrine," p. 8.

38. Jaspal, "Assessment of Indian and Pakistani Nuclear Doctrines," p. 87.

39. "Economic Threat May Push Pakistan to Go Nuclear," *Asia Times Online,* 6 February 2002, www.atimes.com/ind-pak.

40. See also Salik, *Genesis of South Asian Nuclear Deterrence,* p. 143.

41. Verghese Koithara, *Coercion and Risk-Taking in Nuclear South Asia,* CISAC Working Paper (Stanford, Calif.: Center for International Security and Cooperation, March 2003), p. 6. CEP: "An indicator of the delivery accuracy of a weapon system, used as a factor in determining probable damage to a target. It is the radius of a circle within which half of a missile's projectiles are expected to fall." U.S. Defense Dept., *DOD Dictionary of Military Terms,* www.dtic.mil/doctrine/dod_dictionary/, s.v. "CEP."

42. "Drastic Decline in Chenab Water Flows," *Dawn,* 21 January 2010; "Pak-India Water Talks Remain Inconclusive," *Dawn,* 31 March 2010; "Water Dispute and War Risk," *Dawn Economic and Business Review,* 18–24 January 2010; all available at www.dawn.com.

43. The Pakistan National Shipping Corporation's limited number of national-flag carriers transport 45 percent of the country's liquid, and 5 percent of its dry, cargo. Rear Admiral Mohammad Shafi, "Formulation of Maritime Strategy" (talk delivered at Pakistan Navy War College, 25 September 2006).

44. "Agriculture Productivity and Food Security," *The News,* 1 February 2010, www.thenews.com.pk.

45. According to the Ministry of Petroleum and Natural Resources (*Ministry of Petroleum and Natural Resources,* www.mpnr.gov.pk/). Some 16.5 million tons of crude oil and petroleum products were imported in FY 2007–2008, at a cost of $7.4 billion. See *Dawn Economic and Business Review,* 1–7 March 2010, www.dawn.com, and *Daily Times,* 12 February 2009, available at www.dailytimes.com.pk.

46. "Cargo Handling at KPT&PQA" data obtained from KPT. The TEU (twenty-foot equivalent unit) is a standard measurement of volume in container shipping. One TEU refers to a container twenty feet long, eight feet wide, and 8.6 feet high. The majority of containers are either twenty or forty feet long; a forty-foot container is two TEUs.

47. See also Koithara, *Coercion and Risk-Taking in Nuclear South Asia,* p. 10.

48. See also "Limited War in Nuclear Overhang," *Dawn,* 5 February 2010, www.dawn.com.

49. See Koithara, *Coercion and Risk-Taking in Nuclear South Asia,* p. 26.

50. India maintains that it is not holding back the water, that the reduced flow is a result of climate-based water scarcity. However, as an upper riparian state India is obliged under international law to take measures to minimize water scarcity. Experts maintain that nonresolution of the problem will aggravate tension between the two bellicose neighbors, as it will be conflated with the Kashmir dispute. See "Water War with India," *Dawn,* 20 February 2010, www.dawn.com.

51. Ibid.

52. Successive operations by the Pakistan Army—first in Malakand, Rah-i-Rast, later in South Waziristan, Rah-i-Nijat, and now in Operation MOSHTARAK, in neighboring Afghanistan—compelled the militants to seek refuge in Pakistan's southern port city of Karachi, which has a population of roughly twenty million.

53. "On an Upward Curve," *The News,* 22 February 2010, www.thenews.com.pk; "Secret Joint Raid Captures Taliban's Top Commander," *New York Times,* 16 February 2010.

54. The U.S. State Department coordinator for counterterrorism, Daniel Benjamin, recently stated that LeT could become a threat to the West like al-Qa'ida; it has the size and global reach of Hezbollah. *The Nation,* 21 January 2010, www.nation.com.pak; *Dawn,* 21 January 2010, www.dawn.com.

55. "Back in Action," *The News,* 14 February 2010, www.thenews.com.pk. See also Daniel Markey, *Terrorism and Indo-Pakistani Escalation,* CFR Memo 6 (New York: Council on Foreign Relations, January 2010), p. 1.

56. Das, "Coastal and Maritime Security," p. 121.

57. See "The Secretary of Defense Robert Gates Visit to New Delhi, and Islamabad, 20 and 22 January 2010," *Siasat Daily,* 20 January 2010,

www.siasat.com, and *Dawn,* 22 January 2010, www.dawn.com.

58. "General in the Hood," *Times of India,* 22 March 2010; "Endgame Afghanistan: Implications for Pakistan," *The News,* 28 March 2010, www.thenews.com.pk.

59. Y. M. Bammi, *Kargil 1999: The Impregnable Conquered* (Dehra Dun, India: Natraj, 2002), pp. 436–39.

60. Bill Clinton, *My Life* (New York: Knopf, 2004), p. 865

61. India launched Operation PARAKRAM, the largest military exercise ever carried out by any Asian country. Its prime objective is still unclear but appears to have been to prepare the Indian Army for any future nuclear conflict with Pakistan.

62. The Indian Chief of Army Staff, Gen. Deepak Kapoor, spoke of the possibility of "a limited war in a nuclear overhang"; General Kayani responded that the "Pakistan Army is fully alert and alive to the full spectrum of threat, which continued to exist in conventional and unconventional domains. As a responsible nuclear capable state, Pakistan Army would contribute to strategic stability and strategic restraint as per the stated policy of the government. But at the same time, it [the military] will continue to maintain the necessary wherewithal to deter and if required, defeat aggressive design, in any form or shape such as a firmed up proactive strategy or a Cold Start doctrine." As reported in *The News,* 2 January 2010, www.thenews.com.pk, and *Dawn,* 2 January 2010, www.dawn.com. For the statement of General Kapoor, *Dawn,* 25 November 2009, www.dawn.com, and The Current Affairs.com, 24 November 2009. Also Maleeha Lodhi, "Limits of Coercive Diplomacy," *The News,* 9 February 2010, www.thenews.com.pk. See also Markey, *Terrorism and Indo-Pakistani Escalation,* p. 2.

63. In the last week of January 2010 the Indian foreign secretary, Nirupama Rao, called her Pakistani counterpart, inviting him to Delhi for talks.

64. See Markey, *Terrorism and Indo-Pakistani Escalation,* pp. 2–3.

65. See also Koithara, *Coercion and Risk-Taking in Nuclear South Asia,* p. 25. For an examination of the likely consequences, see Paul D. Taylor, "India and Pakistan: Thinking about the Unthinkable," *Naval War College Review* 54, no. 3 (Summer 2001), pp. 40–51.

66. "Rebuffing U.S., Pakistan Balks at Crackdown," *New York Times,* 15 December 2009.

67. Fareed Zakaria, "The Prize Is India," *Newsweek,* 30 November 2009, p. 5.

68. Maleeha Lodhi, "India's Provocative Military Doctrine," *The News,* 5 January 2010, www.thenews.com.pk; "Meeting India's Military Challenge," *The News,* 28 January 2010, www.thenews.com.pk.

69. Maleeha Lodhi, "FMCT and Strategic Stability," *The News,* 26 January 2010, www.thenews.com.pk. The Nuclear Suppliers Group is a multinational body formed in 1974 to reduce nuclear proliferation by controlling the export and transfer of materials usable in nuclear-weapon development. The original seven member nations had grown by 2009 to forty-six.

70. See Koithara, *Coercion and Risk-Taking in Nuclear South Asia,* p. 16.

71. *Dawn,* 15 October 2008, www.dawn.com; "Pak Navy Capable of Deploying Strategic Weapons at Sea," *Defence Talk,* 17 October 2008, www.defencetalk.com/.

72. "Israel Makes Nuclear Waves with Submarine Missile Test," *Sunday Times* (London), 18 June 2000.

73. "SSK Agosta 90B Class Attack Submarine, France," Naval-technology.com.

74. Diesel generators and MESMA both charge batteries that drive the propulsion motors when the vessel is submerged.

75. "Pakistan Commissions AIP-Equipped Agosta," *Jane's Defence Weekly,* 8 October 2008, p. 31

76. "SSK Agosta 90B Class Attack Submarine, France."

77. "Pakistan Commissions AIP-Equipped Agosta," p. 31.

78. Jyotirmoy Banerjee, "Readying the Indian Navy for the Twenty-first Century," *Asian Affairs* 26, no. 1 (January–March 2004), p. 9.

79. Integration will be required unless the missile is a "stand-alone system," complete in itself, like the Harpoon. C4I: command, control,

communications, computers, and intelligence.

80. In VLF communications, a submarine tows a long reception antenna, to which a huge shore-based antenna transmits messages. Such an antenna is vulnerable to air strikes. Currently no such arrangement exists in the Pakistan Navy.

81. The elite crew on board Israeli submarine *Dolphin* is specially selected. Nicknamed "Force 700" for the average 700 points (equivalent to an IQ of 130–40) its crew members score in psychological tests devised by the Israelis, the vessel carries five officers, also specially selected, responsible solely for the missile warheads. "Israel Makes Nuclear Waves with Submarine Missile Test."

82. Banerjee, "Readying the Indian Navy for the Twenty-first Century," p. 9.

83. *The Nation,* 30 December 2009, available at www.nation.com.pk.

84. On 29 November 2009, the Indian prime minister announced that India was willing to join the NPT as a nuclear-weapons state. The move was seen as a ploy to deflect arguments that New Delhi had to accept CTBT, an agreement that would ban all testing of nuclear weapons. *Newsweek,* 14 December 2009, p. 18.

85. "Strategic Stability in South Asia," *The News,* 1 August 2009, www.thenews.com.pk.

86. Ronald O'Rourke, *China Naval Modernization: Implications for U.S. Navy Capabilities—Background and Issues for Congress,* CRS Report for Congress RL 33153 (Washington, D.C.: Congressional Research Service, updated 4 April 2008), p. CRS-7, available at fpc.state.gov/. See also Gabriel B. Collins and William S. Murray, "No Oil for the Lamps of China?" *Naval War College Review* 61, no. 2 (Spring 2008), p. 83, and Eric A. McVadon, "China's Maturing Navy," *Naval War College Review* 59, no. 2 (Spring 2006), p. 93.

87. Kelvin Fong, "Asian Submarine Forces on the Rise," *Asian Defence Journal* (May 2009), p. 25; "China Expands Sub Fleet," *Washington Times,* 2 March 2007.

88. U.S. Defense Dept., *Military Power of the People's Republic of China 2009,* Annual Report to Congress (Washington, D.C.: Office of the Secretary of Defense, 2009), p. 24.

89. Banerjee, "Readying the Indian Navy for the Twenty-first Century," p. 14.

90. Views elicited from defense analyst Gen. Talat Masood (Ret.), in an online exchange.

91. K. Subrahmanyam, "Generally Speaking," *Yahoo India News,* 8 January 2010, www.in.news.yahoo.com.