PACIFIC F☆RUM
INTERNATI☆ONAL

Charting a Roadmap for Multiparty Confidence and Security Building Measures, Risk Reduction, and Arms Control in the Indo-Pacific

BY

DAVID SANTORO & MILES POMPER

Founded in 1975, the Pacific Forum is an independent, nonpartisan, and non-profit foreign policy research institute based in Honolulu, in the U.S. state of Hawaii. The Forum's focus areas encompass current and emerging political, security, economic, and business issues and work to help stimulate cooperative policies in the Indo-Pacific through research, analyses, and dialogues undertaken with the region's leaders in academia, public policy, military, and industry. The Forum collaborates with a network of more than 30 research institutes around the Pacific Rim, drawing on Asian perspectives and disseminating project findings and recommendations to opinion leaders, governments, and various publics throughout the region. We regularly cosponsor conferences with institutes throughout Asia to facilitate nongovernmental institution building as well as to foster cross-fertilization of ideas.

A Board of Directors guides the Pacific Forum's work. The Forum is funded by grants from foundations, corporations, individuals, and governments. The Forum's studies do not engage in classified or proprietary work.

Support Pacific Forum

Pacific Forum is a private, independent, nonpartisan, and non-profit, 501(c)(3) organization. Make a tax-deductible charitable contribution at www.pacforum.org/support-us

To support a specific program, please contact our Director of Development at: brooke@pacforum.org

Charting a Roadmap for Multiparty Confidence and Security Building Measures, Risk Reduction, and Arms Control in the Indo-Pacific

By
David Santoro & Miles Pomper

ISSUES & INSIGHTS

EDITED VOLUME

NOVEMBER 2023

Issues & Insights

Issues & Insights, Pacific Forum's flagship peer review and open access publication, is published in the forms of working papers, edited volumes, and conference/workshop reports. Authored by academics, policy analysts, and subject-matter experts from around the region and beyond, *Issues & Insights* provides timely, contextual, and innovative policy research and analyses on pressing political, security, and economic developments in the Indo-Pacific.

For submission guidelines and to subscribe, email: pacnet@pacforum.org

For back issues, visit www.pacforum.org/programs/issues-insights.

Disclaimer

The statements made and views expressed are solely the responsibility of the authors and do not necessarily reflect the views of their respective organizations and affiliations. Pacific Forum's publications do not necessarily reflect the opinions of its staff, donors, and sponsors.

TABLE OF CONTENTS

Introduction: On Multiparty Confidence and Security Building Measures, Risk Reduction, and Arms Control in the Indo-Pacific

David Santoro

The practice of strategic dialogue, confidence-building measures (CBMs), risk reduction, and arms control has its roots in the nuclear revolution and the Cold War. It thus developed in the Euro-Atlantic because of the realities of the US-dominated, Eurocentric security environment of the time; recall that the United States had just fought the Second World War with a Europe-first strategy. That practice developed primarily in two directions: between the United States and its allies in the North Atlantic Treaty Organization (NATO), and between the United States and the Soviet Union, the two superpower enemies.

The goal of strategic dialogue between the United States and NATO, still in place today, has been to build deterrence of adversaries and defense of the "free world," and an important by-product has been reassurance of weaker NATO allies by the much stronger United States. To do so, Washington and allied capitals have engaged at many levels, including in the strategic nuclear domain, where they have established shared roles and responsibilities over forward-deployed US nuclear weapons.[1]

Strategic dialogue between the United States and the Soviet Union/Russia, meanwhile, developed in the context of bilateral arms control discussions. After they built the nuclear capabilities to assure their mutual destruction, and after the Berlin and Cuban crises of 1961 and 1962 when they flirted with nuclear confrontation, the United States and the Soviet Union sought to stabilize their relationship by preserving mutual deterrence. This was achieved through negotiations, which began in the early 1960s and first culminated in a hotline agreement in 1963. This agreement created a direct communication link between Washington and Moscow for use in time of emergency. It was followed by several rounds of talks that led to agreements imposing limits and, later, reductions on US-Soviet/Russian nuclear arsenals.

In the late 1990s, US-Russia arms control discussions expanded into the NATO context. Under the auspices of the NATO-Russia Council, at least until the 2010s, the United States, other NATO allies, and Russia explored the requirements of strategic stability in an ongoing dialogue and worked to improve the relationship between the West and Russia.

The Indo-Pacific Experience, or the Lack Thereof

Similar developments did not take place in the Indo-Pacific. Even though the United States has been in that region for much of its existence, for a long time there was no tradition of strategic dialogue there, be it between the United States and its Indo-Pacific allies, or between the United States and the region's increasingly dominant power, China.

Despite a US forward nuclear presence—terminated in 1991—in three US allies (the Philippines, South Korea, and Taiwan) during much of the Cold War, no robust strategic dialogue emerged or became institutionalized between the United States and these allies, or others. Unlike European allies, US Indo-Pacific allies have traditionally remained on the receiving end of US policy and posture. They have, for instance, merely relied on a US promise to shield them under the "nuclear umbrella" without engaging in discussions with the United States about that policy, let alone taking roles and responsibilities for it.

The absence of strategic dialogue between the United States and its Indo-Pacific allies was partly the result of the lesser importance of the region during the Cold War. At the time, the Indo-Pacific was a second-order priority compared to the Euro-Atlantic, and there were thus less urgent matters to discuss.

But the primary reason was that the US alliance system in the Indo-Pacific was not designed for dialogue. Unlike in the Euro-Atlantic, where US defense commitments have been exercised mostly through NATO, a collective defense mechanism conducive to dialogue, Washington opted for individual, bilateral defense treaties with its Indo-Pacific allies because it wanted to exert maximum control over them, fearing that their anti-communist leaders might engage in aggressive behavior against adversaries that could trap the United States in unwanted wars.[2] Simply put, the United States was considerably more suspicious of Indo-Pacific countries because none had been longstanding allies, unlike European countries.

---

[1] For a study on this topic, see William Alberque, "The NPT and the Origins of NATO's Nuclear Sharing Arrangements," *Proliferation Papers*, 57, Feb. 2017.

[2] Victor D. Cha, *Powerplay: The Origins of the American Alliance System in Asia* (Princeton, NJ: Princeton University Press, 2016).

To be fair, there *were* attempts to establish collective defense arrangements in the Indo-Pacific. They all proved unsuccessful, however: the 1951 trilateral Australia, New Zealand, United States Security Treaty (known as ANZUS) dissolved in its original form when New Zealand was suspended in 1986 after initiating a nuclear-free zone in its territorial waters, and the 1954 Southeast Asia Treaty Organization, or SEATO, never gained momentum because internal conflict hindered general use of a common military force.[3]

Accordingly, the alliance system that remained, famously labelled the "hub-and-spokes" system by John Foster Dulles (with the United States as the "hub"), sought not only to contain the Soviet threat, but also to constrain Indo-Pacific allies, i.e., not to engage in strategic dialogue with them.

Similarly, there has been no tradition of strategic (nuclear) dialogue between the United States and China. While Washington was initially worried when Beijing went nuclear (and tried hard to prevent it), US policymakers quickly decided that the United States could live with a nuclear China, not only because Beijing had neither the ability nor, seemingly, the willingness to engage in nuclear competition, but also because US officials wanted US-China rapprochement to help them "win" against the Soviet Union, their primary competitor.

So, when after US President Richard Nixon's 1972 visit to China Washington began to engage (while also hedging against) Beijing in a wide range of areas, it adopted, *de facto*, an "ignore-China" policy when it came to strategic issues. That policy, which was not initially meant to last forever, took deep roots in US circles and, as a result, there was no attempt to engage China in strategic dialogue, let alone CBMs, risk reduction, or arms control, during the Cold War.[4]

Post-Cold War Developments

The collapse of the Soviet Union and the end of the Cold War did not immediately give rise to a practice of strategic dialogue, CBMs, risk reduction, or arms control in the Indo-Pacific. On the contrary, interest in strategic issues receded, including in the Euro-Atlantic, because the risks of nuclear war had dropped.

There was thus no effort—or perceived need—by the United States and its Indo-Pacific allies to engage in strategic dialogue to strengthen deterrence and defense, despite the emerging North Korea nuclear problem.

The same was true in the US-China context. To be sure, US-China relations became difficult: the Tiananmen Square Massacre of 1989 put a hard stop on all exchanges, and when they resumed in 1994, they remained on an on-again, off-again cycle as crises emerged throughout the 1990s. But Washington did not try to engage Beijing in strategic dialogue because it continued to regard China as a mostly weak nuclear power, and because US officials had other priorities: Russia, the so-called rogue states, and nuclear proliferation; significantly, the United States viewed China as part of the solution to address the latter two problems. Another reason is that China showed "good nuclear behavior," embracing much of the nonproliferation regime: Beijing became a party to the Nuclear Nonproliferation regime in 1992, and it subsequently signed up to the Comprehensive Nuclear Test Ban Treaty and the Chemical Weapons Convention, among other key treaties and conventions.

Several Indo-Pacific dialogues did emerge shortly after the Cold War, initially at the track-2 and track-1.5 levels. Yet none focused on deterrence and defense, or CBMs, risk reduction, and arms control. Instead, they dealt with nonproliferation, the peaceful uses of nuclear technology, disarmament, and then nuclear safety, security, and safeguards. These efforts led to interesting initiatives. For example, the Regional Forum of the Association of Southeast Asian Nations (ASEAN) established in 2009 an annual Nonproliferation and Disarmament Inter-sessional Meeting, which track-2 and track-1.5 forums, notably the Council for Security Cooperation in the Asia Pacific (CSCAP), have supported ever since.[5] Another example is the launch in 2011 of the ASEAN Network of Regulatory Bodies on Atomic Energy, dubbed ASEANTOM, which enables Southeast Asian regulators to share information and build capacity on nuclear safety, security, and

---

[3] SEATO, which included Australia, France, New Zealand, Pakistan, the Philippines, Thailand, and the United Kingdom and United States, was disbanded in 1977. But Washington considers the Manila Pact—the mutual defense aspects of the Treaty—active for Australia, France, New Zealand, Philippines, Thailand, and the United Kingdom.

[4] For a discussion on this topic, see David Santoro, (ed.), *US-China Nuclear Relations: The Impact of Strategic Triangles* (Boulder, CO: Lynne Rienner, 2021).
[5] For details of CSCAP activities, visit the CSCAP or Pacific Forum websites at www.cscap.org and www.pacforum.org

safeguards. Thanks to these processes and several others, much progress has been made in these areas, well beyond the goals of the South Pacific and Southeast Asian nuclear-weapon-free zones, which were concluded in 1985 and 1995, respectively.

From the late 1990s, however, the deteriorating Indo-Pacific security environment began to provide a growing rationale for a focus on strategic issues in the region. By 1998, it became clear that several states across the region, notably India, Pakistan, and North Korea, were developing nuclear and long-range missile programs, while others (China) were working hard to improve existing capabilities. Developments were so significant that analysts began to opine that the epicenter of strategic nuclear politics would soon shift from the Euro-Atlantic to the Indo-Pacific. As one scholar pointed out in 2000, "the nuclear future will be written in Asia."[6] This became a key feature of the so-called "Second Nuclear Age."[7]

The first two decades of the twenty-first century confirmed this trend. During that time, India and Pakistan developed sophisticated nuclear arsenals, North Korea became a de facto nuclear-armed state (after conducting numerous missile test-launches and no less than six nuclear tests), and China pressed on with the development of increasingly modern nuclear and conventional forces; of late Beijing has appeared committed to a significant—and unprecedented—quantitative build-up. These developments have led many in Northeast and Southeast Asia to develop their military capabilities, notably missile delivery systems.

More concerning, tensions have risen considerably as a result, and several serious crises and incidents have erupted, not only between India and Pakistan and between India and China, but also between the United States (along with its allies and others) and both North Korea and China, all of which run the risk of nuclear use. While Russia's invasion of Ukraine and nuclear saber-rattling have again raised fundamental strategic—nuclear—questions for the Euro-Atlantic, the Indo-Pacific is still expected to remain an essential piece of today's nuclear puzzle,

and where much of the global nuclear balance lies and will continue to lie in the foreseeable future.

In response to these developments, the United States has worked more closely with its Indo-Pacific allies to strengthen deterrence and defense. In recent years, much has been achieved in this area with Japan, South Korea, the Philippines, and Australia, both in the context of their bilateral alliance relationship with the United States and beyond, i.e., in trilateral settings (such as in the US-Japan-Australia Trilateral Strategic Dialogue or, more recently, the Australia, United Kingdom, United States—AUKUS—security arrangement) or in new, bigger forms of engagement involving new partners, as is the case of the Quadrilateral Security Dialogue (Quad), which includes Australia, India, Japan, and the United States.

At times, the United States has also tried hard to deal with North Korea (in multiple, very diverse ways) and has been committed to engaging China in strategic dialogue, with the goal of developing a nuclear relationship and, eventually, concluding CBMs, risk reduction, and arms control arrangements. US attempts to deal with North Korea have not paid off, however, and while engaging in unofficial bilateral dialogues with the United States, China has systematically turned down US invitations to strategic dialogue, arguing that it is a weaker nuclear power and that, therefore, Washington would use its strength to outmaneuver Beijing.[8] In other words, to this day North Korea remains an unresolved problem and the United States and China have not developed CBMs, risk reduction, or arms control measures when it comes to strategic (nuclear) issues. Similarly, there is no sign of improvement in the India-Pakistan nuclear relationship.

About the Volume

A considerable amount of work has been done—and is being done—on ways the United States and its Indo-Pacific allies should strengthen deterrence and defense in an increasingly tense regional security environment.[9] There is also an emerging body of work on how the United States and China can and

---

[6] Brad Roberts, *Nuclear Multipolarity and Stability* (Washington, DC: IDA, 2000), p. 35.

[7] Many have written about the "Second Nuclear Age" since the late 1990s. Paul Bracken has done the most to popularize the phrase, notably in *The Second Nuclear Age: Strategy, Danger, and the New Power Politics* (New York: St Martin's Griffin, 2013).

[8] For background on this topic, see David Santoro and Robert Gromoll, "On the Value of Nuclear Dialogue with China," *Issues & Insights*, Vol. 20, no. 1, Nov. 2020, and Brad Roberts (ed.), *Taking Stock: U.S.-China Track 1.5 Nuclear Dialogue* (Livermore, CA: CGSR, 2020).

[9] The Pacific Forum has done considerable work in this area. Of late, it has conducted a project on "Making Collective Deterrence and Defense Work in the Indo-Pacific." The meeting report is forthcoming.

should proceed to develop a stable, or more stable, nuclear relationship, and much ink has been spilled on options to deal with North Korea or address nuclear competition in South Asia.[10]

Little work, however, has been done on how "the region" can, as a whole, advance CBMs, risk reduction, or arms control. Plainly, there is little scholarship on the potential of multiparty options on these questions in the Indo-Pacific.

To help inform policymakers about these options, this volume fills this gap by looking at several strategic themes and topics where there can (and should) be multiparty action to increase confidence, reduce risks, or get to arms control arrangements. While it does not claim to be comprehensive, the volume includes nine chapters, each focused on a specific subject and authored by a regional expert.

Written by Miles Pomper, Chapter 1 opens the volume by asking whether the Indo-Pacific can learn from the experiences of the Euro-Atlantic to enhance its stability. While explaining that there is much to learn from these experiences, the chapter argues that it will not be possible to try and solve Indo-Pacific problems with Euro-Atlantic solutions because the strategic and technological context in the Indo-Pacific is too different.

In Chapter 2, Mely Caballero-Anthony reflects on the evolving security architecture in the Indo-Pacific and, in particular, the relationship between ASEAN or ASEAN-led institutions and the new, emerging minilateral arrangements such as the Quad or AUKUS. Her chapter contends that regional security institutions are at a critical juncture and that the ideal way forward is to promote complementarity between the different arrangements, instead of dwelling on the "battle of the fittest." Doing so would not only minimize the risks of fragmentation of the Indo-Pacific security architecture, but it would also mitigate the threats of competition and conflicts.

Authored by Ferenc Dalnoki-Verses and Nobumasa Akiyama, Chapter 3 focuses on specific CBMs for mitigating regional missile risks, which of late have been increasing considerably. The chapter reviews existing measures for ballistic missile controls, highlighting that their impact is limited, and thus

argues for a range of short-term measures to minimize escalation risks, a multilateral missile test notification mechanism, mutual restraints in building and deploying dual-capable systems, the denuclearization of warheads for short- and medium-range missiles, and a sophisticated verification network to detect missile launches and notify relevant stakeholders.

Next, in Chapter 4, Collin Koh explores the potential of maritime CBMs in the Indo-Pacific, zooming in on the proposed Code of Conduct for the South China Sea. The chapter highlights the "wicked problems" of compliance, verification, and enforcement associated with naval arms control and underscores that progress in this area requires all the parties involved to come to terms with the notion of militarization, something which, in the current and looming security environment, may not be forthcoming.

Ristian Atriandi Supriyanto, in Chapter 5, then analyzes safety, security, and defense options in the underwater domain. The chapter explains that the defense imperative and aspirations of many Indo-Pacific countries to fight in the underwater domain stands at cross-purposes with their attempts to enhance trust and confidence and advance regional peace and stability. It is critical, then, to reconcile this interest in acquiring and operating advanced underwater warfare systems with effective CBMs and risk reduction measures.

In Chapter 6, George Moore unpacks possible next steps for the management of both nuclear weapons and nuclear and other radioactive materials. The chapter suggests that there is considerably more potential for productive work in the area of nuclear and radiological security, and that it should be the focus of efforts.

Penned by Karla Mae G. Pabelina, Chapter 7 examines a specific regional effort to advance nuclear governance and disarmament diplomacy: the Southeast Asian Nuclear-Weapons-Free Zone (SEANWFZ). The chapter explains that challenges to SEANWFZ's implementation are many (notably because none of the nuclear-weapon states have acceded to its protocol), but that ASEAN countries can and should show leadership to build support for, and enhance the profile of, the Treaty because it will

---

[10] For some work on China, see, for instance, David Santoro's latest article on "Getting Past No: Developing a Nuclear Arms Control Relationship with China," *Journal for Peace and Nuclear Disarmament*, Jun. 2023, pp. 1-19.

help avoid that the region gets engulfed by rising US-China competition.

In Chapter 8, Allison Berke looks at measures to enhance chemical and biological security in the Indo-Pacific. The chapter recommends tighter controls over chemical trade and transfers, a roadmap toward laboratory certification by the Organization for the Prohibition of Chemical Weapons for state-run laboratories, monitoring of the development of technologies and capabilities to engineer novel chemicals and biomaterials, improvement of tracking for certain bio-/dual-related research, inspection procedures for biomedical facilities, and a decrease in reliance on animal agriculture and abandonment of live animal trade and live meat markets.

Finally, in Chapter 9, Ferenc Dalnoki-Verses explores the opportunities for "science diplomacy" in the Indo-Pacific. The chapter explains that such diplomacy is critical to improving trust, sustainable development, and regional cooperation, so long as it focuses on actions designed to cater to national needs. The chapter further argues that there are opportunities for science diplomacy initiatives in the Indo-Pacific, and that they should be seized.

Written by Michiru Nishisda, the concluding chapter closes the volume with a set of broader recommendations for action drawn from the nine chapters and beyond.

1

Learning from Europe?

Miles Pomper

Introduction

T   As Washington and regional states look to manage military relationships in the Indo-Pacific, especially with China, it is worth examining the measures the United States and the Soviet Union (and then Russia) have used to stabilize *their* relationship—from arms control to risk reduction and confidence-building measures (CBMs). This is the purpose of this chapter, which argues that it will not be possible to transfer those measures wholesale to today's Indo-Pacific because the strategic and technological context is too different. Nonetheless, the chapter stresses that there is much to learn in both general and specific terms from this rich experience.

Background

The effort to stabilize strategic relations between the United States and the Soviet Union and their respective alliances—the North Atlantic Treaty Organization (NATO) and the Warsaw Pact—emerged out of a broader push in the 1960s towards *détente* (an easing of tensions) in a divided Europe. That push, in turn, reflected several developments that had shaped thinking in capitals from Paris, Bucharest, and Bonn to Washington and Moscow. Two seminal events were the construction of the Berlin Wall in 1961 and the Cuban Missile Crisis in 1962.

By building the Wall, Russia declared itself as a status quo rather than revisionist power, trying to retain rather than change the superpower division of Europe. Likewise, the Cuban Missile Crisis with its near brush with superpower nuclear war encouraged US and Soviet leaders to seek ways to prevent another such incident, particularly in Europe, where the threat of a nuclear war over divided Berlin was a consistent concern. The possibility of another European war also threatened the continent's hard-won economic recovery from the destruction of World War II. Russia, meanwhile, faced increasing pressure to seek peace on its Western borders amid its growing rift with China on its Eastern flank. Moreover, as the decade progressed, the capabilities of Moscow's nuclear arsenal came ever closer to parity with that of the United States, leading to the strategic stalemate of mutually assured destruction

(MAD). With neither side able to prevail in a nuclear contest, thinkers like Thomas Schelling and Morton Halperin developed the basic intellectual framework for nuclear arms control as a way of managing nuclear competition, given that nuclear disarmament was highly unlikely but that both superpowers still wished to avoid limitless and costly arms races. To Schelling and Halperin, arms control was "all the forms of military cooperation between potential enemies in the interest of reducing the likelihood of war, its scope and violence if it occurs, and the political and economic costs of being prepared for it."[1]

The first steps to turn this intellectual construct into practical reality occurred soon after the Cuban Missile Crisis with the establishment in 1963 of a hotline for instant crisis communication between the White House and Kremlin. That same year, a long-stalled effort to put some limit on nuclear testing led to a US-Soviet-UK agreement on a Limited nuclear Test Ban Treaty banning atmospheric nuclear tests. In the next few years—after Lyndon Johnson became US President following the assassination of President John Kennedy—the two superpowers led the global effort to conclude the Nuclear Nonproliferation Treaty (NPT), to prevent the spread of nuclear weapons to additional countries. That accord brought some stability to the European continent given that it limited weapons on the continent to those of France, Russia, the United Kingdom, and the United States, putting a definitive end to some European countries' nascent nuclear weapons programs. However, the end of US nuclear dominance triggered anxiety among NATO allies about whether the United States would risk a nuclear war with the Soviet Union to protect Europe, especially given Russian conventional superiority. One outgrowth of this fear was the 1967 Harmel Report, a landmark NATO study that served as a blueprint for the Alliance's dual track approach ever since—deterrence and defense on the one hand, and arms control on the other.[2] The Johnson administration also began but was unable to conclude bilateral nuclear arms control agreements with the Soviet Union. Another outgrowth was a call for Mutual and Balanced Force Reductions (MBFR),

---

[1] Schelling and Morton Halperin, *Strategy and Arms Control*, 2nd edition (Washington, DC: Pergamon-Brassey, 1985), p. 2.

[2] "The Future Tasks of the Alliance-Harmel Report" Dec. 14, 1967, https://archives.nato.int/report-on-future-tasks-of-alliance-harmel-report-rapport-sur-les-futures-taches-de-lalliance-rapport-harmel-2

an effort to limit conventional arms on the European continent.[3]

With the Vietnam War raising the political and financial costs of the Cold War and prodded by European leaders, including Charles de Gaulle, Georges Pompidou, and Willy Brandt, President Richard Nixon and his top national security aide Henry Kissinger embraced a policy of *détente*. This approach culminated in the first strategic arms limitation agreement, a ban on anti-ballistic missiles systems, and several risk reduction measures.

The 1972 Anti-Ballistic Missile (ABM) treaty was an outgrowth of the intellectual approach pioneered by Schelling and Halperin and the achievement of strategic parity. With the two nuclear superpowers sufficiently armed to respond to any nuclear attack with a devastating nuclear response, the arms race had been stabilized through a system of mutually assured destruction or "two scorpions trapped in a bottle, each capable of killing the other, but only at the risk of his own life," as J. Robert Oppenheimer, the father of the US atomic bomb put it.[4] For arms control advocates, ballistic missile defenses threatened to upset that precarious balance by potentially allowing one state to strike first and then repel any response. By 1972, both the United States and Soviet Union had been won over to this way of strategic thinking and agreed to the pact.

With the ABM treaty in place, the countries were able to take their first steps to limit strategic nuclear weapons in the Strategic Arms Limitations Talks (SALT). To be sure, these limits set a high ceiling for the numbers of such weapons, but the fact that there were some limitations and the heightened transparency and procedures they involved contributed to reducing the possibility of misunderstandings that could lead to nuclear war.

Short of formal treaties, the two superpowers agreed to several other measures to reduce the risks of crises escalating to the nuclear level. These included (1) an agreement to prevent collisions between the US and Russian navies and other incidents that might lead to broader military crises following several such incidents in the previous decade;[5] (2) agreements to take measures to prevent accidental nuclear war and nuclear war generally between the two superpowers and a commitment by both to consult with each other in the case such a nuclear war did occur.[6]

Concurrent with these bilateral processes, European states, including both NATO and Warsaw Pact members, began a two-track process of CBMs to reduce tensions and the risk of war on the continent. On one track was the Conference and Security in Europe (CSCE), a broad political process which included some specific nuclear risk reduction measures. A second track included the MBFR negotiations, which decades later led to the Conventional Forces in Europe (CFE) treaty.

The CSCE process built on the success of Brandt in ending the post-World War II occupation of Berlin with Germany and others seeking a broader post-war settlement on the continent. The Helsinki Final Act, the product of this three-year conference restated the countries' United Nations Charter commitment to refraining from the threat or use of force. Concretely, it included a series of modest CBMs designed to reduce the "dangers of armed conflict and of misunderstanding or miscalculation of military activities which could give rise to apprehension…" The centerpiece was the commitment to provide notification, twenty-one days in advance, of major military maneuvers involving more than 25,000 troops (to include amphibious and airborne troops) taking place "on the territory, in Europe, of any participating state as well as, if applicable, in the adjoining sea area and air space." As one expert has noted, the CBMs were of little operational military value. However, "By requiring every participant to make its military activities more transparent, they would ease mutual suspicion and reduce the dangers of a war started by misperception or miscalculation."[7]

The first period of *détente* unraveled amid US and Soviet standoffs in regional conflicts around the globe, the Soviet invasion of Afghanistan in 1979, and Moscow's decision to deploy SS-20 intermediate-

---

[3] Michael Cotey Morgan, *The Final Act: The Helsinki Accords and the Transformation of the Cold War* (Princeton: Princeton University Press, 2018), pp. 95-100.

[4] J. Robert Oppenheimer, "Atomic Weapons and American Policy," *Foreign Affairs*, July 1953, p. 529.

[5] Agreement Between the Government of The United States of America and the Government of The Union of Soviet Socialist Republics on the Prevention of Incidents On and Over the High Seas (May 25, 1972), https://2009-2017.state.gov/t/isn/4791.htm

[6] Agreement on Measures to Reduce the Risk of Outbreak of Nuclear War Between The United States of America and The Union of Soviet Socialist Republics (Accidents Measures Agreement) (September 30, 1971) https://2009-2017.state.gov/t/isn/4692.htm; Agreement Between The United States of America and The Union of Soviet Socialist Republics on the Prevention of Nuclear War (June 22, 1973) https://2009-2017.state.gov/t/isn/5186.htm

[7] The Final Act, 195.

range missiles in Europe, which resurfaced the old European insecurities about a "decoupling" of the US nuclear umbrella from the defense of its NATO allies. In the end, the alliance returned to a variation on the basic themes of the Harmel Report, pursuing a "dual-track strategy" that coupled plans for fresh deployments of intermediate-range US nuclear weapons with offers to abandon the deployments if Moscow withdrew the SS-20s. The deployment plunged the allies into domestic and alliance political battles that one scholar noted "almost destroyed" NATO.[8] But the allies held together sufficiently well to induce a new Soviet leader, Mikhail Gorbachev, to accept the "zero option" of no ground-launched intermediate missiles for either nuclear superpower, which eventually led to the signing of the Intermediate-Range Nuclear Forces (INF) treaty in 1987.

Gorbachev's ascent also led to a deeper round of CBMs in 1986 dubbed "confidence building and security measures" to establish, in the words of his foreign minister Edward Shevardnadze, "a system of comprehensive security" that would "rule out the very possibility of war breaking out." [9] These measures agreed upon at a CSCE meeting in Stockholm, included Soviet acquiescence for the first time to on-site inspections (by air or on the ground) to verify compliance with agreed measures. Building on the Helsinki CBMs, they also included:

- An expanded Notification Requirement: 42-day prior notification of military activities taking place within the whole of Europe whenever they involve a divisional structure or two or more brigades/regiments and at least 13,000 troops or 300 tanks.

- Observation: mandatory invitation to observers from all participating states to attend notified military activities above a threshold of 17,000 troops.

- Forecasting: exchange of annual forecasts of all notifiable military activities. Activities involving more than 40,000 troops were prohibited unless announced a year in

advance and activities involving more than 75,000 troops were prohibited unless forecast two years in advance.

Four years later, with the Cold War over and the Soviet Union winding down, European states agreed to an even more ambitious set of measures in Vienna, the first of several iterations of the "Vienna Document" with the most recent occurring in 2011. The document introduced four sets of new measures: new communication and consultation measures (including emergency mechanisms) [10]; annual exchanges of detailed military information [11]; enhanced verification measures [12]; and an annual meeting to assess compliance with the CSBMs.

Vienna Document 2011

The following is a list of all VD11 chapters and their core provisions (all but Chapter II apply only to military forces in the Zone of Application (ZOA):

I. Annual Exchange of Military Information (AEMI): exchanging information on command organization, location, personnel strength, and major conventional weapon and equipment systems of active "combat" (vice "support") forces.

II. Defense planning: exchanging information on defense policy, force planning, budgets, procurements, and calendars.

III. Risk Reduction: mechanism for consultation and cooperation, through notifications and meetings, regarding unusual military activities.

IV. Contacts: inviting all OSCE states to visits to air bases and demonstrations of new major weapon systems or equipment, and facilitating contacts (e.g., joint trainings, academic exchanges, etc.) between members of the armed forces.

V. Prior Notification of Certain Military Activities (CMA): at least 42 days advance notice for CMA

---

[8] Susan Colbourn, *Euromissiles: The Nuclear Weapons that Nearly Destroyed NATO* (Ithaca: Cornell University Press, 2022).

[9] Edward A Shevardnadze's speech to CSCE Review Meeting, Nov 5, 1986. HPRE.doc.13

[10] Establishment of points of contact for hazardous incidents of a military nature, a communications network able to transmit computerized information; and emergency meetings to clarify unusual military activities,

[11] Information on existing forces, including the structure of the armed forces, their deployment, peacetime authorized strength and major weapons and equipment systems down to brigade/regiment level; information about the planned deployment of major weapons and equipment systems; annual military budgets.

[12] Imposed obligation to accept evaluation visits to military formations or units reported under the information regime and provided for obligatory invitations to visit air bases.

exceeding one of the following thresholds: 9,000 troops, 250 tanks, 500 ACVs, or 250 pieces of artillery.

VI. Observation of Certain Military Activities: inviting all OSCE states to observe CMA exceeding one of the following thresholds: 13,000 troops, 300 tanks, 500 ACVs, or 250 pieces of artillery.

VII. Annual calendars: exchanging information on certain military activities subject to prior notification planned for the subsequent calendar year.

VIII. Constraining provisions: limits certain large-scale military activities, including limiting numbers of activities and levels.

IX. Compliance and Verification: provisions for on-site inspections and evaluation visits (to confirm the accuracy of information exchanged).

The Past and Future of Bilateral Nuclear Arms Control

Along with the Vienna document, the end of the Cold War produced a slew of arms control and risk reduction measures including the first treaty to make major cuts in US and Soviet/Russian Strategic Nuclear Arsenals (START); the Presidential Nuclear Initiatives, matching unilateral initiatives to reduce the deployments of tactical nuclear weapons and alert postures; pre-launch notifications of missile tests[13]; the establishment of Nuclear Risk Reduction Centers (1989) in Moscow and Washington to manage communications between the nuclear superpowers, including treaty-related notifications and declarations; and the CFE treaty. This heyday continued throughout the 1990s with the signing of the Chemical Weapons Convention and the Comprehensive Test-Ban Treaty and US-Russian push to make the NPT permanent.

One long-awaited result was a US-Soviet "Open Skies" agreement to permit reconnaissance overflights of each other's territories that was first proposed by US President Dwight Eisenhower in the 1950s, before the age of satellites. By the end of the Cold War, the concept had evolved to a proposed multilateral agreement giving nearly three dozen countries the right to fly unarmed military reconnaissance aircraft over each other's territories with only twenty-four hours' notice of the intended flight plan. As such, it was an important verification tool for the CFE treaty and the Vienna Document.[14]

During this high period of US-Soviet/Russian arms control, risk reduction, and CBM efforts, the two nuclear superpowers also attempted to export this model to other regions, in particular the Middle East, in a multilateral working group formed as an outgrowth of the post-Desert Storm 1991 Madrid Peace Conference. The Arms Control and Regional Security (ACRS) working group drew directly from the US-Russian experience, with many of the initial meetings (during the tail end of the George H. W. Bush administration) involving presentations by US and Russian experts on potentially relevant CBMs and risk reduction measures. ACRS ultimately foundered along with the broader Middle East peace process, but made substantial progress toward agreements on operational CBMs, including establishing several regional security centers; a communications network; procedures for pre-notification of certain military activities and exchange of military information; and a number of maritime CBMs, such as draft agreements on search and rescue and the prevention of incidents at sea.[15] It also built relationships among participants that have had enduring value for regional security (for instance, among Sunni Arab states and Israel, who were later involved in the Abraham Accords).

Toward the end of the decade, however, this momentum towards risk reduction faded as US-Russian relations plummeted amid NATO enlargement, domestic problems in Russia, and the war in Kosovo, plus Vladimir Putin's rise to power and the end of the ABM treaty. A temporary respite followed during the Obama and Medvedev

---

13 Amy F. Woolf, *The Past and Future of Bilateral Nuclear Arms Control*, (Geneva: United Nations Institute for Disarmament Research, 2023) 19-20. According to Woolf "In 1988, presidents Reagan and Gorbachev agreed to provide pre-launch notifications for tests of all land-based intercontinental ballistic missiles (ICBMs) and long-range submarine-launched ballistic missiles (SLBMs), to reduce the risk that test launches would be seen as the opening salvo of a missile attack. This was supplemented in 1989 by notifications of major strategic exercises that included the participation of

heavy bombers. In 2000, the United States and the Russian Federation expanded this effort and agreed to provide pre- and post-launch notifications for ballistic missiles and space launch vehicles."

14 Peter Jones, *Open Skies: Transparency, Confidence Building, and the End of the Cold War* (Stanford, CA: Stanford University Press, 2014).

15 Hanna Notte and Chen Zak Kane: *An Oral History of the Arms Control and Regional Security (ACRS) Working Group,* James Martin Center for Nonproliferation Studies, 2022.

presidencies. But during the past two decades much of the intricate architecture of arms control, risk reduction, and CBMs has come undone, including the end of the INF and Open Skies treaties and Russia's recent decision to suspend participation in the 2010 New START treaty.

Comparisons between Europe and the Indo-Pacific

This chapter, as previously stated, aims to identify lessons from this European experience for the Indo-Pacific. However, as the above-mentioned failure in the Middle East suggests, it is difficult to transplant the European experience *per se* to other regions. Arms control, including risk reduction and CBMs, that grew as part of *détente* between the United States and the Soviet Union/Russia as well as between the Warsaw Pact and NATO came at a specific historic moment and under specific historic and technological circumstances.

What, then, are the differences between the situation in Europe back then and the current situation in the Indo-Pacific?

China Is Not Satisfied With The Status Quo

Following the erection of the Berlin Wall and the Cuban Missile Crisis, the United States and Soviet Union were essentially status quo powers willing to live with the existing division of Europe. China appears intent on changing the regional and perhaps global orders, beginning with the unification with Taiwan and the control of the South and East China Seas. Therefore, although there is a great need for arms control in the Indo-Pacific, as there was in Europe at the time, it is highly challenging to promote arms control and risk reduction measures when one side is a status quo changing power.

Lack of Shared Sense of Nuclear Risk Between the United States and China

The more China perceives a threat to itself, the more hesitant it is to curb its military capabilities, and the less incentive it has to control its arsenal.[16] This is a major difference from the United States and Soviet Union, which shared a sense of crisis over potential global annihilation after the Cuban Missile Crisis.

The United States and China do not share such a global sense of crisis, and China still perceives itself as inferior in its relationship with the United States, especially in the area of nuclear weapons, and is therefore working hard to build up its nuclear arsenal. In other words, from the Chinese viewpoint, since China's nuclear capability is overwhelmingly inferior to that of the United States, at least at present, even if a nuclear war were to break out, it would not result in global annihilation, but rather would endanger only China's existence. So, Beijing assumes that it needs to manipulate US perceptions of "risk" to maintain "stability" with Washington. As a result, what is regarded as "risk reduction measures" by one side means abandonment of leverage by the other, and thus considered impractical.

Lack of Parity and Rise of a Tripolar World

Logically, if the United States and China reach strategic parity, they may be able to share a sense of risk or crisis, even though, paradoxically enough, such an increase in China's nuclear capability also runs the risk of further destabilizing the region. Hence the need for arms control and risk reduction, yet from China's perspective, that looks like the United States trying to suppress China's deterrent. In other words, one of the reasons Beijing is now engaged in a crash nuclear build-up may be that the West has increased pressure on China to engage in arms control. Of course, it is precisely because China builds its nuclear capability (and does so in a non-transparent manner) that the United States and its allies are calling for arms control.

Another problem is that achieving parity in a world dominated by three nuclear superpowers—the United States, Russia, and China—is conceptually impractical, especially in light of potential scenarios in which two could gang up against one.[17] Still, in a trilateral world, even if, for the time being, it is not the negotiation of a nuclear arms control treaty like the New START but risk reduction or CBMs that are most likely between the United States and China, it will thus be essential to factor in Russia, at least to a certain degree. Ultimately, unlike the simpler US-Soviet bilateral dialogue of the Cold-War era, in the modern era, China's rise and effects on other regional balances—in particular, with India—means that there also will likely be a need for multilateral talks,

---

[16] Tong Zhao, "Reducing US-China Nuclear Risks: Prospects for Arms Control Cooperation," *YouTube Video*, November 18, 2022, Nuclear Threat Initiative (NTI), https://www.youtube.com/watch?v=1VdNdFTMLWc.

[17] Andrew F. Krepinevich, Jr., "The New Nuclear Age: How China's Growing Nuclear Arsenal Threatens Deterrence," *Foreign Affairs*, May/June 2022, Vol.101 Issue 1.

and such talks have not seen in over 100 years, since the negotiations leading up to the Washington Treaty of 1922.

What Needs To Be Addressed and Controlled Is More Complex and Challenging

The nuclear balance was the central security issue during the Cold War. Today, the security equation is far more complex, notably due to the dual nature of contemporary delivery systems for many nuclear and conventional weapons, the linkage between their dual nature and emerging and disruptive technologies, and the potentially higher escalation risk of conventional to nuclear weapons due to such factors. Therefore, what needs to be addressed and controlled is also more challenging.

Lack of Full Regional Alliance Structure

The above points are factors that make the possibility of arms control and risk reduction in the Indo-Pacific more difficult. But even if the above problems were overcome, the lack of a full regional security alliance structure in the region is a problem. In Cold-War Europe, the structure was simple, with two collective defense regimes, NATO and the Warsaw Pact, facing each other, and with the United States and Soviet Union leading each regime. In today's Indo-Pacific, however, no such collective defense regime exists, but rather a cluster of separate bilateral alliances between the United States and its respective allies as well as some incipient fora, such as the Quad and informal trilateral processes, including the recent Australia, United Kingdom, United States security arrangement dubbed AUKUS. There is not yet sufficient coordination among these respective arrangements, at least not at the level of NATO or the Warsaw Pact. Therefore, when the United States and China engage in some kind of arms control dialogue, there will be no mechanism to absorb the perspectives of regional allies in a coordinated manner, and the risk that Washington and Beijing strike a deal at the expense others in the region will be omnipresent. Special consideration must thus be given to the perspective of regional states to avoid creating a stability-instability paradox, i.e., stability in US-China strategic relations and instability at the regional level. Failure to do so could lead regional states to seek to obstruct or object to US-China dialogue for fear that their own security will be undermined. That, in turn, could make arms control in Indo-Pacific more difficult or, worse, a stillborn project.

2

ASEAN Institutions and Mini-lateral Arrangements: A Stronger Regional Security Architecture

Mely Caballero-Anthony

Introduction

Amid rapid changes in the physical and geostrategic environments, states in the Indo-Pacific find themselves having to constantly navigate around a range of security challenges and recalibrate policies to maintain regional order and achieve peace. In recent years, challenges have become daunting. Just as the world was coming out of a devastating global health crisis caused by the COVID-19 pandemic, the war in Ukraine broke out, profoundly shaking the fundamentals of a rules-based international order.

Closer to home, the geopolitical rivalry between China and the United States has become more acute, compounded by growing competition in critical technology, resources, and global markets. Equally significant is the issue of Taiwan, which sits squarely between these two major powers. Adding to these are potential flashpoints, such as the territorial disputes in the East and South China Seas and the tensions on the Korean peninsula, aggravated by North Korea's regular testing of missiles. These tensions present high risks of conflicts escalating to military confrontation, even war.

The heightening major power competition and changing nature of regional flashpoints have become worrying for small- and medium-sized countries in Southeast Asia, which also have their own share of security challenges. Among these is the ongoing conflict in Myanmar following the 2021 military coup. The coup, which has met strong resistance from the Myanmar people, has already caused untold human suffering as egregious human rights violations continue, including indiscriminate military attacks.

The fluid situation of the Indo-Pacific security environment poses questions about the ability of the Association of Southeast Asian Nations (ASEAN) and ASEAN-led institutions to deal with the myriad challenges confronting the region. Adding yet another layer of complexity to this challenge is the emergence of mini-lateral security arrangements, like the Quadrilateral Security Dialogue (Quad), which brings together the United States, Japan, Australia, and India, and the trilateral security pact between Australia, the United Kingdom, and the United States (AUKUS). Both arrangements threaten ASEAN centrality. Until a decade ago, ASEAN was the first mover in building regional institutions in the Indo-Pacific, and it has even been feted as the "fulcrum of evolving regional architecture."[1]

All these unfolding developments thus present growing uncertainties for the region's future, leading political leaders and analysts to warn of an "unprecedented global situation that is graver than before."[2]

Wither ASEAN then in the evolving regional order?

Growing Irrelevance of ASEAN-led Institutions in the Indo-Pacific?

It is quite common nowadays to hear doubts about its centrality and its ability to be in the "driver's seat" of multilateral security processes in the region. The other concern is the prospect of a divided and bifurcated ASEAN given disputes such as those over the ongoing political crisis in Myanmar and the South China Sea. These concerns will be discussed further in latter sections of the paper, but it is useful at this point to review briefly how and why ASEAN and ASEAN-led institutions previously were viewed as holding such promise for shaping the regional order.

ASEAN as a Force for Peaceful Change

For many scholars in regionalism, ASEAN has been viewed as a model for banding small- and medium-sized countries into one regional body that has proven instrumental in maintaining peace in Southeast Asia, despite its great diversity and history of internal and inter-state conflicts. Since its establishment in 1967, ASEAN has been described as Southeast Asia's key mechanism to prevent and manage intra-mural conflicts,[3] and has been able to do so successfully through its assiduous cultivation and promotion of regional norms and practices to

---

[1] Hillary Clinton, "America's Pacific Century", *Foreign Policy,* November 2011. In the same year when this article came out, former Indonesian President Susilo Bambang Yudhoyono declared at the 19th ASEAN Summit in Bali, Indonesia that "ASEAN's centrality has been maintained', see Antara News Agency, "ASEAN Centrality Maintained says Yudhoyono," Nov. 19, 2011.

[2] See for example, "Amid Unprecedented global situation, remain united, be go-getters and uphold S'pore's reputation: PM Lee," Straits Times, https://www.straitstimes.com/singapore/politics/remain-united-be-go-

getters-and-uphold-s-pore-s-reputation-amid-grave-global-situation-pm-lee; Evan Feigenbaum and Adam Szubin, "What China has learnt from Ukraine," Foreign Affairs, Feb. 14, 2023, https://www.foreignaffairs.com/china/what-china-has-learned-ukraine-war; Kevin Rudd, *The Avoidable War: The Dangers of a Catastrophic Conflict between the US and Xi Jingping's China",* Public Affairs, March 2022.

[3] Michael Leifer, *ASEAN and the Security of Southeast Asia,* London: Routledge, 1989, Rodolfo Severino, *Southeast Asia in Search of an ASEAN Community, Singapore: Institute of Southeast Asian Studies*, 2006.

prevent conflict and manage differences. [4] The ASEAN 1976 Treaty of Amity and Cooperation (TAC) reflects this set of norms, which include respect for sovereignty, non-interference in domestic affairs, peaceful settlement of disputes, and regional economic cooperation. These norms are also supported by the so-called ASEAN practices (or also known as the "ASEAN Way") of consultation and dialogue, and consensus based decision-making processes. The history of peaceful change in a region once regarded as the "Balkans of East" can thus be explained as a product of a careful nurturing of a set of norms over several decades that have guided the conduct of interstate relations. These norms have been critical in building trust and confidence among states of different political orientation and levels of development. Trust has yielded the peace dividend enjoyed by ASEAN members states for decades, which in turn, has allowed them to focus on building their respective economies and promoting closer regional economic cooperation.

It was the same approach—building and advancing a normative framework for interstate conduct—that ASEAN used when it founded the ASEAN Regional Forum (ARF) in 1994. Fostering habits of dialogue and building trust and confidence among members, encouraging inclusiveness among like-minded and non-like-minded states, and promoting comprehensive and cooperative security were the norms, ideas, and practices that the ASEAN-led ARF has outlined as pathways to promote peace and security in the wider Indo-Pacific.[5] These remained constant when ASEAN established the East Asia Summit (EAS), a leaders-led meeting, in 2005.[6]

Several observations can be made from ASEAN's experience in institution-building in East Asia and wider region, which help explain its ascribed centrality.

First is that ASEAN is the first mover in institution-building in the region. Aside from the ARF and EAS, ASEAN has established the ASEAN Defence Ministerial Meeting (ADMM) and the ADMM-Plus,[7] as well as the ASEAN Plus Three, an institution which focuses largely on promoting economic and financial cooperation between ASEAN and the three Northeast Asian states, China, Japan, and South Korea. In this so-called alphabet soup of multilateral institutions, ASEAN has remained at the center, allowing it to be in the "driver-seat."

Second is ASEAN's normative influence, exemplified by its ability to create these institutions despite a lack of material and military power. The establishment of the ARF illustrates ASEAN's normative influence. Mindful that the end of the Cold War and the rise of China would change the power dynamics in the region, ASEAN exercised agency by engaging with all major powers and enmeshing them in a web of multilateral institutions that are norms-based rather than power-based, while cultivating and encouraging cooperation in shared areas of interest (ARF and EAS). ASEAN's contribution to regional order is seen in three ways: norms, socialization, and identity building.[8]

Third, the ARF and EAS provide, in turn, the unique platforms for small- and medium-sized states to hedge [instead of bandwagoning] with any major power. That has given ASEAN states the space to exercise active neutrality while "constructing different modes of cooperation and expanding collaboration" in a wide range of political-security and economic issues to garner mutual benefits and make diffuse reciprocity possible.[9]

However, notwithstanding the benefits of an ASEAN-led inclusive multilateralism, ASEAN centrality in is now severely challenged. ASEAN's brand of inclusive multilateralism is primarily

---

[4] Amitav Acharya, *Constructing a Security Community in Southeast Asia*, Routledge, 3rd edition, 2014; Mely Caballero-Anthony, *Regional Security in Southeast Asia: Beyond the ASEAN Way*, Singapore: Institute of Southeast Asian Studies, 2005, Alice Ba, "On Norms, Rule Breaking and Security Communities: A Constructivist Response," *International Relations in the Asia-Pacific*, 5(2), 2005, pp. 255-266.

[5] The ASEAN Regional Forum is a 27-member grouping that brings together the 10 ASEAN states (Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Vietnam), its 10 dialogue partners—China, Japan, Republic of Korea, India, Australia, New Zealand, Canada, United States, Russia, European Union, North Korea, Bangladesh, Mongolia, Pakistan, Sri Lanka, Papua New Guinea, and Timor-Leste.

[6] The East Asia Summit comprise the 10 ASEAN member states, China, Japan, South Korea, India, Australia, New Zealand, Russia, and the United States.

[7] The ADMM-Plus comprise all the 10 ASEAN countries and 8 dialogue partners of ASEAN, namely Australia, China, India, Japan, New Zealand, Republic of Korea, Russia, and the United States. The 8 countries are collectively referred to as the "plus countries."

[8] Evelyn Goh, "Great Powers and Hierarchical Order in Southeast Asia: Analyzing Regional Security Perspectives", *International Security*, 32(3), 2008, pp 113-157; Amitav Acharya, *Constructing a Security Community in Southeast Asia*, Routledge, 3rd edition, 2014; Kei Koga, Koga, K. (2018) "ASEAN's evolving institutional strategy: Managing great power politics in South China Sea disputes," *The Chinese Journal of Political Science* 11(1), 2018, pp. 49-80.

[9] C.C. Kuik, "Hedging via Institutions: ASEAN-led Multilateralism in the Ave of the Indo-Pacific", *Asian Journal of Peacebuilding*, 10(2), 2022, pp. 355-386.

defined by a normative framework based on the 1976 ASEAN TAC, which, as mentioned earlier, advances the norms of sovereignty, non-interference in internal affairs of member states, and non-use of force, among others.[10] The modalities of these institutions are also largely influenced by the ASEAN way of informality, dialogue, consultation, and consensus. However, this informality, lack of binding rules, and the absence of enforcement mechanisms are now among the key factors that hamper ASEAN's ability to manage regional crises.

Accordingly, in a significantly changed Indo-Pacific where geopolitical dynamics are now far more different than what they were in the past, and with new and complex security challenges, ASEAN centrality is, arguably, no longer tenable. Making matters worse is the perceived growing division within ASEAN.

ASEAN Centrality Amidst Disunity and Bifurcation

The palpable cracks appearing in ASEAN are caused by several factors. These factors are both external, coming from power competition between the United States and China and disputes in the South China Sea, as well as domestic issues within ASEAN member states that affect regional security.

South China Sea

The concern that the South China Sea disputes is dividing ASEAN began in July 2012 at the 20th ASEAN Ministerial Meeting in Phnom Penh when Cambodia served as the ASEAN Chair. For the first time in the grouping's history, the ASEAN foreign ministers failed to issue a joint statement over disagreement on the issue of the South China Sea. It was reported that Cambodia's position on the matter, apparently under the influence of China, scuttled efforts by the rest of the ASEAN members to develop a common position on the issue. The failure to have a joint statement was acknowledged by ASEAN officials as having dented ASEAN's credibility. Since then, there have been growing differences among ASEAN members on the approaches to manage and resolve the territorial disputes. For instance, none of the ASEAN members supported the Philippines

when it took China to the Permanent Court of Arbitration in 2013 to challenge its expansive maritime claims to its Exclusive Economic Zone defined under the United Nations Convention on the Law of the Sea (UNCLOS).

Even though the Arbitral Court ruled in favour of the Philippines, ASEAN members remained silent. Ironically, while ASEAN has continued to engage China on the issue, notably on talks on the Code of Conduct, it has failed to constrain China's expansive claims and aggressive actions in the South China Sea. Whatever hope ASEAN had on socializing China to its norms of peaceful settlement of disputes and multilateral processes to manage the territorial disputes have faded. .

Myanmar Crisis

The Myanmar crisis has been one of the most difficult crises facing ASEAN. The lack and/or absence of any progress in the resolution of the political crisis in Myanmar, despite the deteriorating humanitarian situation in the country, has added to the frustration of many who expected ASEAN to act decisively in dealing with a recalcitrant member state. Although the Chief of Myanmar's State Administrative Council General Min Aung Hlaing had agreed to ASEAN's Five-Point Consensus at the ASEAN Summit in Jakarta in April 2021, ASEAN has so far failed to convince the military regime to end the continuing violence and perpetuation of atrocity crimes.

The need to "intervene" in Myanmar has become more urgent given the snowballing impact of the military coup and the subsequent armed conflicts involving the Tatmadaw (Myanmar's military) the resistance, and ethnic armed fighters, which has led to the country's worst humanitarian crisis ever. Over two years on from military takeover, the humanitarian situation in the country has deteriorated. To date, there are around 17.6 million people—nearly one third of the population—requiring humanitarian assistance.[11] Since February 2021, about 1.2 million people have been displaced within Myanmar.[12] With its economy in shambles, millions of people are struggling to find sustainable income, employment, and basic services such as health care. Around 15.2 million people across the

---

[10] See ASEAN Treaty of Amity and Cooperation, https://asean.org/wp-content/uploads/2021/01/20131230235433.pdf

[11] UN OCHA, Myanmar Humanitarian Update No. 26, Feb. 2, 2023, https://reliefweb.int/report/myanmar/myanmar-humanitarian-update-no-26-2-february

2023?_gl=1*5wgwge*_ga*MTUxMjE1MzQ1OC4xNjc3NDc5MjUw*_ga_E60ZNX2F68*MTY3NzQ3OTI1MC4xLjAuMTY3NzQ3OTI1MC42MC4wLjA.

[12] UNHCR, 2023.

country are facing acute food insecurity, with worrying implication for malnutrition, especially for vulnerable communities in conflict-affected states.[13]

The Myanmar crisis has further exposed the division in ASEAN. While Indonesia, Malaysia, Singapore, and Philippines have openly criticised the junta and appealed for an end to violence, other ASEAN members have remained been silent. As the crisis deepens, it only serves to highlight ASEAN's ineffectiveness in dealing with intra-state conflicts and poses a high risk to ASEAN's relevance.

Heightened US-China Competition

ASEAN has remained largely a bystander amid the sharpening tensions between the United States and China, despite the existence of ARF and EAS. Although ASEAN countries have made clear that they will not take sides, there is a noticeable shift in how some ASEAN members have leaned toward one great power for their economic and security interests.

Undoubtedly, China's economic prowess offers immense opportunity for Southeast Asian states. Its Belt-and-Road Initiative (BRI) has been praised for providing regional public goods, particularly infrastructure development and investments. Although the recent US-led Indo-Pacific Economic Framework offers a wider range of opportunities from digital economy, supply chain resiliency, decarbonisation and infrastructure, its tangible benefits remain to be seen.

Nonetheless, Washington's emphases on security cooperation and balancing/containing China's actions provide reassurance to some ASEAN states that feel especially vulnerable to Beijing's aggressive behavior. As both great powers galvanize support and increase pressure on their bilateral relations with ASEAN states, these have driven a wedge in ASEAN unity and risked bifurcating ASEAN into pro-US and pro-China camps.

ASEAN and ASEAN-led Institutions in the Indo-Pacific

As can be gleaned from the challenges described above, ASEAN, the ARF and EAS are at a critical juncture, one where they need to prove their usefulness and effectiveness or risk irrelevance. This pressure has been made more acute with the emergence of mini-laterals such as the Quad and AUKUS.

To be sure, ASEAN is not geared to deal with the strategic flux in the Indo-Pacific and has proven ineffective in addressing the crisis in Myanmar and making progress on the South China Sea. The ARF had little or no role in the South China Sea conflict and has remained largely a forum or (some say a "talk shop") rather than a problem-solving mechanism. When it was established in 1994, the ARF's main objective was to engage all major powers, particularly a rising China and a seemingly disengaged United States that had withdrawn its military bases from the Philippines, and to lock them into a set of regional multilateral processes. As noted earlier, the ASEAN way of building trust and confidence by institutionalizing habits of dialogue, consultation, and consensus, while promoting the norms of non-use of force, non-interference, and peaceful settlement of disputes, also became the ARF's institutional modalities.

Given the geostrategic milieu at the time, the ARF was not intended to replace US-led alliances, but to complement security arrangements that could improve and promote regional peace. Driven by an ASEAN that lacked material power, the ARF created another pathway to building trust and confidence among like-minded and non-like-minded states by promoting norms of comprehensive and cooperative. ASEAN's strategy then and now has been to engage and intertwine as many major powers as possible in an inclusive web of multilateral processes.[14]

Much has changed since the ARF was established in 1994. The demands for more effective regional institutions to manage regional crises have now become more urgent. However, given ARF's inclusive and diverse membership, consensus

---

[13] UNHCR, Myanmar Emergency Update, 1 February 2023, https://reporting.unhcr.org/document/4315

[14] For comprehensive discussion on ASEAN's normative multilateralism strategy, see for example Evelyn Goh, "Great Powers and Hierarchical Order in Southeast Asia: Analyzing Regional Security Strategies", *International Security*, 2008, 32 (3), pp. 113-157; Amitav Acharya, *ASEAN and regional order:*

Revisiting security community in Southeast Asia (Routledge, 2021); and Mely Caballero-Anthony, "The ASEAN way and the changing security environment: navigating challenges to informality and centrality", *International Politics*, June 2022, https:// DOI10.1057/s41311-022-00400-0

building has made decision making too unwieldy. This has hampered any serious attempts to deal with difficult issues involving member states such as the territorial disputes in the East and South China Sea and the North Korean nuclear proliferation. Since it is not institutionally designed to resolve regional security issues, it is not surprising that the ARF's agenda has not progressed beyond advancing confidence-building measures to preventive diplomacy and then conflict resolution. In other words, the ARF cannot take a more active role, nor has it been given the necessary attention and legitimacy by its big members to do so.

The same challenges confront the EAS. Despite being the premier multilateral forum of top leaders in the region, its institutional practices are similar to those of ASEAN and the ARF. With these modalities in place, there is neither pressure nor interest for EAS members to deal with the kinds of crises affecting regional security, nor is there any interest for major powers to use this platform to address bilateral tensions.

Meanwhile, the Quad, which began as a loose arrangement in 2007, is rapidly transforming into a central security arrangement in the Indo- Pacific. From having started with joint maritime exercises that display their naval power projections, the Quad has, since its revival in 2017, progressed to holding ministerial and summit level meetings among the leaders from the United States, Australia, Japan, and India over the past three years. The latest statements from the ministerial meetings strongly reaffirm the Quad's agenda of championing a "free, open and inclusive rules-based order, rooted in international law, that protects the sovereignty and territorial integrity of regional countries." These military exercises and high-level meetings have sent strong signals about their intent to counter-balance China's growing military presence in the region and contain its unilateral actions that threaten the region's status quo.

While many in Southeast Asia appreciate the notion of a "Free and Open Indo-Pacific" (dubbed FOIP), the fact that it was actively advanced by the United States has generated concerns about the prospects of fragmenting the regional security architecture

around US-China competition. Southeast Asian states are worried because, despite Beijing's aggressive stance in dealing with territorial disputes, China remains a strong economic partner for them. With its economic weight, China has demonstrated its ability to provide public goods, particularly in building much-need infrastructural projects in the region, through the BRI and its more recent Global Development Initiative.

To mitigate potential regional fragmentation and prevent major power rivalry from aggravating the regional security environment, ASEAN thus came up with the ASEAN Outlook in the Indo-Pacific (AOIP) in 2019, which underscores the importance of inclusivity and promoting cooperation in four priority areas: maritime, connectivity, sustainable development, and the economy. Some observers have argued that the AOIP does not offer anything new, that its priority areas are already in the agendas of other ASEAN-led institutions, such as the ADMM. [15] However, what is significant is that through the AOIP, ASEAN is asserting its centrality and advancing its preference for inclusivity, a principle often cited in the AOIP. The emphasis on inclusivity underscores an important aspect of the AOIP: that its vision for the Indo-Pacific is one where cooperation prevails, not rivalry. Also significant is that the AOIP highlights the role of ASEAN-led mechanism like the EAS and ARF in operationalising the priority areas of cooperation.

Since its adoption in 2019, there has been little reported progress on the AOIP. Much has been said about the lack of an ASEAN strategy to implement the AOIP. [16] Questions have also been raised as to which specific ASEAN-led institution can and should operationalize the AOIP, particularly the goals of ensuring that the Indo-Pacific remains a rules-based region and of advancing the priority areas of cooperation.

Given the richness of regional security frameworks in the Indo-Pacific, there can be complementarity between the different arrangements, instead of dwelling on the "battle of the fittest." In this regard, the EAS, as the premier regional institution that can advance the goal of a rules-based regional order, has potential. As a leaders-led Summit that brings the

[15] See for example, Hoang Thi Ha, (2019), "ASEAN Outlook on the Indo-Pacific: Old Wine in New Bottle?", ISEAS Perspective, Jun. 25, 2019, https://www.iseas.edu.sg/images/pdf/ISEAS_Perspective_2019_51.pdf

[16] Huong Le Thu, "The Long and Winding way to the Indo-Pacific", *The Strategist*, May 29, 2019, https://www.aspistrategist.org.au/the-long-and-

winding-way-to-the-indo-pacific/; Azzarizal Jaknanihan, "What Critics Miss on ASEAN's Indo-Pacific Outlook", *East Asian Forum*, Jan. 23, 2022, https://www.eastasiaforum.org/2022/01/26/what-critics-miss-on-aseans-indo-pacific-outlook/

two contesting powers together—the United States and China, the EAS is the best platform for these two powers to engage. Precisely because the frameworks for bilateral dialogue are currently not working, the EAS can provide the opportunity for the Chinese and US leaders to talk, and ASEAN can demonstrate its role as "an honest broker." Putting more effort in getting these two competing powers to engage dialogue within the EAS setting would also help mitigate the threats that the Quad poses to China and perhaps others that feel excluded by this mini-lateral arrangement.

Recent events have demonstrated how ASEAN-led meetings like the EAS and meetings held in ASEAN can be useful platforms for the US and Chinese leaders to meet, despite heightened bilateral tensions. The much-expected meeting between Biden and Xi at the G-20 meeting held in Bali, Indonesia in November 2022 gave the two leaders an opportunity to speak. Although the bilateral meeting took place immediately after the EAS Summit—as Xi could only attend after the EAS and because there were three back-to-back summits held during that period (ASEAN/EAS, G-20, and APEC),[17] this summit help facilitate that engagement, while allowing for other bilateral and regional matters to be discussed.[18]

Moreover, it is in the EAS where the agenda of maritime cooperation can be meaningly advanced with the participation of not only among Quad members, but also ASEAN members and other countries that have a stake in upholding UNCLOS. Significantly, it was at the EAS summit in 2011 when Japan proposed the establishment of forum to discuss maritime cooperation among EAS member states. The aim was to expand the existing ASEAN maritime forum to include non-ASEAN members. The idea took off with the holding of the first expanded "expanded maritime forum" in Manila, Philippines in 2012, and it has been held annually ever since. Although largely organized as a Track-1.5 forum, it has drawn active participation from EAS member states. It has over the years also addressed the territorial disputes in the South China Sea and the importance of UNCLOS. As discussions and proceedings at Track-1.5 meetings often feed into official EAS channels, these are important pathways

to get member states, including China, to commit to respecting UNCLOS and refraining from further militarizing the South China Sea. Cooperation in other functional maritime areas of cooperation such as marine environmental protection and regulation of illegal, unreported, and unregulated fishing can also be further explored.[19]

The EAS is also an important platform to promote closer cooperation in other important functional areas. For instance, it is in the EAS where the Quad's expanded agenda of promoting pandemic cooperation with its own agenda on health security can be integrated. In terms of pandemic response, Quad members during the COVID-19 pandemic had promised to deliver at least a billion vaccines at the end of 2022. Given that COVID-19 will likely not be the last pandemic, timely access to vaccines and therapeutics is something that the Quad should continue as part of its agenda for regional cooperation. This part of pandemic response dovetails well with the wider EAS agenda of global health issues, specifically in mitigating the COVID-19 pandemic and preparing for future pandemics.[20]

To be sure, pandemic preparedness and response should go beyond providing more access to vaccines and engage in sharing technology in the development and production of new vaccines and therapeutics, ensuring supply-chain resilience, and providing financing for building capacity in public health systems. In this regard, there are several areas of cross-cutting cooperation in pandemic preparedness and response between EAS member states and Quad countries to scale up regional capacity to address resurgent and future threats to health security within and outside the region. Another key area where complementarities can be explored is climate change. The Indo-Pacific is widely known as the region most exposed to natural hazards, with climate change causing more frequent and intense occurrences of extreme weather events, such as typhoons and cyclones. The region is also particularly exposed to sea-level rise in archipelagic countries, small island states, and large coastal population centers, while extreme heat are impacting large geographic areas and densely populated urban settlements.

---

[17] The 3 back-to-back international summits held in Southeast Asia in November 2022 were: the ASEAN Summits in Phnom Penh (Nov. 11-13); the G20 in Bali (Nov. 15-16); and the APEC Leaders' Summit in Bangkok (Nov. 18-19).

[18] Ian Storey, "Setback for Moscow, Progress for Kyiv: The Russia-Ukraine War and its Impact on ASEAN, G20 and APEC Summits", ISEAS Perspective, No. 117, Nov. 28, 2022; Al Jazeera, "After meeting Xi, Biden says

there need be no new Cold War", Nov. 14, 2022, https://www.aljazeera.com/news/2022/11/14/biden-xi-discuss-taiwan-competition-human-rights-at-summit

[19] See Gurjit Singh, 'The Relevance of the Expanded ASEAN Maritime Forum", Observer Research Foundation, https://www.orfonline.org/expert-speak/the-relevance-of-the-expanded-asean-maritime-forum/

[20] See Chairman's Statement of the 13th East Asia Summit, Jul. 14, 2023.

At the recent EAS Foreign Ministers held in Indonesia in July 2023, strengthening cooperation among ASEAN Committee on Disaster Management and the National Disaster Management Organizations of non-ASEAN EAS states was encouraged. More specifically, the meeting further encouraged non-EAS states to participate actively in rapid disaster response through the ASEAN-led humanitarian assistance and disaster response (HADR) exercises.[21] While respective Quad countries already participate in ADMM-Plus HADR activities, more can be done by the Quad to scale up regional capacity of non-Quad members on disaster preparedness and response in areas such as building disaster-resilient infrastructure.

It is also important to push cooperation and complementarities on climate change beyond the framework of the ADMM-Plus HADR activities (whose membership includes all of EAS states) since with the ongoing war in Ukraine, it is unlikely that the United States and Russia will participate in HADR activities. US allies like Australia and Japan may not also wish to participate in joint military exercises. Thus, Quad countries can complement the EAS climate change agenda by building regional capacity, such as developing low carbon industries and providing access to climate financing.

With climate change becoming a serious threat to the global community, this is an area where the United States and China has found converging interest to work together. The new US *National Security Strategy* stated that Washington is willing to work with Beijing "where our interest align… including climate change…"[22] Moreover, at the recent high-level meeting between US and China officials in Beijing in July 2023, both countries pledged to work on cutting greenhouse gas emissions and helping developing countries to address climate change.[23] Given this shared interest to work together on climate change, the United States and China could try and get the EAS and Quad to promote greater multilateral cooperation in all facets of the climate change agenda within and outside the Indo-Pacific.

In sum, by finding complementarities and charting areas of cooperation between ASEAN-led institutions like the EAS and mini-lateral security arrangements

such as the Quad, the risk of fragmentation of the security architecture of the Indo-Pacific would be minimized and the threats of escalating competition to conflicts mitigated. Having initiated most the regional frameworks in the region, ASEAN should thus ensure that it exercises its agency in helping make this happen.

[21] Ibid.
[22] See United States' *National Security Strategy*, October 2022, p. 25, https://www.whitehouse.gov/wp-content/uploads/2022/10/Biden-Harris-Administrations-National-Security-Strategy-10.2022.pdf. See also Jonathan Stromseth, "Southeast Asia needs Biden and Xi to work together on climate", Nikkei Asia, Nov. 14, 2022, https://asia.nikkei.com/Opinion/Southeast-Asia-needs-Biden-and-Xi-to-work-together-on-climate
[23] Valerie Volcocci, "US-China aim to revive climate change cooperation as tensions simmer", *Reuters*, July 17, 2023, https://www.reuters.com/world/us-china-aim-revive-climate-cooperation-tensions-simmer-2023-07-16/

3

Confidence-Building Measures for Mitigating Regional Missile Risks

Ferenc Dalnoki-Verses and Nobumasa Akiyama

Introduction

The spread and modernization of missile capabilities in the Indo-Pacific has undermined regional stability. The rise in regional missile risks stems from a variety of factors, including intensifying strategic rivalries, the modernization of nuclear and conventional forces, the proliferation of missile technology, and the complex impact of emerging technologies. The March 2022 Mian Channu Incident exemplified how missile proliferation threatens regional security and stability.[1] Missile proliferation and the potential for missile attacks increase the risk of conflict and escalation and could lead to a wider conflict between the United States and China.

One of the main drivers of missile risks in the Indo-Pacific is the ongoing US-China strategic competition. Beijing is expanding its missile arsenal and capabilities, including anti-ship missiles, intermediate-range ballistic missiles, and hypersonic glide vehicles, both at the strategic and regional levels. At some point, China's strategic calculations could be affected by deployments of US missile defense, including its national and regional missile defense systems. Japan is also acquiring the Integrated Air and Missile Defense, which will integrate various sensors and shooters to respond to diverse missile and air threats. According to Tong Zhao, Chinese experts usually cite US missile defense as a justification for China's nuclear modernization, though foreign analysts are unconvinced that it is the primary driver due to ambiguities surrounding China's response and intentions.[2] China has also become more assertive in the region leading to a heightened risk of miscalculation and conflict. For instance, as tensions over the Taiwan Strait rise, so does the risk of a US-China confrontation turning into an armed conflict.

North Korea has been developing and testing intercontinental ballistic missiles (ICBMs) that can potentially reach the United States, as well as shorter-range missiles that can threaten South Korea and Japan. North Korea announced in April 2022 that it had conducted tests of maneuverable, tactical nuclear weapons[3]. One year later, North Korea conducted a lofted solid-fueled ICBM missile test. [4] Both developments are likely an attempt to use nuclear forces to make up for the inferiority of its conventional forces, which increases the threat that short- and intermediate-range missiles carrying nuclear warheads will be used.

India and Pakistan, both nuclear-armed states, have also been expanding their missile capabilities. Furthermore, the region is home to territorial disputes that could intensify and accelerate with the increase in missile capabilities.

Given these risks, it would be desirable for regional players ultimately to work together to promote legally binding arms control and disarmament measures. In the meantime, the region urgently requires new transparency and confidence-building measures (CBMs), and to utilize crisis communication channels and crisis management mechanisms to avoid escalation.

Missile Developments in the Indo-Pacific

Development of HCM/HGM's

Hypersonic glide vehicles (HGVs), hypersonic cruise missiles (HCMs), and scramjet-powered missiles travel faster than Mach 5 (or five times the speed of sound).[5] HGVs are launched to high altitudes and glide to their targets, while HCMs are powered throughout their flight. Proponents claim that their speed and resulting shorter delivery times, maneuverability, and stealth allow them to carry out various military functions better, such as launching precision strikes, conducting reconnaissance, or avoiding missile defenses. So even though the technology also has weaknesses that in some cases

---

[1] A supersonic missile was unintentionally launched by India on 9 March due to what authorities called a "technical malfunction." The missile landed in Pakistani territory near Mian Channu in the Khanewal District of Punjab. Although no civilians were harmed, the incident resulted in damage to civilian property. Cf. Michael Kugelman, "The Missile Crisis That Wasn't," *Foreign Policy*, Mar. 17, 2022, https://foreignpolicy.com/2022/03/17/india-pakistan-missile-launch-accidental-crisis-security/.

[2] Zhao, Tong. "Narrowing the US-China gap on missile defense: How to help forestall a nuclear arms race. (2020), p. 45.

[3] Jesse Johnson, "North Korea tests new weapon in bid to improve its 'tactical nukes'," *The Japan Times*, Apr. 17, 2022,

https://www.japantimes.co.jp/news/2022/04/17/asia-pacific/north-korea-tactical-weapon-missile-test/.

[4] NPR. "North Korea tests a powerful new kind of missile." Apr. 13, 2023. Accessed Apr. 18, 2023. https://www.npr.org/2023/04/13/1169878514/north-korea-missile-test-solid-fuel

[5] An excellent source on hypersonic missiles is the RAND report from 2017: Speier, Richard H., George Nacouzi, Carrie Lee, and Richard M. Moore, Hypersonic Missile Nonproliferation: Hindering the Spread of a New Class of Weapons. Santa Monica, CA: RAND Corporation, 2017. https://www.rand.org/pubs/research_reports/RR2137.html https://www.rand.org/pubs/research_reports/RR2137.html

make them inferior to ballistic missiles,[6] there is growing interest in developing hypersonic vehicles among Indo-Pacific militaries.

HGVs and HCMs require complex guidance and control subsystems and lightweight airframes and may have variable payloads. At Mach 5, the drag on a vehicle is 25 times that at Mach 1, draining kinetic energy from the vehicle and converting it to shock waves and heat. This puts a huge strain on the vehicle and requires specialized thermal protection systems to prevent damage.[7] The HGV needs to be able to handle these stresses and requires precise inertial sensors to navigate independently.[8]

China has been developing HGVs and hypersonic cruise missiles HCMs, helping to fuel an arms race. Early tests have been met with mixed success, including some outright failures, though this is expected of any test programs.[9] The United States is particularly concerned about missiles and frames its missile development as a reaction to China's. Russia has developed the Khinzal and the Avangard HGV; the latter can travel at 27 times the speed of sound.

India is also working on hypersonic technology, including the BrahMos II hypersonic missile with Russia, and the Hypersonic Demonstrator Vehicle, and it is selling these missiles to the Philippines and contemplating selling them elsewhere in Southeast Asia.[10] Pakistan is less invested in hypersonic development, but China may sell the DF-17 missile to Pakistan, a missile that contains the DF-ZF HGV.[11] South Korea recently unveiled the Hycore, a two-stage solid-fuel booster with scramjet engine HCM to counter North Korea's hypersonic vehicles.[12] Japan, meanwhile, is currently developing the XASM-3 supersonic anti-ship missile and has multiple hypersonic wind tunnels.[13] To be sure, Taiwan lacks an indigenous hypersonic program.[14] Still, the trend towards hypersonics has raised concerns about the military implications and the possibility of a full-on arms race.

China's Interest in Manoeuvrable Anti-Ship BM and FOBS

China has recently conducted tests on new hypersonic weapons, which involve a glide body integrated into a Fractional Orbital Bombardment System (FOBS) nuclear weapons delivery system.[15] This system potentially puts glide vehicles containing warheads into Low Earth Orbit (LEO) before de-orbiting onto targets. Although details of the test are not entirely clear and Beijing has denied conducting it, if the claims are true, China would be the first country with this capability.[16] [17] In the July 2021 test, the glider fired a missile at a target during long-range hypersonic flight, which apparently missed its target by about "two dozen miles."[18] China has also developed a maneuverable anti-ship ballistic missile (DF-21D) dubbed by analysts as the "Carrier Killer," undeniably aimed at destroying US aircraft carriers and other large ships.[19] [20]

[6] Tracy, C. L., and D. C. Wright. "The Physics and Hype of Hypersonic Weapons." Scientific American (2021), pp.64-71.

[7] Aerospace Engineering. "Understanding Hypersonic Missile Systems." Aerospace Engineering. Accessed Mar. 1, 2023.

[8] SIPRI. 2022. "A matter of speed? Understanding hypersonic missile systems." SIPRI Topical Backgrounder. https://www.sipri.org/commentary/topical-backgrounder/2022/matter-speed-understanding-hypersonic-missile-systems

[9] Shaikh, Shaan, Ian Williams, and Masao Dahlgren. "DF-17 | Missile Threat." Missile Threat, Aug. 2, 2021. https://missilethreat.csis.org/missile/df-17/

[10] Asia Times. "India's New Hypersonic Relies on Russian Tech," Aug. 4, 2022. https://asiatimes.com/2022/08/indias-new-hypersonic-relies-on-russian-tech/

[11] Tiwari, Sakshi. "China Could Equip Pakistan With Hypersonic DF-17 Missiles To Neutralize India's 'Game-Changing' S-400 Defense System - Experts." Latest Asian, Middle-East, EurAsian, *Indian News*, Jan. 27, 2022. https://eurasiantimes.com/china-to-equip-pakistan-with-hypersonic-df-17-missiles-india/

[12] "South Korea launches development of Hycore hypersonic missile". Defence Monitor Worldwide. Jan. 10, 2022 Monday. Janes.com. https://www.janes.com/defence-news/news-detail/south-korea-develops-hycore-hypersonic-cruise-missile

[13] Inaba, Yoshihiro. "Japan to Field New ASM-3A Long Range Supersonic Anti-Ship Missile - Naval News." Naval News, Dec. 30, 2020. https://www.navalnews.com/naval-news/2020/12/japan-to-field-new-asm-3a-long-range-supersonic-anti-ship-missile/

[14] Speier, Richard H., George Nacouzi, Carrie Lee, and Richard M. Moore, Hypersonic Missile Nonproliferation: Hindering the Spread of a New Class of Weapons. Santa Monica, CA: RAND Corporation, 2017. https://www.rand.org/pubs/research_reports/RR2137.html

[15] China tests new space capability with hypersonic missile | Financial Times. "China Tests New Space Capability with Hypersonic Missile," October 16, 2021. https://www.ft.com/content/ba0a3cde-719b-4040-93cb-a486e1f843fb

[16] Ritchie, Hannah. "China Denies Testing a Nuclear-Capable Hypersonic Missile, Says It Was a Spacecraft | CNN." CNN, Oct. 18, 2021. https://www.cnn.com/2021/10/18/china/china-hypersonic-missile-spacecraft-intl/index.html

[17] IISS. "Is China Gliding toward a FOBS Capability?" n.d. https://www.iiss.org/blogs/analysis/2021/10/is-china-gliding-toward-a-fobs-capability

[18] China tests new space capability with hypersonic missile | Financial Times. "China Tests New Space Capability with Hypersonic Missile," Oct. 16, 2021. https://www.ft.com/content/ba0a3cde-719b-4040-93cb-a486e1f843fb

[19] Kazianis, Harry. "Lifting the Veil on China's 'Carrier-Killer.'" Lifting the Veil on China's "Carrier-Killer" – The Diplomat, Oct. 23, 2013. https://thediplomat.com/2013/10/lifting-the-veil-on-chinas-carrier-killer/

[20] The Chinese military even built targets in the shape of American warships in the Taklamakan desert to test this missile's capabilities. [BBC News. "Satellite Images Appear to Show Mock-up US Warships in China Desert," n.d. https://www.bbc.com/news/world-asia-china-59210417

Diversification of Launch Platforms: Death Trains and Submarines

In 2016, China conducted a cold launch of the DF-41 ICBM from a railcar, while North Korea reported the construction of similar railcars in the same year. These missiles are mobile and can be fired from anywhere on a rail network, making them difficult to detect.[21] Due to sanctions and technical challenges North Korea has always had problems procuring or constructing Transporter Erector Launchers (TELs) or Mobile Erector Launchers (MELs), so launching from railcars is potentially a way to compensate.[22] In September 2021 North Korea launched two KN-23 quasi-ballistic short-range missiles from a railcar.[23] China may also be experimenting with launching missiles from high-speed trains. Despite technical challenges, doing so offers distinct advantages such as rendering the train difficult to track.[24] India has unveiled the AGNI-P (primed) medium-range ballistic missile with a range of 1,000-2,000 km.[25] All the missiles discussed are rail-mobile, and capable of delivering nuclear weapons.

In May 2022, North Korea attempted to launch a KN-23 SLBM off the coast of Sinpo. It flew 430-600 km and was launched from a Gorae/Sinpo-class submarine.[26] [27] In September 2021, North Korea cold-launched a KN-23 from a submarine; the missile subsequently entered Japan's exclusive economic zone.[28] North Korea is attempting to make it difficult for the United States to launch a preemptive nuclear attack by making their missiles mobile and using TELs, trains, and submarines.

Diversification of Launch Platforms: Missile Silos

In 2021, open-source researchers from the James Martin Center for Nonproliferation Studies and the Federation of American Scientists revealed three sites where China is likely constructing missile silos for the DF-41 ICBM—the Yumen, Hami, and Ordus sites located in Northwestern China—leading the Pentagon to speculate on "the conditions under which China would act outside of its 'No First Use policy' and whether China is planning a much larger expansion of delivery systems and warheads."[29] [30] Others, such as Vipin Narang, have argued that Beijing is following a shell game strategy in which missiles can be moved around by rail in underground networks and not every silo houses a missile making it challenging for opponents to know which silos to target.[31]

In another troubling development, North Korea in late March 2023 revealed imagery of a KN-23 launch from what appear to be an underground missile silo.[32] North Korea seems to continue to diversify its launch platforms.

Existing Measures for Ballistic Missile Controls

Many factors could cause accidents or failed launches of these technologies when they are tested or deployed: miscommunication, lack of communication, failure to follow proper procedures or protocol, technical malfunctions, or inadequate training or discipline.

Significant risk reduction measures to address a lack of communication or miscommunication include

[21] https://www.rfa.org/korean/in_focus/nk_nuclear_talks/missile-08302016093639.html
[22] Bermudez Jr., Joseph S. "What Is the Significance of North Korea's Rail-Mobile Ballistic Missile Launcher?" What is the Significance of North Korea's Rail-mobile Ballistic Missile Launcher?, n.d. https://www.csis.org/analysis/what-significance-north-koreas-rail-mobile-ballistic-missile-launcher
[23] This is a database that track North Korean missile tests: https://www.nti.org/analysis/articles/cns-north-korea-missile-test-database/
[24] South China Morning Post. "Could China Use a High-Speed 'Doomsday Train' to Launch Nuclear Missiles?" Mar. 28, 2022. https://www.scmp.com/news/china/science/article/3172173/could-china-use-high-speed-doomsday-train-launch-nuclear
[25] capsnetdroff. "Understanding the AGNI-P Missile Test by India - CAPS India." CAPS India, Dec. 12, 2022. https://capsindia.org/understanding-the-agni-p-missile-test-by-india/
[26] Choe Sang-Hun. "North Korea Tests a Submarine-Launched Missile." *New York Times*. May 7, 2022. https://advance-lexis-com.ezproxy-miis.middlebury.edu/api/document?collection=news&id=urn:contentItem:65D1-T8J1-JBG3-61WJ-00000-00&context=1516831

[27] Bermudez Jr., Joseph S., Victor Cha, and Jennifer Jun. "Sinpo South Shipyard Update: SLBM Test Launch - Beyond Parallel." Beyond Parallel, Oct. 21, 2021. https://beyondparallel.csis.org/sinpo-south-shipyard-update-slbm-test-launch/
[28] NEWS, KYODO. "North Korea Fires 2 Ballistic Missiles into Waters in Japan's EEZ." Kyodo News+, n.d. https://english.kyodonews.net/news/2021/09/6265406e278c-breaking-news-n-korea-fired-what-may-be-ballistic-missile-japan-coast-guard.html
[29] Feng, John, and Jeff Charles. "China's New Nuclear Missile Silos Confirm U.S. Defense Officials' Fears." Newsweek, Jul. 28, 2021. https://www.newsweek.com/chinas-new-nuclear-missile-silos-confirm-us-defense-officials-fears-1613882
[30] The National Interest. "Is China Preparing to Abandon Its 'No First Use' Nuclear Policy?" Jan. 24, 2022. https://nationalinterest.org/blog/reboot/china-preparing-abandon-its-no-first-use-nuclear-policy-199620
[31] Broad, William J., and David E. Sanger. "A 2nd new nuclear missile base for China, and many questions about strategy." New York Times (2021).
[32] US News & World Report. "North Korea's Use of Missile Silo Could Mean Less Warning of Launches -Analysts," Mar. 20, 2023. www.usnews.com/news/world/articles/2023-03-20/north-koreas-use-of-missile-silo-could-mean-less-warning-of-launches-analysts

military-to-military hotlines, which can provide direct and immediate communication channels between leaders in case there is suspected military activity. The *India-Pakistan Hotline Agreement* and *India-China Hotline Agreement* both focus on direct communication to prevent nuclear conflict or facilitate dialogue during crises.[33] On May 3, 1998, China established its first hotline with a foreign state, Russia, and a decade later, in March 2008, they further strengthened their bilateral cooperation by setting up a hotline between their Defense Ministries to discuss international, regional, and mutual issues.[34]

Similarly, the *China-India Border Defense Cooperation Agreement* and *China-Japan Maritime and Air Communication Mechanism* aim to prevent border incidents or accidental clashes between their respective military forces.[35] [36]

The Military Maritime Consultative Agreement and US-China 2014/2015 Memoranda of Understanding on aerial and naval incidents between China and the United States were expected to function as risk communication channels. However, in comparison with the US-Soviet Incidents at Sea Agreement, US-China agreements, including the Military Maritime Consultative Agreement of 1998 as well as the Memoranda of Understanding on Notification of Major Military Activities (2014) and Rules of Behavior for Safety of Air and Maritime Encounters (2015) are not as binding, detailed, operational, or effective, principally due to China's resistance to implement them and engage in more substantive agreements.

In addition, all five examples are limited to individual countries or specific regions, and ongoing political tensions or territorial disputes can undermine effectiveness. Significantly, China sees

value in using uncertainty as a tool in its relationships. Chad Sbragia, a former Deputy Assistant Secretary of Defense for China, suggests that China's strategy aims to instil uncertainty by making US officials believe that managing escalation or controlling risks could potentially spiral out of control.[37]

Another bilateral agreement is the *Agreement on Pre-Notification of Flight Testing of Ballistic Missiles* between India and Pakistan, which requires notification when ballistic missiles are launched.[38] The agreement requires countries to issue Notice to Air Missions (NOTAM) and Navigational Warning to alert aviation pilots and seafarers of potential hazards along a flight route, including missile tests. However, unlike China, North Korea does not issue NOTAMs ahead of missile launches, meaning that NOTAMs have limited impact on missile control.[39]

The Missile Technology Control Regime (MTCR) is an informal political understanding among 35 member states to limit the proliferation of missiles and missile technology. It maintains a list of controlled items, including equipment, materials, software, and technology needed for missile development, production, and operation.[40] The MTCR urges its members to restrict their exports of missiles and related technologies capable of carrying a 500-kilogram payload at least 300 kilometers or delivering any type of weapon of mass destruction.[41] In the Indo-Pacific, key countries such as North Korea and Pakistan remain outside of the MTCR and the United States has lifted restriction on South Korea's missile development.[42] In addition, emerging technologies such as hypersonic vehicles and unmanned aerial vehicles make it difficult for the regime to adapt to threats posed by these weapons.

Another agreement is the Hague Code of Conduct against ballistic missile proliferation (HCoC), which

[33] US News & World Report. "North Korea's Use of Missile Silo Could Mean Less Warning of Launches -Analysts," Mar. 20, 2023. www.usnews.com/news/world/articles/2023-03-20/north-koreas-use-of-missile-silo-could-mean-less-warning-of-launches-analysts

[34] "Hotlines." Arms Control Association. Accessed Jul. 24, 2023. https://www.armscontrol.org/factsheets/hotlines

[35] Border Defence Cooperation Agreement between India and China | UN Peacemaker. "Border Defence Cooperation Agreement between India and China | UN Peacemaker," n.d. https://peacemaker.un.org/china-india-border-cooperation2013

[36] Japan, China to set up communication system to avoid sea, air clashes in East China Sea: Report | *The Straits Times*. "Japan, China to Set up Communication System to Avoid Sea, Air Clashes in East China Sea: Report," Dec. 6, 2017. https://www.straitstimes.com/asia/east-asia/japan-china-to-set-up-communication-system-to-avoid-sea-air-clashes-in-east-china-sea

[37] "China Balks at U.S. Push for Better Communications During Crises." *Wall Street Journal*. Accessed Apr. 30, 2023. https://www.wsj.com/articles/china-balks-at-u-s-push-for-better-communications-during-crises-3ed48ae6

[38] Mechanix, Web. "Agreement Between India And Pakistan On Pre-Notification Of Flight Testing Of Ballistic Missiles • Stimson Center." Stimson Center, Oct. 25, 2012. https://www.stimson.org/2012/agreement-between-india-and-pakistan-on-pre-notification-of-flight-tes/

[39] Did China Start Testing Anti-Ship Ballistic Missiles into the South China Sea?" The Diplomat. Accessed Jul. 24, 2023. https://thediplomat.com/2019/07/did-china-start-testing-anti-ship-ballistic-missiles-into-the-south-china-sea/

[40] United States Department of State. "Missile Technology Control Regime (MTCR) Frequently Asked Questions - United States Department of State," n.d. https://www.state.gov/remarks-and-releases-bureau-of-international-security-and-nonproliferation/missile-technology-control-regime-mtcr-frequently-asked-questions/

[41] Ibid.

[42] US lifts missile restrictions on South Korea, ending range and warhead limits." Defense News. Accessed Jul. 24, 2023. https://www.defensenews.com/global/asia-pacific/2021/05/25/us-lifts-missile-restrictions-on-south-korea-ending-range-and-warhead-limits/

is a specific agreement that aims to curb the proliferation of weapon-of-mass-destruction-capable ballistic missiles through a set of general principles, modest commitments, and limited CBMs. [43] The HCoC calls for restraint in the production, testing, and export of ballistic missiles and requires pre-launch notifications. [44] It is not a ban on ballistic missiles; rather, its purpose is to "supplement, not supplant" the MTCR, and it is "administered collectively by all subscribing states." [45] As of February 2020, 143 countries have subscribed to the HCoC.[46] It is a politically binding (voluntary, without enforcement) agreement, and thereby lacks the force of a legally binding treaty, which limits its effectiveness. Also, not all the countries in the Indo-Pacific are subscribers to the agreement. This is the case of North Korea, which continues to produce ballistic missiles and does not issue NOTAM's or notify the HCOC.

In sum, missile proliferation in the Indo-Pacific is marked by complexity across technological, political, and strategic dimensions. Technologically, the development of hypersonic technologies and dual-use applications, alongside the diversification of launch platforms, make monitoring and compliance verification difficult. [47] Politically, the desire for power projection and national prestige, an unwillingness to accept restrictions, and discrepancies in definitions regarding missile ranges and payloads exacerbate the challenges. [48] Strategically, the dual nature of space launch vehicles for both civilian and military uses, coupled with the need for effective risk management, CBMs, and the influence of emerging technologies, underline the multifaceted nature of the problem. The risk posed by missile proliferation in the Indo-Pacific became alarmingly apparent with the missile misfire incident in 2022 discussed next, emphasizing the pressing need to develop new strategies and mechanisms to prevent accidents that could unintentionally or intentionally lead to heightened tensions or conflict.

Missile Misfire Incident in 2022: Lessons Learned and Implications for Mitigating Risks

On March 9, 2022, there was a missile misfire incident where a Brahmos supersonic cruise missile landed deep in Pakistani territory. Fortunately, it did not injure anyone or cause significant damage. Pakistan did not engage the incoming missile and did not respond immediately. On March 10, the Pakistani authorities gave a press conference stating that the Pakistan Air Force picked up a "high-speed flying object" that crashed inside Pakistan.[49] India waited three days to respond saying that a technical malfunction led to the accidental firing of a missile.[50] The Indian government later changed its rhetoric and fired three Air Force officials.

The incident highlighted significant problems in missile controls. India failed to issue a NOTAM, creating a risk to civilian aircraft in the vicinity. The object was not a ballistic missile and therefore outside of the *Agreement on Pre-Notification of Flight Testing of Ballistic Missiles*. This incident highlights the need for further considerations of alternatives for mitigating the risk of missile launches that could cause escalation.

Short-term Measures for De-Escalation and Crisis Management

Approaches to CBMs and Threat Reduction in Missile Activities

In the Indo-Pacific, many countries are rapidly improving their missile capabilities. Unlike the United States, Russia, and Europe, which, after experiencing several crises, developed arms control regimes to ensure crisis stability and arms race stability, the Indo-Pacific is lacking experience in

[43] FREQUENTLY ASKED QUESTIONS ABOUT HCoC | HCoC. "FREQUENTLY ASKED QUESTIONS ABOUT HCoC | HCoC," n.d. https://www.hcoc.at/what-is-hcoc/frequently-asked-questions.html
[44] https://www.nonproliferation.eu/hcoc/what-is-the-hague-code-of-conduct/
[45] United States Department of State. "Hague Code of Conduct Against Ballistic Missile Proliferation (HCOC) - United States Department of State," n.d. https://www.state.gov/hague-code-of-conduct-against-ballistic-missile-proliferation-hcoc/
[46] FREQUENTLY ASKED QUESTIONS ABOUT HCoC | HCoC. "FREQUENTLY ASKED QUESTIONS ABOUT HCoC | HCoC," n.d. https://www.hcoc.at/what-is-hcoc/frequently-asked-questions.html
[47] "General Says Countering Hypersonic Weapons Is Imperative." n.d. U.S. Department of Defense. Accessed Jul. 10, 2023.

https://www.defense.gov/News/News-Stories/Article/Article/3391322/general-says-countering-hypersonic-weapons-is-imperative/
[48] "Missile Technology: Accelerating Challenges." n.d. IISS. Accessed Jul. 31, 2023. https://www.iiss.org/en/publications/strategic-dossiers/mdi-missile-technology-accelerating-challenges/
[49] Korda, Matt. "Flying Under The Radar: A Missile Accident in South Asia." Federation Of American Scientists, n.d. https://fas.org/blogs/security/2022/04/flying-under-the-radar-a-missile-accident-in-south-asia/
[50] Krishn Kaushik. "Explained: When a missile misfires." Indian Express. Mar. 12, 2022 Saturday. https://advance.lexis.com/api/document?collection=news&id=urn:contentItem:6503-NPF1-JB5M-W4SP-00000-00&context=1516831

managing nuclear crises (except for a few cases in South Asia).[51]

In a volatile strategic environment with little crisis management expertise, escalating tensions between adversaries may lead to misunderstanding of signals and intentions. Drawing on lessons from European experiences, Indo-Pacific countries should thus take steps to minimize the risks of escalation, beginning with the establishment of CBMs. However, for CBMs to work, the participating states must perceive their benefits, and more extensive measures require a minimum level of trust. Short of that, the focus should be on short-term de-escalation and crisis management, while in the medium to long term, CBMs could be used to stabilize strategic relations.

Taking Measures for De-Escalation and cCisis Management: Making Crisis Communication Measures Functional

As discussed, several crisis communication mechanisms have already been agreed upon among regional stakeholders. The problem is that these communication mechanisms are not functioning properly. For example, after then Speaker of the US House of Representatives Nancy Pelosi visited Taiwan in August 2022, China suspended initiatives of dialogue and communication, such as the Military Maritime Consultative Agreement for reducing tensions in cases of dangerous maritime and air encounters between US and Chinese forces, and the annual Defense Policy Coordination Talks on an annual engagement plan.

Military tensions and competition between the United States and China can be prevented and managed with open communication channels. But China has escalated tensions by increasing ambiguity to pressure the United States. Political posturing has derailed military talks before, but with the intensifying competition, communication channels are crucial in preventing and managing conflicts. An agreement among countries to end these habits and ensure proper functioning of crisis management and communication channels is necessary.

One possible way forward would be for the United States and China to involve neutral third parties, such as the Association of Southeast Asian Nations or the United Nations, to mediate and oversee the implementation of these communication mechanisms. Regional states can also play a pivotal role by forming a collective pressure group, emphasizing the regional stability benefits of maintaining open channels. They have a direct interest in doing so given that a US-China conflict would have direct consequences for them as well.

Strengthening Missile Notification Mechanisms

Establish a Multilateral Missile Test Notification Mechanism

The HCoC includes several transparency measures aimed at increasing confidence and trust among its subscribing states. These measures call for states to make an annual declaration outlining their ballistic missile and space launch vehicle policies, as well as providing information on the number and class of such weapons during the previous year. States are also required to exchange pre-launch notifications on ballistic missiles and space launch vehicles and test flights.

However, some subscribing states may choose to dissociate from these international CBMs, posing a challenge to their implementation. As such, the HCoC encourages subscribing states to develop bilateral or regional transparency measures on a voluntary basis. Additionally, efforts to enhance the implementation of the HCoC and its transparency measures on a regional level could be explored, with outreach activities such as regional workshops and seminars.

Given the tensions and security concerns in the Indo-Pacific, it is useful to establish a missile test notification mechanism to build trust among regional countries, to supplement HCoC measures.

Contrary to the limited coverage of types of missiles by the existing notification mechanism, a potential notification mechanism should include all test launches of ballistic missiles, HGV/HCM, quasi-ballistic missiles, missile defense interceptors and target ballistic as well as cruise missiles. The following is a list (not exhaustive) of elements that should be considered.

---

[51] For arms race stability and crisis stability, eg., Robert Jervis, "Arms Control, Stability, and Causes of War," *Political Science Quarterly,* Vol. 108, No. 2 (Summer, 1993), pp. 239-253.

Broader Membership

Such a mechanism should involve all major powers in the Indo-Pacific, including nuclear-armed states, namely China, Russia, the United States, India, Pakistan, North Korea, and major non-nuclear stakeholders such as Japan and South Korea. The mechanism should be open to other countries in the region, who may have an interest in missile testing activities.

A Dedicated Communication Channel

To define and agree on a dedicated, an appropriate communication channel for timely notification and communication is essential. The channel should be a hotline or an online platform accessible to all participants.

Standardized Notification Procedures

The method, which is founded on the concepts of transparency, reciprocity, and timely communication, would be successful if it were feasible to standardize notification protocols, including the format, substance, and timing of notifications. The format could include information about the location, trajectory, range, and purpose of the missile test.

Ensure Compliance and Enforcement

To ensure compliance and enforcement, the mechanism should include provisions for monitoring and verification of missile test activities.

Verification

A verification mechanism is desirable to ensure that countries comply with the notification requirement, and to investigate suspected violations. However, given the technical challenges and domestic political obstacles in respective countries, it would be difficult to establish such a mechanism. More practical would be for each state to rely on its national technical means, while as mentioned below, with the complement of a network involving societal verification measures.

Opportunities and Challenges for a Missile Test Notification Mechanism

Opportunities for implementing a multilateral missile test notification mechanism lie in the increasing international unease regarding unchecked missile tests. As countries become more interdependent, there is an inherent desire for stability, making this mechanism not only essential but timely. It can serve as a tool to build trust, avert misunderstandings, and subsequently reduce potential conflict risks. Previous successes in multilateral agreements and arms control domains underscore the potential value of this mechanism, suggesting that with the right incentives, countries could rally behind its implementation.

The prospects for the missile test notification mechanism's success largely depend on the balance between its benefits, costs, and risks. The mechanism's widespread acceptance would also depend largely on the attitudes of major powers. If China, Russia, or the United States advocate for this mechanism, it stands to gain substantial endorsement. However, challenges like historical mistrust, evident in relations between India and Pakistan or North Korea and its neighbors, would be a powerful obstacle. The technical complexities of reliably monitoring and verifying missile tests further complicate matters. Additionally, domestic political resistance in various countries could impede adoption and implementation of such a mechanism, especially if covert missile tests are perceived to be in their strategic interest.

Negotiating for Mutual Restraints in Building and Deploying Dual-Capable Systems

Dual-Capable Systems Increase Uncertainty, Raising the Risks of Misunderstandings that could Lead Top Nuclear War

China and Russia are co-locating missiles carrying nuclear and conventional warheads at the same base.[52] If these bases are attacked, it will be difficult to distinguish whether an attack on such a base is an attack on a nuclear asset or a conventional asset. Even if the attacker intended to attack a conventional asset, if the attacked party determines that the attack is

---

[52] James M. Acton, ed., E*ntanglement: Russian and Chinese Perspectives on Non-Nuclear Weapons and Nuclear Risks* (Carnegie Endowment for International Peace, 2017).

against a nuclear asset, there is a risk of unintended escalation into a nuclear war. There is also the possibility that the attacked party will dare to claim the attack as an attack on nuclear weapons and use it as a pretext for escalation.

Therefore, China and Russia should declare that they will cease co-location. Of course, if the declaration cannot be verified, adversaries would not formulate security policies based on this declaration. However, such a declaration might be used as a cue to initiate a process of dialogue and communication. One of the authors of this chapter (Ferenc Dalnoki-Verses) is part of a collaboration to examine a novel method for secure warhead tracking that likely could be used for distinguishing between sites where conventional and nuclear warheads are typically housed.[53]

Meanwhile, before co-location problems are solved, nuclear-armed states could take measures to reduce risks. First, nuclear armed states could consider making mutual pledges eschewing offensive actions (either kinetic or otherwise) against the dual-use systems of adversaries, including nuclear command, control, and communications (NC3) systems, for the sake of stability in their strategic relationships. China relies heavily on dual-use offensive systems and NC3 for deterrence. From the US perspective, de-targeting this kind of capabilities would provide reassurance to China, while asymmetrically giving up an advantage.

Second, nuclear-armed states should consider refraining from building and deploying dual-capable systems. For the United States, that would mean relocating or withdrawing from combat duties most of its strategic bombers, and its cruise missiles in the Indo-Pacific. China, meanwhile, would need to eliminate its co-locations.

Separation of conventional, nuclear, and NC3 systems by nuclear-armed states would impose costs on the nuclear-armed states, notably financial costs for system separation and reconfiguration. There are strategic considerations as well. One option, then, might be to jump-start unofficial dialogue centered around hypothetical scenarios that do not necessarily demand immediate transparency or concrete commitments. These would provide a safe space for countries to understand one another's thought processes and strategies without directly

compromising their positions. Another possibility is an escalation control agreement that focuses more on each side's expected behavior during potential conflicts rather than pre-conflict transparency. Countries could acknowledge that they have certain ambiguous strategies in place but commit to specific actions (or non-actions) if certain scenarios arise.

Monitoring Hypersonic Wind Tunnels

In addressing the challenge of hypersonic missile development in the Indo-Pacific, one measure to foster confidence among nations is the monitoring of hypersonic wind tunnels. The sharing of information and mutual inspection of hypersonic wind tunnel facilities might serve to build trust and reduce the likelihood of misperceptions, thereby diminishing the potential for an escalation of an arms race. International cooperation and dialogue are needed to address the risks and monitor hypersonic wind tunnels. Establishing a network for verification involving societal verification measures could also be a useful supplementary measure for building trust and confidence. This could involve civil society, research community, or independent organizations, and could supplement the transparency measures of the HCoC.

To be sure, using wind tunnels for hypersonic ballistic missile development is challenging. Wind tunnel and test instrumentation technologies continue to advance, but computational models still lack the fidelity and accuracy required to design a hypersonic vehicle without complementary ground and flight test data. Hypersonic wind tunnels capable of producing flight-representative hypersonic flow for extended periods of time are expensive to construct and simulations are difficult to carry out successfully. Test durations are also short, and turbulence levels in the test section flows in wind tunnels are typically higher than they are during flight. Despite these challenges, high-quality hypersonic ground test facilities can still be useful through careful examination and calibration, especially when based on actual flight test data. Therefore, monitoring of hypersonic wind tunnels may be an important measure to prevent the design, construction, and proliferation of hypersonic vehicle technologies.[54]

---

[53] Marshall L. Brown, Jr., *Demonstrating a Warhead Tracking System,* James Martin Center for Nonproliferation Studies, March 2023. https://nonproliferation.org/demonstrating-a-warhead-tracking-system/

[54] Speier, Richard H., George Nacouzi, Carrie Lee, and Richard M. Moore, Hypersonic Missile Nonproliferation: Hindering the Spread of a New Class of Weapons. Santa Monica, CA: RAND Corporation, 2017. https://www.rand.org/pubs/research_reports/RR2137.html

Declaring the Denuclearization of Warheads for Short- and Medium-Range Missiles

Indo-Pacific countries that have nuclear warheads on medium-range missiles are China, Russia, North Korea, India, and Pakistan. While the focus of this section is on medium-range missiles, short-range missiles do play an important role, especially for Pakistan: they are central to its defense against India, a conventionally superior adversary. [55] The United States also possesses the capability of air-launched cruise missiles. Non-nuclear-armed states in the region have also made significant improvements in their missile capabilities, notably South Korea and Japan.

The regional security architecture is becoming increasingly complex, with missile-possessing countries that have different objectives and therefore different thresholds for escalation at the regional and strategic levels. In these circumstances, it is difficult to categorize strategic and sub-strategic/non-strategic weapons in a way that satisfy all stakeholders.

Still, a possible measure to ensure the "denuclearization" of regional conflicts is a commitment by all relevant regional countries to use only conventional warheads on their regional-level short- and intermediate-range missiles, which are used in regional theaters. Doing so would not be challenge-free, of course, but the benefits would likely outweigh the costs.

Establishing a Verification Network, including Societal Measures

A network of verification and information sharing systems is essential to detect missile launches and notify relevant stakeholders. That typically involves the use of advanced radar systems, satellite surveillance, and other technologies that can quickly detect missile launches and track their trajectories, which are nationally available.

However, with the lack of credibility and question on the accuracy of information shared by certain states, societal verification of missile launch notification is a useful supplement for building trust and confidence. Societal verification refers to the process of ensuring

that certain claims or commitments are credible and accurate by involving civil society, the research community, or relevant stakeholders in the verification process. The aim is to increase trust, reduce the risk of false alarms, and prevent panic or other negative consequences such as unintended escalation and the rise of political tensions that may result from inaccurate or incomplete information.

Societal verification can also be an effective supplementary tool for detecting and deterring the illicit transfer and acquisition of missile technology. One of the key advantages of societal verification is that it can provide a complementary and independent source of information to the traditional means of verification used by states. Civil society groups and academic institutions can bring expertise and knowledge that may not be available to states, such as technical knowledge and access to open-source information. This can help to fill gaps in information and provide a more complete picture of the missile proliferation landscape.

Conclusion

The Indo-Pacific faces an increasing risk of conflict due to intensifying strategic competition and the rise in missile capabilities. The problem is exacerbated by the absence of crisis management expertise and little degree of trust among regional countries. Short-term measures for de-escalation and crisis management, such as functional crisis communication mechanisms and societal verification of missile launch notification, are necessary to minimize risks.

Additionally, CBMs are essential to stabilize relations. To reduce the risk of nuclear accidents and incidents, steps such as the denuclearization of regional conflicts through the removing of nuclear warheads from short- and medium- range missiles would be hugely beneficial. The establishment of a network for open source/societal monitoring should be considered as potential supplemental measures.

---

[55] "Pakistan to Focus on Short-Range Missiles | Arms Control Association." n.d. www.armscontrol.org. Accessed Aug. 14, 2023. https://www.armscontrol.org/act/2013-10/news/pakistan-focus-short-range-missiles

4

Maritime CSBMs in the Indo-Pacific: Whither the Code of Conduct in the South China Sea?

Collin Koh

Introduction

The South China Sea is not only a global maritime commons vital to international seaborne trade and commerce, but also a geopolitical hotspot. Since 2010, tensions over unresolved maritime disputes in the South China Sea have spiked, particularly following China's seizure of the Scarborough Shoal in 2012,[1] and Beijing's land reclamation and island-building work in the disputed waters, which culminated in the arbitral tribunal ruling of July 2016.[2] Since then, the ten-member Association of Southeast Asian Nations (ASEAN) and China have sought to tamp down tensions, notably by reinvigorating the proposed Code of Conduct for the South China Sea (CoC). They adopted a draft framework in 2017, followed by the Single Draft Negotiating Text (SDNT) in 2018. The COVID-19 interregnum saw virtually no movement on the CoC. With the post-pandemic opening, there was renewed effort to advance CoC negotiations. ASEAN and China then completed the second reading of the SDNT in late 2022[3] and adopted the Guidelines for Accelerating the Early Conclusion of an Effective and Substantive CoC at a Jakarta meeting in July 2023, which commits the parties to completing negotiations before the fall of 2026.[4]

In August 2019, Chinese Foreign Minister Wang Yi expressed optimism that the CoC could be promulgated "within three years' time."[5] 2022 came and went without an agreement because of the COVID-19 outbreak. Tensions also spiked in the South China Sea before the pandemic, between China and Vietnam over Vanguard Bank in late 2019,[6] China and Indonesia over the North Natuna Sea in early 2020,[7] followed soon after by China and Malaysia over West Capella drillship off Sarawak,[8] and then China and the Philippines over Whitsun Reef in early 2021.[9] In early 2023, ASEAN member states refrained from suggesting timelines even though Indonesia sought to leverage its position as

ASEAN Chair to give negotiations a push.[10] Hence, the Guidelines adopted in July 2023 appear to demonstrate efforts to reinvigorate negotiations following the almost three-year COVID-19 hiatus. It remains to be seen (by the fall of 2026) whether the code is, as what some analysts have suggested, "nothing more than an attempt to present an illusion of progress."[11]

Historical antecedents can shed light on the difficulty of promulgating a multilateral operational arms control mechanism, which is what the CoC is, besides promoting practical security cooperation in the South China Sea. The longstanding "wicked problems" of arms control revolving around compliance, verification, and enforcement (CVE) threaten not only CoC negotiations but implementation, should an agreement be reached. There are analyses about the flaws and challenges inherent to the CoC mainly from a political perspective, chiefly over intramural disunity of ASEAN and China's "salami slicing" strategy. With the benefit of drawing insights from the original SDNT, this chapter addresses the underlying problems of the CoC from a naval arms control perspective.

The chapter first looks at the ideas behind naval arms control, outlining the "wicked problems" of CVE. It then turns to examine what the CoC is about, focusing on the issues that have yet to be resolved, especially the inherent CVE challenges and the root problem over how parties perceive and define the notion of militarization.

CoC as a (Partial) Naval Arms Control Instrument

What is the connection between the CoC and naval arms control? While the CoC is never referred to as an arms control instrument, it is designed as such. In addition to promoting ASEAN-China practical security cooperation, the CoC is aimed at promoting

---

[1] Read for instance, Renato Cruz De Castro, "Facing Up to China's Realpolitik Approach in the South China Sea Dispute: The Case of the 2012 Scarborough Shoal Stand-off and Its Aftermath," *Journal of Asian Security*, Vol. 3, No. 2 (August 2016), pp. 157-182.

[2] Permanent Court of Arbitration, The South China Sea Arbitration (The Republic of Philippines v. The People's Republic of China), at: https://pca-cpa.org/en/cases/7/

[3] Tristan Nodalo, "South China Sea code of conduct in second round of talks, but far from completion — DFA official," *CNN Philippines*, Dec. 7, 2022.

[4] Niniek Karmini and Jim Gomez, "China and ASEAN agree to try to conclude nonaggression pact on sea feud in 3 years," *Associated Press*, Jul. 13, 2023.

[5] "Chinese state councilor says consultations on COC in South China Sea can be concluded in time," *Xinhua*, Aug. 1 2019.

[6] Read for instance, Carl Thayer, "The End of the Vanguard Bank Standoff Does Not Resolve the Confrontation's Root Cause," *Radio Free Asia*, Nov. 14, 2019.

[7] Read for instance, Aristyo Rizka Darmawan, "China's traditional fishing rights claim in North Natuna Sea baseless," *The Jakarta Post*, Apr. 4, 2020.

[8] Read for instance, Ben Werner, "Maritime Standoff Between China and Malaysia Winding Down," *USNI News*, May 13, 2020.

[9] Read for instance, Leilani Chavez, "Chinese 'fishing fleet' anchored on Philippine reef raises tensions," *Mongabay*, Mar. 26, 2021.

[10] Niniek Karmini, "ASEAN vows to conclude pact with China on disputed territory," *Associated Press*, Feb. 5, 2023.

[11] See for example, a discussion with some of the Southeast Asian experts on issues related to the CoC. "A South China Sea Code of Conduct: A hopeful reality or a hopeless falsity?" *Maritime Issues*, July 28, 2017.

confidence and security building measures (CSBMs), which trace their origins to operational naval arms control measures. [12] The SDNT's preamble repeats ASEAN-China joint documents on the South China Sea, including the 2002 Declaration on the Conduct of Parties in the South China Sea (DoC), which reaffirms the commitment of ASEAN and China to "the purposes and principles of the Charter of the United Nations, the 1982 UN Convention on the Law of the Sea (UNCLOS), the Treaty of Amity and Cooperation in Southeast Asia, the Five Principles of Peaceful Coexistence, and other universally recognized principles of international law which shall serve as the basic norms governing state-to-state relations."[13] The role of UNCLOS is important here, insofar as this document provides a firm legal base for discussing arms control and disarmament at sea. [14] The term "peaceful purposes" may be inferred from UNCLOS Article 301, in conformity with the principles embodied in the UN Charter, which is also mentioned in the preamble of the SDNT concerning the prohibition of the threat or use of force.[15] This suggests that the CoC is effectively a naval arms control instrument, even if it is not explicitly stated as such. Naval arms control can be broadly defined as:

Comprising those measures and activities that seek to prevent or dissuade war by eliminating or reducing the sources of danger that stem from the naval forces or activities of various nations. This is a more comprehensive construction than the traditional but narrow concept of arms control, and includes everything from negotiated bilateral, multilateral or regional agreements to unilateral or non-negotiated measures, with or without reciprocity, to various

forms of joint cooperation ranging from exchanges of information and personnel to structured dialogue.[16]

Naval arms control represents one of the earliest attempts to avoid the security dilemma, with efforts dating back to the interwar years.[17]

The ultimate failure of interwar naval disarmament efforts was then viewed as a demonstration of the difficulty if not impossibility of successful naval arms control. This perception was reinforced by the difficulties encountered in the US-Soviet naval arms control negotiations of the 1980s. It was deemed to be an ill-fated endeavor that should not have been considered because of stark differences between the two superpowers, not just in their security outlooks and national interests, but also in geostrategic and doctrinal considerations and force requirements. In today's context, structural naval arms control becomes an even more intractable problem because as far as collective security is concerned, certain naval armaments are deemed necessary.[18]

An alternative to structural measures is operational naval arms control, which seeks to constrain the way navies utilize them, for instance through advanced notification of naval exercises and restrictions on naval force size in particularly sensitive maritime zones. Operational measures hold a greater promise of success because they do not impose limitations on national naval armament choices. In today's context, operational arms control measures are often conflated with confidence-building measures (CBMs).[19] But CBMs have since been loosely applied. Some studies call such measures "operational

---

[12] While structural arms control refers to traditional efforts aimed at imposing structural limitations on naval forces through limiting or reducing naval equipment, operational arms control envisages the imposition of controls on activities of naval forces, their operations, exercises, formations, movements, deployment areas and so forth, though such measures can merge with a third possible type of control, the so-called confidence-building measures that presumably could include prior notification of naval activities. See, for instance: Johan Jorgen Holst, "Confidence-Building Measures: A Conceptual Framework", *Survival*, 25 (1), 1983, pp. 2-15; and Zdzislaw Lachowski, "Confidence and Security Building Measures in New Europe", SIPRI Research Report No.18, New York: Oxford University Press, 2004.

[13] *Single Draft Code of Conduct in The South China Sea (CoC) Negotiating Text* (heretofore referred as SDNT) as of 25 June 2018, p. 2. [Author's personal copy obtained from ASEAN diplomatic sources], p. 1.

[14] It needs pointing out that even though UNCLOS negotiations did not directly discuss military/strategic matters or matters relating to disarmament and arms control at sea, this is not to say that the question of military utilisation of the seas did not play a part during the negotiations. Jan Prawitz, 'Naval arms control: history and observations', in Richard Fieldhouse (ed.), *Security at Sea: Naval Forces and Arms Control* (SIPRI Publications) (SIPRI, Oxford University Press, 1990), p. 51; and Ove Bring, 'Naval arms control and the Convention on the Law of the Sea', in Richard Fieldhouse (ed.), *Security at Sea: Naval Forces and Arms Control* (SIPRI Publications) (SIPRI, Oxford University Press, 1990), p. 138.

[15] Bring, "Naval arms control and the Convention on the Law of the Sea," pp. 138-139.

[16] Richard Fieldhouse, "Naval forces and arms control: a look to the future," in Richard W. Fieldhouse and Shunji Taoka (eds), *Superpowers at Sea: An Assessment of the Naval Arms Race*, SIPRI Strategic Issue Papers (New York: Oxford University Press, 1989), p. 158.

[17] For historical antecedents of naval arms control up to 1945, refer to Department of Disarmament Affairs Report to the Secretary-General, *The Naval Arms Race* (NY: United Nations, 1986), pp. 4-6. See also Annex I in the same report.

[18] For example, the US Navy's aircraft carriers and their organic strike aviation, Tomahawk sea-launched cruise missile, large amphibious landing ships and U.S. Marine Corps amphibious assault forces were essential in evicting Iraqi aggressors from Kuwait back in 1991.

[19] Read, for instance, John Borawski, "The World of CBMs," in John Borawski (ed.), *Avoiding War in the Nuclear Age: Confidence-building Measures for Crisis Stability*, Westview Special Studies in National Security and Defense Policy (Boulder and London: Westview Press, Inc.: 1986), pp. 16-17; and James Macintosh, "Confidence- and Security-Building Measures: A Sceptical Look," in United Nations Department for Disarmament Affairs, *Disarmament: Confidence and Security-building Measures in Asia*; based on materials from a regional meeting held at Kathmandu, Nepal, 29-31 January 1990 (New York: United Nations, 1990), pp. 78-79.

constraints," which are also referred to as "stabilization" or "security-building" measures that seek to restrict military activities by regulating how, when, and where they are conducted.[20] Other studies distinguish CBMs from operational constraints, pointing out that the former do not constrain operations but merely make them more transparent to observers.[21] For the purpose of this discussion, CBMs and operational constraints are subsumed under CSBMs, which aim to: 1) communicate credible evidence of the absence of feared threats; 2) provide reassurance by reducing uncertainties and; 3) constrain opportunities for exerting pressure through military activity.[22]

Categories	Declaratory Measures	Transparency Measures	Constraint Measures
Sub-Categories	General principles that promotes interstate amity and concord National politico-legal acceptance of international laws, e.g. UNCLOS III Non-aggression pacts Nuclear weapons-free pacts	**Information Measures** - Dialogues - Participation in arms registry - Navy-to-navy contacts - Seminars and workshops - Personnel exchanges - Exchanges of calendar on naval activities **Communication Measures** - Common inter-navy communication procedures - Crisis management communication links - Conflict prevention centres - Mandatory consultation on unusual or dangerous naval activities **Notification Measures** - Naval force manoeuvres or movements - Military alerts - Mobilization of reserves - Weapon test-launches - Naval accidents at sea - Scientific activities in disputed zones **Observation/Inspection Measures** Invitation of observers to naval exercises Surveillance and control zones Open skies treaties Naval force separation and monitoring Sensors/early-warning stations	**Risk Reduction Measures** - INCSEA-type pacts - Special communication procedures - Emergency communication procedures for ships and aircraft crossing or entering disputed maritime boundaries - Submarine underwater communications for close-contact contingencies **Exclusion/Separation Measures** - Demilitarized zones - Disengagement zones - Keep-out/in zones (air/sea) - Nuclear weapon-free zones **Constraints on Personnel, Equipment and Activities** - Personnel: national limits; category limits and zone limits - Equipment: deployment limits (by geographical area or numbers); category/type limits; storage/monitoring limits; and nuclear weapons types/deployment - Activities: manoeuvre/movement limits (by geographical area or force size); advance notification for movements, exercises and alerts; limits on force readiness; bans on simultaneous exercises/alerts and/or certain force/unit types; nuclear weapons

Table 1: Typology of CSBMs.

Table 1 is non-exhaustive.[23] The three CSBM categories may be ranked in an ascending order of difficulty in the process of negotiations and implementation.[24] Declaratory measures are comparatively easiest because they are political and impose no technical-operational restrictions on naval forces. Not all such instruments are legally binding; the onus falls upon signatories to keep to these declarations as an article of faith. Transparency measures require greater commitment towards implementation and may involve defense establishments and operational forces. Information measures are perhaps the most common. Communication, notification, and observation/inspection measures are more difficult to accomplish. Significantly, CSBMs of the information kind have the most hope of gaining widespread

[20] Borawski, "The World of CBMs," p. 13.

[21] William J. Durch, 'Naval arms control and the Norwegian Sea: a US perspective' in Andreas Furst, Volker Heise and Steven E. Miller (eds), *Europe and Naval Arms Control in the Gorbachev Era* (A SIPRI Publication) (SIPRI, Oxford University Press, 1992), p. 39; and *Comprehensive Study on Confidence-building Measures*, United Nations Department for Disarmament Affairs Report for the Secretary-General, A/36/474 (NY: United Nations, 1982), p. 7.

[22] Peter Hohenfellner, "The Achievement and Drawbacks of the Helsinki/Stockholm CSBM Process," in United Nations Department for Disarmament Affairs, *Disarmament: Confidence and Security-building Measures in Asia*; based on materials from a regional meeting held at Kathmandu, Nepal, 29-31 January 1990 (New York: United Nations, 1990), p. 19.

[23]Source: Based on and compiled from: *Comprehensive Study on Confidence-building Measures*, United Nations Department for Disarmament Affairs Report for the Secretary-General, A/36/474 (NY: United Nations, 1982); Borawski, "The World of CBMs," pp. 11-13; Fieldhouse and Taoka (eds), *Superpowers at Sea*, pp. 164; James L. Lacy, "Within and Beyond Naval

Confidence-Building: The Legacy and the Options," The RAND Note, N-3122-USDP (Santa Monica, CA: The RAND Corporation, 1991), pp. 28-29; Andrew Mack, "Arms Control at Sea," in Hugh Smith and Anthony Bergin (eds.), *Naval Power in the Pacific: Toward the Year 2000* (Colorado; London: Lynne Reiner, 1993), p. 93; Stanley B. Weeks, "Chapter 4: Incidents at Sea Agreements and Maritime Confidence-Building Measures," in Sam Bateman and Stephen Bates (eds.), *The Seas Unite: Maritime Cooperation in the Asia-Pacific Region* (Canberra: Strategic and Defence Studies Centre, Research School of Pacific and Asian Studies, The Australian National University, 1996), pp. 88-89; Rory Medcalf and Raoul Heinrichs with Justin Jones, "Crisis and Confidence: Major Powers and Maritime Security in Indo-Pacific Asia," Lowy Institute for International Policy, June 2011, pp. 26-30.

[24] Lodgaard and Holdren for example classified naval CSBM approaches in more or less ascending order of difficulty and comprehensiveness. Of the seven key approaches proposed by them, clarifying rules of behaviour is ranked at the bottom whereas limiting nuclear weapons at sea being at the top. Sverre Lodgaard and John P. Holdren, "Chapter 1: Naval Arms Control," in Lodgaard (ed.), *Naval Arms Control*, pp. 16-17.

agreement, even if they are at best of limited value.[25] Constraint measures are the most intrusive of all CSBMs due to certain restrictions placed on personnel, equipment, and activities that may clash with countries' own preferences and priorities. This creates potential hurdles during negotiations, especially concerning CVE provisions. Therefore, constraint measures are more challenging to reach and implement because they require signatories to give up some measure of sovereignty and freedom of action.

Generally, the level of difficulty rises when CSBMs require greater commitments; if they impose restrictions on political and operational freedom of action; and if they require relinquishing of some sovereignty to accept intrusive verification mechanisms. Based on this rationale, if states embark on potentially more challenging CSBMs, it also signals political intent to their potential rivals or to the international community. But CSBMs must be credible, tangible and without ambiguity, otherwise they can become means of deception.[26] Limitations on naval activities may remain unpalatable to some because of the perceived right to freedom of navigation at sea. Moreover, the possibilities of limiting conventional maritime forces appear bleak since they run into all kinds of difficulty of concept, measurement, strategic asymmetry, national sensitivity, and compliance monitoring. [27] Plus, if negotiating naval arms control is difficult at the bilateral level, doing so at the multilateral level is even more challenging. The more parties are involved, the more difficult it is to reconcile the structural and operational naval requirements.[28] CVE, the commonly observed "wicked problem" of arms control, challenges negotiations and implementation, as Fieldhouse explained:

> The history of naval arms control thus does not present a rosy picture and contemporary developments in this regard appear to give mixed perceptions at best. Arms control agreements cannot exist unless two or more

nations see it in their interest to agree on given measures. No nation will agree to measures that it believes will diminish its security. Naturally, navies do not like arms control. They seem to believe that it is antithetical to their very purpose.[29]

The most feasible measures are typically regional more than global.[30] However, while the CoC is at first glance a regional arrangement—merely the ten ASEAN member states and China as contracting parties—there is more than meets the eye.

The Code in a Nutshell

This chapter will not ruminate on the CoC's origins and history. The CoC came about following the Mischief Reef incidents in the 1990s. Intramural divergences over the form that the proposed CoC should take emerged in the late 1990s. In 1999, a Philippine Department of Foreign Affairs source reportedly suggested that the proposed CoC should bind all countries with a stake in the South China Sea to refrain from undertaking any destabilizing move. "It is better to include Japan, Korea, and the United States, so they would be bound by a code of conduct... If they accede to the code, they would refrain from doing anything to cause tension in the area," he said in an interview, adding that "Each one has their (sic) own interests to protect." At least some of the parties already conceived of the CoC as an inclusive mechanism.

In March 2000, ASEAN and China exchanged their drafts and agreed to consolidate them into one document. Four major areas of disagreement were identified: 1) the geographic scope; 2) restrictions on construction on occupied and unoccupied features; 3) military activities in waters adjacent to the Spratly islands, and 4) whether fishermen found in disputed waters could be detained and arrested. A formal

---

[25] Vice Admiral (ret) Carsten A. Lutken, "Chapter 9: Confidence and Security Building – a Naval Perspective," in Lodgaard (ed.), *Naval Arms Control*, p. 145.

[26] Peter Hohenfellner, 'The Achievement and Drawbacks of the Helsinki/Stockholm CSBM Process,' in United Nations Department for Disarmament Affairs, *Disarmament: Confidence and Security-building Measures in Asia*; based on materials from a regional meeting held at Kathmandu, Nepal, Jan. 29-31, 1990 (New York: United Nations, 1990), p. 19.

[27] Rear Admiral J.R. Hill, *Arms Control at Sea* (London & NY: Routledge, 1989), p. 154.

[28] On the difficulties encountered in regional-level naval arms control, read William J. Durch, "Naval arms control and the Norwegian Sea: a US

perspective," in Furst et al (eds.), *Europe and Naval Arms Control in the Gorbachev Era*, p. 39.

[29] Richard Fieldhouse, "Superpowers at sea: the need for a new assessment," in Richard W. Fieldhouse and Shunji Taoka, *Superpowers at Sea: An Assessment of the Naval Arms Race*, SIPRI Strategic Issue Papers (Oxford; New York: Oxford University Press, 1989), p. 11.

[30] Derek Boothby, "Maritime change in developing countries: the implications for naval arms control" in Richard Fieldhouse (ed.), *Security at Sea: Naval Forces and Arms Control* (SIPRI Publications) (SIPRI, Oxford University Press, 1990), pp. 86-87.

ASEAN-China CoC, however, proved a bridge too far.[31]

Therefore, in November 2002, ASEAN and China agreed on the DoC, a watered-down version of, and precursor to, the CoC. It reaffirms freedom of navigation and overflight and commits the parties to peaceful dispute settlement. However, there is no commitment requiring the claimants to refrain from building new structures on the features they already occupy even though there is an agreement not to occupy any additional uninhabited features. In principle, the parties agreed to avoid provocative actions and desist from placing further installations on the disputed features. But in practice, not all parties fully complied with these guidelines, thus provoking further tensions. The de facto occupation of Scarborough Shoal by Chinese forces in 2012, and Beijing's massive island-building work, laid bare the ineffectiveness of the DoC and accentuated the urgency of having the CoC.

Momentum on the CoC picked up in the aftermath of the Scarborough Shoal debacle. ASEAN's failure to issue a joint communique for the first time over the South China Sea in July 2012, Manila's decision to initiate arbitration against Beijing, and China's island-building and fortification works in the area, reinvigorated talks on the CoC to stabilize the situation, reassert rules-based order, and reinforce ASEAN's centrality in the regional architecture. China, however, turned from foot-dragging to an enthused party on the CoC only after the arbitral tribunal ruled against China in July 2016. The CoC was then viewed as not only helping to repair Beijing's reputation, but also, and more importantly, feed its strategic narrative that South China Sea issues should be addressed solely by ASEAN and China without the need for extra-regional interference.

Differences between China and ASEAN countries emerged nonetheless. Some ASEAN countries wanted a substantial, prescriptive CoC to constrain provocative behavior, a recommendation that preceded the unfortunate events that began in April 2012. For example, in January 2012, the Philippines circulated an informal, eight pages-long working draft titled "Philippines Draft Code of Conduct." In September of that same year in New York, ASEAN ministers reviewed an Indonesian proposal called "Zero Draft A Regional Code of Conduct in the South China Sea," which was based on the DoC, ASEAN's Proposed Elements of a Regional Code of Conduct and the ASEAN's Six-Point Principles on the South China Sea. The most significant Indonesian contribution was Article 6 on the implementation of the CoC, which suggested rules, norms, and procedures for carrying out CBMs.[32] This "Zero Draft" did not gain consensus within ASEAN, however.

To this day, intra-ASEAN differences regarding the form of the CoC endure.[33] Instead of a united ASEAN position versus China's, negotiations on the CoC take the form of ten ASEAN member states against Beijing, due to varying national interests. Generally, those differences revolve around: 1) geographical scope; 2) measures to manage escalation of disputes and promote self-restraint; 3) whether the code is binding or otherwise; and 4) participation of relevant countries, including non-claimants and maritime users. The SDNT reflects yet again differences between the parties.[34]

There is no agreement on the geographical scope, which was left open-ended within the SDNT. Vietnam proposed "all disputed features and overlapping maritime areas," which would imply inclusion of the Paracel Islands. However, this proposal was not accepted by some ASEAN member states, which view the Paracel Islands row as a purely bilateral issue between China and Vietnam. Not surprisingly, Beijing does not accept Hanoi's proposal to include this island cluster.

[31] Carlyle A. Thayer, "ASEAN'S Code of Conduct in the South China Sea: A Litmus Test for Community-Building?" *The Asia-Pacific Journal*, Vol. 10, Issue 34, No. 4 (August 19, 2012), pp. 1-22.

[32] Alice D. Ba, "ASEAN's Stakes: The South China Sea's Challenge to Autonomy and Agency," *Asia Policy*, No. 21 (January 2016), pp. 47-53.

[33] According to Carlyle Thayer, who saw the draft ASEAN ministerial joint communique dated August 4, 2017, Vietnam appeared to have pushed for stronger language on the SCS. In the draft communique, while Vietnam sought to retain the clause of the CoC to be legally binding, Cambodia sought to delete it, while Malaysia and Singapore weighed in to keep this option open during formal negotiation, whereas Brunei, Indonesia, Myanmar, and Thailand were flexible with it. Vietnam sought to include "extended construction" and Malaysia sought to include "presence of military assets", whereas Indonesia and the Philippines sought to omit such activities by non-claimant nations. Cambodia and the Philippines sought to

eliminate mention of these activities altogether. Thayer pointed out that in the draft communique, the expression "non-claimant nations" is new, further pointing out that when coupled with military assets this could refer to Japan and the U.S. or even Indonesia which regards itself as a non-claimant. Carlyle A. Thayer, "Draft ASEAN Statement on South China Sea: Has Vietnam Been Isolated?" Thayer Consultancy Background Brief, August 5, 2017.

[34] The author consolidated the proposed clauses from the SDNT and categorized them into key sub-headings including the various classes of CSBMs, which can be found in Table 2 of this publication: Collin Koh, "Confidence and Security Building Measures in Southeast Asia's Maritime Domain," Asia-Pacific Leadership Network, July 2023. https://www.apln.network/projects/maritimeincidents/confidence-and-security-building-measures-in-southeast-asias-maritime-domain

The second issue concerns differences over measures to manage escalation of disputes and promote self-restraint. The phrase "self-restraint" was not defined in the 2017 framework, so various parties have interpreted it as they see fit;[35] Vietnam is the only party to define it. All parties have made proposals to promote practical security cooperation such as search-and-rescue and marine environmental protection. Such extensive proposals mask that most parties have shied away from making substantial CSBM-related proposals. Much of the CSBMs proposed in the SDNT relate to transparency measures, such as dialogues and hotline communication mechanisms. Constraint measures constitute the "barren land" for reasons explained in the next section.

The third issue of concern is the role played by non-parties to the CoC, which refer to any state which does not sign onto it or accede to it. More pertinent is whether ASEAN and China alone suffice in making the CoC effective given the international nature of the South China Sea. Non-parties are often mentioned, as in the draft ASEAN joint communique penned by Manila as the ASEAN Chair in August 2017, which mentioned "all other states." [36] Beijing referred to these "all other states" as "non-regional forces" in its repeated call to push away external interference in the disputes.[37] Therefore, the CoC will likely not be signed by anyone besides ASEAN members and China, since doing otherwise will imply Beijing's endorsement of internationalization of the disputes.

Finally, on whether the code is binding, legally or otherwise. This is where much disagreement exists. Vietnam is again the only party that explicitly proposes that the CoC be legally binding. Kuala Lumpur once referred to the envisaged CoC as "a guideline." [38] Manila called it a "gentleman's agreement" and added that "the word and commitment of countries" should be sufficient to make the accord binding.[39] Vietnam even claimed that ASEAN has been pushing for an "effective and legally-binding" CoC.[40] To this author this discussion is premature without first understanding the CVE

challenges of arms control, which arise from differences over the term "militarization."

One Man's Militarization is Another's Self-Defense Measures

For the CoC to promote self-restraint and prevent and manage incidents in the South China Sea, there is a need to first define the concept of militarization because this issue cuts into the very root of differences over CSBM prescriptions. Vietnam is the only party that defined militarization in the SDNT, as the "installation, deployment or development for any purpose by a Contracting State to the present Code of Conduct of any weapon of offensive nature in relation to any relevant feature in the South China Sea."[41] The question, however, is how to define "any weapon of offensive nature." That other parties have refrained from making similar proposals could be due to their recognition of the complexities of distinguishing what constitutes "offensive weapons."

One man's self-defense measures, therefore, can become another's militarization. At the most basic level, the difficulty in distinguishing between civilian and military use of installations and assets confounds verification, one of the key elements for effective arms control. For instance, referring to Chinese installations on the outposts, then Philippine National Security Adviser Hermogenes Esperon asked "what are the purpose(s) of those structures? They could be for civilian use but we should look to possibilities that they could be used against us. If they are for military use, that is something we should look into."[42] In May 2018, responding to reported landing of Chinese H-6 bombers on the Paracel Islands, then Philippine Presidential Spokesperson Harry Roque Jr. said: "We have no independent verification."[43]

While ASEAN has collectively called for non-militarization and exercise of self-restraint in the South China Sea, there is so far no common position on what constitutes militarization. The statements—a mix of indifference and obfuscation—coming out of various ASEAN capitals only further complicate

---

[35] Ian Storey, "Assessing the ASEAN-China Framework for the Code of Conduct for the South China Sea," *Perspective*, Issue: 2017, No. 62, ISEAS Yusof-Ishak Institute, Aug. 8, 2017.

[36] "Philippines mulls signaling no welcome of U.S. role in S. China Sea," *Kyodo News*, Aug. 5, 2017.

[37] Willard Cheng, "Wang Yi warns 'non-regional forces' to stay away from South China Sea," *ABS-CBN News*, Jul. 25, 2017.

[38] Stephanie Lee, "Malaysia wants South China Sea CoC to be finalised soon," *The Star Online*, May 21, 2017.

[39] Michaela Del Callar, "Cayetano not keen on legally binding code of conduct in disputed sea," *GMA News*, May 19, 2017.

[40] *Regular Press Conference, Ministry of Foreign Affairs*, Socialist Republic of Vietnam, Aug. 4, 2017.

[41] *SDNT*, p. 2.

[42] Virgil Lopez, "PHL knew about China structures in PHL reefs 'from the start' —NSA," *GMA News*, Feb. 6, 2018.

[43] "PH gov't will talk to China about Chinese bombers in WPS, Palace assures," Presidential Communications Operations Office, Republic of the Philippines, May 21, 2018.

matters. For instance, in 2018, responding to reported Chinese military aircraft landings on Mischief Reef, the Philippine leader remarked: "there is an airport. There are missiles there in store. There are military equipment already in place. So, what's the point of questioning whether the planes there landed or not? There's an air strip." [44] However, Manila's stance towards the US Navy's freedom of navigation operations (FONOPs)—China's primary grouse concerning what it perceives as US militarization of the South China Sea—has been consistently supportive. The Aquino Administration voiced its support for FONOPs "as long it is within the rules set out by international law." [45] The Duterte Administration expressed "no objection" towards those operations,[46] though it distanced itself from the Sino-US tussle following the USS *Hopper* FONOP off Scarborough Shoal in January 2018.[47] The Philippine stance over US FONOPs has much to do with its support for Washington's security role in the South China Sea, despite Chinese objections. The same could be applied to Indonesia, which has so far made one open criticism. Then Indonesian Coordinating Minister for Political, Legal, and Security Affairs Luhut Pandjaitan criticized the United States for "power projection" following the USS *Lassen* FONOP.[48] But no other statement to that effect was made thereafter.

Kuala Lumpur's statement is an example of obfuscation over the meaning of militarization. Then Malaysian Prime Minister Mahathir bin Mohamad warned of risks created by the presence of warships in the South China Sea. "Our (Malaysia's) appeal to the big powers is to keep out all these weapons of war (warships) from this area...might lead to accidents and as you all know, accidents may lead to war.[49] Former Malaysian Foreign Minister Saifuddin Abdullah warned that the large number of warships from various countries passing through the South China Sea might result in increased tension, adding that "the government's stand is that all nations should reduce their warship's presence in the waters there and this is in line with ASEAN's Zone of Peace, Freedom, and Neutrality Declaration." [50] There is a

tinge of double standard here because Malaysia, like other claimants, routinely deploys regular navy assets to the disputed waters. The Royal Malaysian Navy has continued to deploy assets to South Luconia breakers since 2015 because the coastguard is unequipped to carry out sustained offshore operations in the area.

ASEAN governments' ambivalence towards the notion of militarization has much to do with national interests. Imposing a strict definition of militarization limits the freedom of options for these countries, which are weaker than China. For Malaysia, it could mean denying itself the use of essential military assets to make up for its coastguard capacity shortfalls. This is especially relevant when China's coastguard buildup far outstrips those of its ASEAN rivals. In the case of the Philippines especially, it could mean foreclosing the option of tapping its alliance with the United States. This is an important point because it highlights one of the key differences between ASEAN and China in CoC negotiations, which concerns the role of so-called "non-signatory" or "non-regional" parties. This problem is best borne out in the case of China and the United States in their verbal sparring over militarization. Washington referred to China's island-building and fortification work as militarization, which Beijing justifies instead as "self-defense."[51] Meanwhile, Beijing's labeling of others' actions as "militarization" appears to lack clear basis, except in the case of the United States, which is referred to as "non-regional" party, and whose military activities involve "strategic weapons." Still, Beijing did not clarify what "strategic weapons" mean, though they could refer to high-powered American military assets such as *Arleigh Burke* class guided missile destroyers—the workhorse of the FONOPs—and carrier strike groups. Military activities carried out by other "non-regional forces" also found themselves in Beijing's crosshairs, even if they have long predated recent South China Sea flareups.

For decades, ASEAN governments have engaged extra-regional counterparts such as Australia and the

---

[44] Dharel Placido, "Duterte: What's the point of questioning Chinese planes?" *ABS-CBN News*, May 16, 2018.

[45] "PH not opposed to US naval patrols," *Manila Bulletin*, Nov. 6, 2015.

[46] "PH backs US Navy presence in disputed maritime area," *Manila Bulletin*, Aug. 12, 2017.

[47] "We don't want to be part of their intramural —Palace," *GMA News*, Jan. 21, 2018.

[48] Daniel Moss, "Indonesia calls for US-China to 'restrain themselves', lashes US 'power projection' after Spratly sail-by," *South China Morning Post*, Oct. 28, 2015.

[49] "Presence of warships in South China Sea can lead to unnecessary conflicts - Dr Mahathir," *Bernama Daily Malaysian News*, Oct. 21, 2019.

[50] Amar Shah Mohsen and Timothy Achariam, "Govt not deploying military war fleet in South China Sea: Saifuddin," *The Sun Daily*, Jul. 25, 2018.

[51] See for instance, *Foreign Ministry Spokesperson Geng Shuang's Regular Press Conference on February 13, 2017*, Ministry of Foreign Affairs of the People's Republic of China; *Remarks with Chinese Foreign Minister and State Councilor Wang Yi at a Press Availability, during Press Availability with Mike Pompeo Secretary of State*, Ben Franklin Room, US Department of State, Washington, DC, May 23, 2018.

United States in military and coastguard capacity-building. Longstanding support for such extra-regional presence is best evident in at least some of the ASEAN parties' opposition to Beijing's proposal in the SDNT that "the Parties shall establish a notification mechanism on military activities, and to notify each other of major military activities if deemed necessary. The Parties shall not hold joint military exercises with countries from outside the region, unless the parties concerned are notified beforehand and express no objection." [52] To these ASEAN parties, such a proposal constitutes an affront to their sovereign prerogatives.[53]

The basis of any multilateral confidence-building arrangement must be "notification," giving warning of maneuvers that might otherwise take the other side by surprise and create a perception of threat.[54] However, if the aforementioned Chinese proposal is deemed too obtrusive, it is unclear whether proposals made by several ASEAN parties would be better. For example, Indonesia suggested the possibility of "notifying, on a voluntary basis, other Parties concerned of any impending joint/combined military exercise. [55] Making notification voluntary creates a convenient opening for parties to decide whether to act depending on its prevailing national interest at that point of time. Vietnam has proposed that parties "notify other Contracting States of any impending joint/combined military exercise/drill to be taken place within the South China Sea. Such notifications shall be made 60 days before the commencement of such military exercise/drill." [56] This is more prescriptive but unlikely to be adopted because it reduces the flexibility of ASEAN militaries' engagements with extra-regional counterparts. These proposals also did not include maritime law enforcement agencies despite their prominence in the South China Sea. There also would be questions about thresholds that trigger notification, as well as the role of submarines.

Conclusion

This discussion leads to a bigger question that could bedevil the effectiveness of the CoC. In the event one of these so-called "non-regional forces" behaves in ways prone to be broadly interpreted by any of the 11 parties as detrimental to its interests, will it be

possible to maintain the integrity of the CoC? Or will the parties have no choice but to respond in kind, which then may be broadly interpreted as violating the CoC, thus sparking off further chain reaction that could unravel it?

ASEAN and China have different reasons to seek the CoC, but they converge upon a common desire to demonstrate they can manage South China Sea disputes. There is a profuse array of proposals made by various parties, but for the CoC to work it is insufficient to focus on those practical security cooperation aspects since advancement on this front depends on mutual confidence and trust. It is also important to stress that the CoC is an operational arms control instrument, the efficacy of which hinges on the implementation of its CSBM components.

The SDNT proves woefully inadequate where it comes to CSBMs, however, and different and conflictual proposals compound the difficulty of promoting self-restraint, especially given that the absence of consensus on what constitutes "militarization." There are thus reasons to believe a commonly accepted definition may not be forthcoming because each party seeks to further its interests and retain maximum flexibility and freedom to maneuver. This is a longstanding problem of past naval arms control attempts, and it will continue to plague CoC negotiations.

The South China Sea is an international maritime domain where many other user states, not necessarily just the claimants, have significant stakes and will find legitimate reasons to secure their interests by any means possible. It is thus impossible to exclude them, much less control their activities. The 11 parties in the CoC negotiations need to agree to a robust set of CSBMs to promote self-restraint and prevent militarization of the South China Sea. The present climate of trust deficit that exists between the various stakeholders means that significant progress in securing an effective CoC is unlikely in the foreseeable future. As ASEAN and China reinvigorates the CoC process post-pandemic, and given recent flareups, it appears urgent to consider giving CSBMs a central focus. As unsavory as it may seem to some of these parties, it is essential to delve into hitherto "taboo" areas of differences, such as militarization or more broadly, prescribing a set of

---

[52] *SDNT*, p. 10.
[53] The author learned from ASEAN diplomats involved in the CoC discussions about opposition by some member states to Beijing's proposal.

[54] Eric Grove, *Maritime Strategy and European Security*, Common Security Studies: No. 2 (London: Brassey's (UK), 1990), p. 79.
[55] *SDNT*, p. 9.
[56] Ibid, p. 14.

actions that would be deemed provocative instead of leaving this open-ended. Before committing to making the mechanism binding, the parties also need to look into CVE challenges, if the CoC is to be effective.

5

More Risks, Less Confidence: Safety, Security, and Defense in the Indo-Pacific Underwater Domain

Ristian Atriandi Supriyanto

> "Has the *Nautilus* run aground?'
> 'Yes.'
> 'How did it happen?'
> 'By a freak of nature, not human incompetence. No mistakes have been made in any of our procedures. But there is no way of overcoming the power of equilibrium. We can defy the laws of men but not the laws of nature."

Jules Verne, *Twenty-Thousand Leagues Under the Sea*

Introduction

T ake the words of Jules Verne with a heavy dose of humility. No matter how sophisticated technology has revolutionized our lives, like Verne's fictional submarine *Nautilus,* human fallibility remains a constant factor. Mix this with "a freak of nature," and *voila*, an accident is bound to happen. While mankind has tried, with some success, to take advantage of nature, they do not have, by any means, absolute command over it—and that will likely never be the case.

On April 21, 2021, the Indonesian Navy lost its submarine, KRI *Nanggala,* and all 53 of its sailors. As with every accident, questions arose as to what might have caused it. While not discounting "human incompetence" and technical faults, the Navy blamed it on natural causes.[1] Barely six months later, the United States Navy submarine USS *Connecticut* hit a seamount that injured nineteen sailors. Human incompetence was at fault, but the "uncharted" seamount was one of the contributing factors.[2] That the *Connecticut* is nuclear-powered added radioactive pollution risks and could have precipitated an environmental catastrophe.

These two accidents raise pertinent questions that countries, particularly navies, must ponder as national imperatives and aspirations in the underwater domain grow. What are these imperatives and aspirations? How do they change the underwater "maritime strategic landscape" or "seascape," specifically in the Indo-Pacific? What risks do these imperatives and aspirations pose to maritime safety, security, and defense? Finally, and most importantly, how can we manage and hopefully, reduce these risks?

These questions guide the discussion that follows, albeit without clear-cut answers. Suffice it to say, the defense imperative and aspiration of some Indo-Pacific countries to fight in the underwater domain is at cross-purposes with their attempts to gain trust and confidence from competitor or rival nations in the collective regional pursuit of peace and stability. This chapter argues that reconciling this paradox is key to any effective "confidence-building and risk-reduction measures" (CBRMs) as part of "preventive diplomacy" to alleviate interstate tensions while many countries are acquiring and operating more advanced underwater warfare systems.[3]

Maritime Safety, Security, and Defense: A Distinction

The two accidents mentioned reveal one dimension of the risks in the underwater domain: safety. But there are two other dimensions, namely security and defense. Geoffrey Till distinguishes the three dimensions as follows:

- *Safety* from inanimate or non-human objects, such as water pressure;
- *Security*, also known as "law enforcement," from non-state threats, such as criminals and terrorists; and
- *Defence* against hostile state actions or actors, such as enemy submarines.[4]

Although national imperatives to obtain and operate submarines stem mainly from the last two, a submariner's risks start with the first. While humans can learn to swim and sail, the sea is not their natural environment. Nature is the sailor's first enemy, and while the sea can be such a forbidding place on the surface, the world underneath is a   particularly

---

[1] Anne Baker, "Indonesia's sunken submarine may have been hit by a powerful force known as an internal wave," *ABC News,* Apr. 30, 2021. https://www.abc.net.au/news/2021-04-30/indonesian-submarine-may-have-been-hit-by-internal-wave/100102816. Also see, Tongxin Wan et al., "Internal Solitary Wave Activities near the Indonesian Submarine Wreck Site Inferred from Satellite Images," *Journal of Marine Science and Engineering,* 10:2 (2022), 197. As of April 2023, the Indonesian navy has not released any official report of their navigation into the loss of KRI *Nanggala.*
[2] US Naval Institute, "Command Investigation into USS Connecticut's South China Sea Seamount Grounding," May 24, 2022,

https://news.usni.org/2022/05/23/command-investigation-into-uss-connecticuts-south-china-sea-seamount-grounding
[3] For definition of CRBMs, consult United Nations, *Comprehensive Study on Confidence Building Measures: Report of the Security-General* (New York: UN Center for Disarmament, 1982), 6. For 'preventive diplomacy,' read ASEAN Regional Forum (ARF), *Concept and Principles of Preventive Diplomacy,* 2-3 in https://aseanregionalforum.asean.org/wp-content/uploads/2019/01/ARF-Concept-Paper-of-Preventive-Diplomacy.pdf.
[4] Adapted from Geoffrey Till's presentation during the Regional Maritime Security Practitioners' Programme (RMPP) by the Information Fusion Centre (IFC) in Singapore, Sept. 5, 2022.

perilous one. To survive at and under the sea is the sailor's safety imperative.[5]

A record of submarine accidents and incidents within the recent decade shows the continuing challenge of meeting this safety imperative.[6] Figure 1 and the Annex show that collisions account for 45% of total (46) submarine accidents and incidents in 2001-2021, followed by grounding, explosion, fire, technical faults, flooding, and other causes.[7] The accidents that befell *Nanggala* and *Connecticut* eerily paralleled those of ARA *San Juan* in 2017 and USS *San Francisco* in 2005, respectively.[8] The former sank with all 44 hands due to technical faults, while the latter hit a seamount with 98 casualties, including one fatality. Regardless of whether "a freak of nature" was *a* or *the* cause of these accidents and incidents, they speak volumes of the "perils of the deep" that Sam Bateman associates with submarine operations.[9]
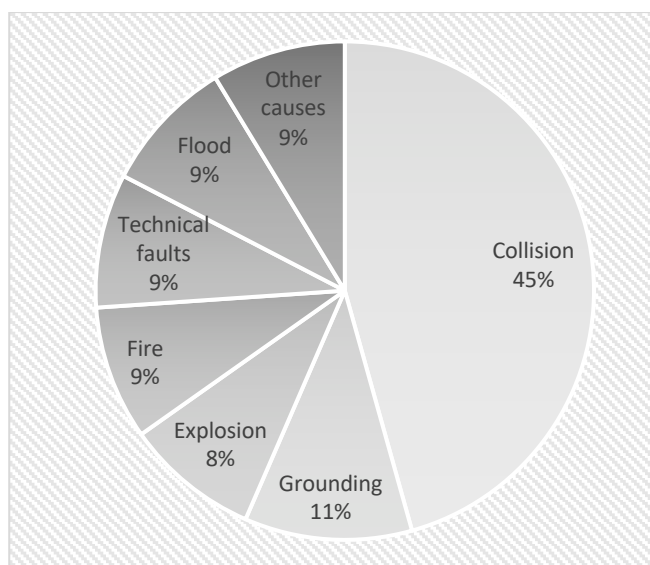

Figure 1. Submarine accidents and incidents, 2001-2021.

Technological progress has mitigated some of these perils. Both combat and non-combat military casualties at sea have decreased overall, which is consistent with the general downward trend in warfare-related casualties.[10] This trend is likely to continue and even grow thanks to artificial intelligence (AI) that has given rise to autonomous technology and its offshoots. How AI is revolutionizing naval warfare today is reminiscent of what nuclear technology did to Cold War naval technology. Nuclear technology greatly extended submarines' operational endurance; by eliminating the need for sailors, AI could eliminate the safety imperative for human operators.[11] Once the human element is out of the operational picture, will it mean that submarine and other underwater military operations are less risky?

The Defense Imperative and Aspiration for the Submarine

Decisions on whether to acquire and operate submarines are primarily political choices, not technological contests. To paraphrase the nineteenth-century Prussian general Carl von Clausewitz, war is not a fight between inanimate objects, but a clash of human wills.[12] AI may change the face of naval warfare, but not its immutable nature.[13] The human desire to defeat their fellow beings—and survive in the process—ensures that wars will continue by robotic or any other means necessary.

Preparing for the possibility of war, irrespective of its *likelihood*, has become the defense imperative for many countries. The submarine reigns supreme in the underwater domain, leading many countries to aspire to acquire and operate more and/or better submarines despite all the known perils of submarine operations. Table 1 shows that while some national submarine fleets are shrinking, others are expanding. Among countries of the Association of Southeast Asian Nations (ASEAN), for instance, diesel-electric submarine fleets have grown nearly sixfold between 2000 and 2023.[14] Meanwhile, shrinking fleets in some

---

[5] As Barnett says, "A seaman's first, visceral battle is with the environment. It is always trying to kill him." Roger Barnett, *Navy and Strategic Culture: Why the Navy Thinks Differently* (Annapolis: Naval Institute Press, 2009), p. 24.

[6] Whereas "accidents" happen entirely *unplanned* after all normal safety procedures have been followed, "incidents" are usually accidents that resulted from *planned* risky activities or missions vis-à-vis another state or states.

[7] Figure 1 is based on the author's worksheet in the Annex. It adapts from and develops the worksheet from Christopher Tingle, "Submarine Safety: A 60-Year Statistical Assessment," *Professional Safety,* 54:9 (2009), pp. 31-39.

[8] Both *Nanggala* and *San Juan* are of the same German-designed Type-209 class diesel-electric boats, while *Connecticut* and *San Francisco* are both nuclear-powered attack submarines albeit from two different classes of boat.

[9] Sam Bateman, "Perils of the Deep: The Dangers of Submarine Proliferation in the Seas of East Asia," *Asian Security,* 7:1 (2011), pp. 61-84.

[10] Tanisha Faizal and Paul Poast, "War is Not Over: What the Optimists Get Wrong about Conflict," *Foreign Affairs,* Oct. 15, 2019.

[11] Michael Horowitz and Paul Scharre, *AI and International Stability: Risks and Confidence-Building Measures* (Washington DC: Center for a New American Security, January 2021), pp. 7-10.

[12] In Clausewitz's words, war "is not the action of a living force upon a lifeless mass…but always the collision of two living forces." Carl von Clausewitz, *On War,* ed. and trans. Michael Howard and Peter Paret (Princeton: Princeton University Press, 1976), p. 7.

[13] Frank Hoffman, "Squaring Clausewitz's Trinity in the Age of Autonomous Weapons," *Orbis,* 63:1 (2019), pp. 44-63.

[14] While Southeast Asia's submarine fleets are growing in number, Andersson made the case in 2015 that their actual capabilities were "in fact overstated." With the loss of *Nanggala* in 2021, Andersson might have a point. Jan Joel Andersson, "Submarine Capabilities and Conventional

countries by no means indicates waning interest in submarines. Rather, it indicates the decommissioning of old boats to save resources for acquiring new ones or modernizing existing ones. For example, Russia's

fleet of ballistic missile nuclear submarines (SSBNs) shrank nearly half during the same period as the new and stealthier *Borei*-class boats are being built.[15]

Table 1. Estimates of submarine fleets in the Indo-Pacific, 2000-2030												
Countries	2000			2010			2023			2030**		
	SSK	SSN	SSBN	SSK	SSN	SSBN	SSK	SSN	SSBN	SSK	SSN	SSBN
ASEAN	3	0	0	8	0	0	17	0	0	22+	0	0
Australia	3	0	0	6	0	0	6	0	0	6	3	0
China	58	5	1	55	6	3	46	6	6	48	10	10
India	16	0	0	16	1	0	15	0	1	18	6	5
Japan	16	0	0	16	0	0	22	0	0	20+	0	0
Korea, RO	19	0	0	13	0	0	19	0	0	27	0	0
Korea, DPR*	26	0	0	22	0	0	21	0	0	?	?	0
Russia	16	28	19	20	26	14	21	19	11	29	20+	14
Taiwan	4	0	0	4	0	0	4	0	0	5	0	0
USA	0	55	18	0	57	14	0	53	14	0	46	12
TOTAL	161	88	38	160	90	31	173	78	32	175	85	41
Source: IISS Military Balance 2000, 2010, and 2023												
*) exclude midget (SSW) and coastal submarines (SSC)												
**) author's estimates from various sources SSK: diesel-electric attack submarine; SSN: nuclear-powered 'hunter-killer' submarine; SSBN: ballistic missile nuclear submarine.												

For some navies, quality is a quantity. The number of warships matters less than their individual ability to sail and fight.[16] This is where AI comes into the fray especially since manpower issues have compelled some navies to perform more operational tasks with fewer hands.[17] While nuclear propulsion has increased the range and endurance of submarines—hence, increasing their stealthiness—AI can handle some or even all of the tasks that previously required human operator or intervention. Consequently, the future underwater domain will host various means of warfare born out of the three revolutions from the last two centuries: industrial, nuclear, and information.[18] The industrial revolution, which oversaw the adoption and operation of diesel-electric submarines in World War I and II, led to the nuclear revolution in

the Cold War that introduced nuclear propulsion and nuclear weapons to submarines.[19] The question is what will the information revolution, with AI at its core, bring to the fore in this century and specifically, in the Indo-Pacific?

The Indo-Pacific Underwater Seascape: Less Stable?

All the national submarine operators in Table 1 have coastlines in the Indian or Pacific oceans, or both. But what binds them together is the recognition that the two oceans have become connected commercially and militarily into one giant maritime theatre, the

Deterrence in Southeast Asia," *Contemporary Security Policy,* 36:3 (2015), pp. 489-490.

[15] "Russia Submarine Capabilities," *Nuclear Threat Initiative,* Mar. 6, 2023, https://www.nti.org/analysis/articles/russia-submarine-capabilities/.

[16] Till caricatures quantitative approaches to measuring naval power as "bean-counting exercises", since they may "disregard such issues as technical quality, professional skill and maintenance efficiency." Geoffrey Till, *Seapower: A Guide for the Twenty-First Century,* 2nd ed. (Oxon: Routledge, 2018), p. 115.

[17] Obvious examples are the Australian and Singapore navies. See, James Goldrick, "Submarine Acquisition in Australia," and Collin Koh, "Submarine Acquisition in Singapore" in *Naval Modernisation in Southeast Asia, Part Two: Submarine Issues for Small and Medium Navies,* ed. Geoffrey Till and Collin Koh Swee Lean (Cham: Palgrave Macmillan, 2018), pp. 32 and 85.

[18] Michael Horowitz and Paul Scharre, *AI and International Stability: Risks and Confidence-Building Measures* (Washington DC: Center for a New American Security, January 2021), p. 4.

[19] Karl Lautenschläger, "The Submarine in Naval Warfare, 1901-2001," *International Security,* 11:3 (1986-87), pp. 94-140.

Indo-Pacific.[20] There are, however, detractors to this view who retain their "splittist" argument that the two oceans should remain separate and be treated as such, diplomatically and militarily.[21] Still, many countries in the two oceanic littorals are intimately linked by seaborne trade that underpins globalization.[22]

While increasingly interconnected by commerce, many Indo-Pacific countries still struggle with legacy geopolitical problems. Some of these problems are located at sea, such as the maritime disputes in the South China Sea, while others are landbound problems with maritime implications, such as the Sino-Indian border disputes.[23] Amid and exacerbating these problems are the multidimensional disputes between the United States and China, and their geopolitical rivalry in the global, specifically in the maritime, Indo-Pacific world. These countries aspire to acquire and/or operate means of potent coercion to manage, if not settle, geopolitical problems on their own terms.

Some of these means operate underwater. Although the manned submarine remains the most potent means of all, its tactical and technical dominance has come under challenge from emerging technologies, particularly in autonomous systems and potentially quantum sensing technologies to make the underwater domain more 'transparent .'[24] While autonomy "is more of a continuum stretching from remote automation to true autonomy," only the latter-end of the continuum encapsulates the use of AI *par excellence*.[25] AI has enabled submarines to operate with very minimum human interference as Unmanned Underwater Vehicles (UUVs), or even without it, as Autonomous Underwater Vehicles (AUVs).[26]

UUVs can complicate or even exacerbate existing geopolitical problems by, among others, allowing countries to adopt riskier tactics while probing their rival's warning systems and response capacity. A 2022 study by CRDF Global and BASIC notes that autonomous systems would be "most disruptive" if they combine *both* decision-making autonomy and nuclear propulsion.[27] "Decision-making autonomy is critically important for [UUVs], as the ability to communicate with such an asset is severely degraded at operational depths," whereas "a nuclear fission reactor (very high energy and power density)" would give "any autonomous platform greater mission scope and endurance." The advent of nuclear-powered and nuclear- armed UUVs, such as the Russian Poseidon, thus represent all the three revolutions above in a single platform.[28]
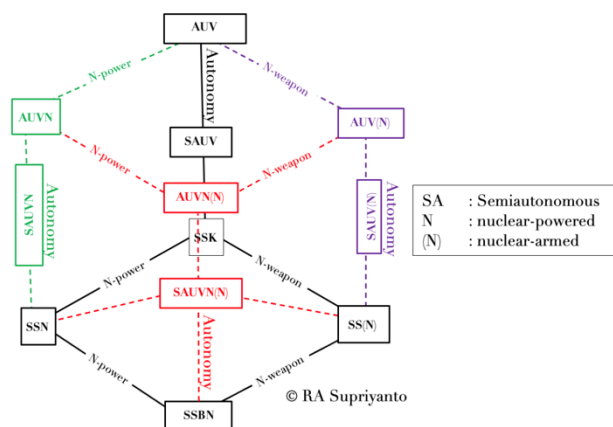

Figure 2. The 'cubical' complexity of Twenty-first century underwater warfare systems.

Figure 2 illustrates the cubical complexity of underwater warfare systems that these three revolutions have brought to the 21st century. It shows that the present and near-future underwater warfare systems can be a motley of three technological compositions: conventional/nuclear,

[20] As Rory Medcalf says in his "Preface": "In a connected, contested Indo-Pacific, no island is an island." Rory Medcalf, *Indo-Pacific Empire: China, America, and the Contest for the World's Pivotal Region* (Manchester: Manchester University Press, 2020).

[21] The two oceans are geographically separate per the International Hydrographic Organization (IHO). ASEAN thus views "the Asia-Pacific and Indian Ocean regions, *not as contiguous territorial spaces,* but as a closely integrated and interconnected region" (emphasis added). See article 6, *ASEAN Outlook on the Indo-Pacific,"* 2, https://asean.org/asean2020/wp-content/uploads/2021/01/ASEAN-Outlook-on-the-Indo-Pacific_FINAL_22062019.pdf

[22] Till, *Seapower,* 1-2.

[23] On the maritime dimension of Sino-Indian disputes, including in the border areas, consult C. Raja Mohan, *Samudra Manthan: Sino-Indian Rivalry in the Indo-Pacific* (Washington DC: Carnegie Endowment for International Peace, 2012).

[24] Andrew James defines emerging technologies as "new technologies that are at an early stage in their development or relatively mature technologies combined in new ways." Andrew D. James, "Emerging Technologies and Military Capability," in *Emerging Critical Technologies and Security in the Asia*

Pacific, ed. Richard Bitzinger (Basingstoke: Palgrave Macmillan, 2016), p. 19. For applications of quantum technology in the underwater domain, see Katarzyna Kubiak, "Quantum Technology and Submarine Near-Invulnerability," Global Security Policy Brief (London: The European Leadership Network, 2020).

[25] For an illustration of this 'continuum,' see Figure 2 in *Countering the Impacts of Anti-Submarine Technologies on Strategic stability in the South China Sea,* p. 11.

[26] See, Russel B. Wynn et al., "Autonomous Underwater Vehicles (AUVs): Their past, present and future contributions to the advancement of marine geoscience," *Marine Geology,* 352:1 (2014), p. 451.

[27] Chris Spedding et al., *Countering the Impacts of Anti-Submarine Technologies on Strategic stability in the South China Sea* (CRDF Global and BASIC, 2022), p. 11. Report is in the author's possession.

[28] "Russian Navy to put over 30 Poseidon strategic underwater drones on combat duty – source," TASS, Jan. 12, 2019. Read also, the probable North Korean version in Kim Tong-Hyung, "North Korea claims another test of underwater nuclear drone," Associated Press, Apr. 8, 2023. https://apnews.com/article/north-korea-nuclear-drone-test-6cbbc90f22f9102112ec5861a7af8421

manned/unmanned, and any possible combination between and amongst them. As autonomy is a continuum, some UUVs are merely semi-autonomous whose operations "can be undertaken by a non-human operator" albeit still "under [human] supervision" as an autopilot does.[29] These UUVs could be nuclearized (Figure 2's red lines) in terms of their propulsion and/or armament, likely in the form of extra-large UUVs (XLUUVs), if not ultra-large (ULUUVs), which are standalone rather than attached to a manned mother submarine.[30] The most disruptive of all is not only a nuclear-powered SAUV/AUV, but a *nuclear-armed* one.[31] An AUVN(N) or SAUVN(N), like the Poseidon, does not need to carry ballistic missiles for its nuclear weapons delivery like an SSBN does. Rather, it could deliver nuclear munitions on its own or from a mother submarine.[32] Even SSKs can be armed with nuclear-tipped cruise missiles and/or torpedoes, thus making them SS(N)s, like the Soviet *Foxtrot*-class deployed during the 1962 Cuban Missile Crisis and reportedly, Israel's German-built *Dolphin*-class in service now.[33] As such, a nuclear-armed, but conventionally-powered AUV or SAUV is neither far-distant nor far-fetched in the future.

As these technologies are maturing (depicted in Figure 2's dashed lines), so will the procedural guidelines—Verne's laws of men—such as doctrines and strategies that countries develop to optimize operational and tactical performance of these systems. Although it will remain as a major subsurface combatant, the manned submarine will be just one system among many in an underwater warfare environment whose ecosystem encompasses the seabed and water column to the surface and, in some cases, the airspace above. This ecosystem will become hotly contested in peace and a critical battlespace in war. Countries compete to degrade or capitalize on this ecosystem as a "kill box, a three-dimensional area used to facilitate the coordinated joint weapons fire," which includes "seabed sensors; intelligence, surveillance, and reconnaissance (ISR) devices; and effects devices."[34]

In the Indo-Pacific underwater seascape, geopolitical rivalries are turning geostrategic about these notional kill boxes. One example is China's so-called Underwater Great Wall (UGW) system of sensors to detect, track, and sink enemy submarines in parts of its coastal and adjacent waters, such as the South China Sea.[35] This concept is similar to the US Sound Surveillance System (SOSUS), in the Atlantic (and possibly beyond) that listened for enemy (Soviet) submarines during the Cold War. Unlike the SOSUS, which merely aims to improve underwater domain awareness (UDA), however; the UGW is a "kill box" in the true sense of the word, i.e., it also serves the offensive tactics of sinking enemy submarines, and incorporates other elements of naval warfare, such as mine and even seabed warfare. [36] In geostrategic terms, China's expansion and hardening of the UGW aims to restrict and hamper the ability of rival countries, such as the United States, to freely navigate for underwater military operations . [37] These operations are critical to prepare Washington's future military contingencies against Beijing, such as in a conflict over Taiwan. China's rivals may well respond by either developing similar systems in their waters, if not develop countermeasures to degrade, even nullify, the efficacy of the UGW, which the United States will likely do.[38]

---

[29] See, Figure 2 in Spedding et al., *Countering,* p. 11.

[30] One example of XLUUVs is the US *Orca* developed for mine warfare. "US Navy's ORCA XLUUV 64% Over Budget, 3 Years Late," *Naval News,* Sept. 29, 2022. https://www.navalnews.com/naval-news/2022/09/us-navys-orca-xluuv-64-over-budget-3-years-late/

[31] See the first out of ten CBRMs that Spedding et al. recommend. Spedding et al., *Countering,* p. 27.

[32] Chris Spedding et al., *Countering,* 11.

[33] Ryurik Ketov, "The Cuban Missile Crisis as Seen Through a Periscope," *The Journal of Strategic Studies,* 28, p. 2. (2005), pp. 217-231; "Israel Submarine Capabilities," *Nuclear Threat Initiative,* Mar. 2, 2023, https://www.nti.org/analysis/articles/israel-submarine-capabilities/.

[34] See "Abstract." Carr et al. also add: "In the case of seabed warfare, U.S. Navy has not utilized kill box as a tactic," however "With recent developments in military and sea-bed technologies, the ability to create battlespace transparency and execute an ambush-based tactic or kill box has only recently become an actionable reality." Christopher J. Carr et al., *Seabed Warfare and the XLUUV,* Systems Engineering Capstone Report, (Monterey: US Naval Postgraduate School, June 2018), p. 15.

[35] Jeffrey Lin and Peter Singer, "The Great Underwater Wall of Robots: Chinese Exhibit Shows Off Sea Drones," *Popular Science,* 22 June 2016. Also see, Carr et al., *Seabed Warfare,* pp. 2-4.

[36] However, Friedman testifies that "It is difficult to say how effective SOSUS was because we have neither Soviet submarine patrol reports nor declassified records of what SOSUS reported and tracked." Nor can it "be shown that over the next twenty or thirty years the ocean will not become transparent." Norman Friedman, *Strategic Submarines and Strategic Stability: Looking Towards the 2030s* (Canberra: ANU National Security College, Sep. 2019), pp. 26 & 32. See also, Abhijit Singh, "The Promise and Pitfalls of Underwater Domain Awareness," *War on the Rocks,* Feb. 10, 2023, https://warontherocks.com/2023/02/the-promise-and-pitfalls-of-underwater-domain-awareness/.

[37] An authoritative Chinese report in 2023 calls US 'freedom of operations' (FONOPs) "island-intrusive" whose intent is to "politicize military operations in the South China Sea." South China Sea Strategic Situation Probing Initiative (SCSPI), *An Incomplete Report on US Military Activities in the South China Sea in 2022,* Mar. 15, 2023, http://www.scspi.org/sites/default/files/reports/an_incomplete_report_on_us_military_activities0ain_the_south_china_sea_in_2022.pdf

[38] Sylvia Mishra exemplifies this probability in a purported UUV-dense ecosystem in the Indian Ocean: "If China begins deploying UUVs in the Indian Ocean Region (IOR) to detect Indian submarines, it would greatly accelerate instability in the region." Sylvia Mishra, "Sea Drones: Implications of the Great Underwater Wall of China," *Observer Research Foundation,* Aug. 2, 2017, https://www.orfonline.org/expert-speak/sea-drones-implications-great-underwater-wall-china/; Evan's concept of Indonesia's maritime A2/AD as a 'mini kill box'

The Changing Face and Evolving Risks of Underwater Warfare

The current Indo-Pacific underwater seascape has rendered the old face of naval warfare obsolete. Countries no longer exploit the bathymetric advantages of the underwater domain only for submarine and mine warfare, but also to employ them to challenge the enemy in a holistic manner: underwater, on the surface of land and sea, even the airspace above. [39] However, the changing face of naval warfare has not replaced its very nature. The top priority of naval warfare remains centered on the defense dimension, not security nor safety.

Take the submarine again. Combatant submarines are not built to insulate sailors from the crushing oceanic depths (if so, the person should have avoided the ocean in the first place!). Nor are they meant to perform law enforcement tasks, no matter how viable they might be in some cases.[40] Rather, these two are merely preconditions for the defense dimension, which is the priority. The logic thus works as follows: the submariner must be safe and secure enough to perform his duties effectively so that his submarine can keep its defense value intact, or a submarine's capability to attack and defend itself against potential enemy submarines and other military units.[41] While the safety of submariners, and what the submarine can do in law enforcement still matter, they do not overshadow the submarine's defense imperative. The latter is usually the first thing Indo-Pacific countries consider when acquiring or operating submarines.

This overt focus on defense can be counterproductive for preventive diplomacy such as CBRMs. While collaborating to improve maritime safety and security, many countries are augmenting defense in the underwater domain whose operational demands run counter to efforts in building interstate trust and confidence. The paradox becomes acute among countries that are geopolitical rivals. While they may not identify the rival as a hostile state *per se*, these countries nonetheless stay abreast with, even seek to counter, what the latter does to improve its underwater defenses. Consequently, there is a trend for these geopolitical rivals to acquire, if not the whole gamut of underwater warfare systems, then at least submarines. Hence, the growing submarine fleets in Table 1.

The problem partly stems from the offensive and clandestine nature of underwater warfare that is unique from its surface and airspace counterparts. While some underwater systems, like the UGW, may be dual-purpose, their capabilities are, relatively speaking, more offensive in nature than naval surface and air warfare systems. [42] Security and safety missions, such as maritime anti-piracy and search-and-rescue (SAR), are secondary motivations for countries acquiring or operating underwater systems like a submarine. In other words, underwater warfare systems may send clearer signals of national distrust to their rivals, real or potential, than do the surface or airspace systems.[43]

This trend can be destabilizing in strategic and tactical military terms. Strategically, they can exacerbate geopolitical rivalries. The acquisitions and operations of these underwater warfare systems have set in motion an arms competition among some countries to stay abreast of the latest technological trends, at least with manned submarines. [44] If unabated, this arms competition could spiral into an arms race that might divert valuable resources, economic or otherwise, from non-military priorities.[45] While the present Indo-Pacific has not entered into a full-blown arms-race yet, tell-tale signs of a

---

[39] While the submarine was incapable of self-air defense, the German-designed 'Interactive Defense and Attack System for Submarines' (IDAS) submarine-launched anti-aircraft missile has made it possible today, even without the submarine "showing mast mounted optical or ESM sensors or even by surfacing." ThyssenKrupp, "IDAS - Interactive Defense and Attack System for Submarines," https://www.thyssenkrupp-marinesystems.com/en/products-services/innovations/missile-system-idas.

[40] The Dutch navy, for example, deployed its submarine for counter-piracy patrols in the Gulf of Aden under NATO auspices. NATO, "Dutch submarine to help NATO combat piracy off Somali coast," June 28, 2010, https://www.nato.int/cps/en/natolive/news_64706.htm.

[41] Lautenschläger, however, distinguishes between the "survival" and "defense" value of a submarine. The former rests on "its ability to remain undetected" rather than kinetically defending itself against or attacking the enemy as does the latter. Lautenschläger, "The Submarine in Naval Warfare," p. 98.

[42] For example, the UGW is also useful for marine geological and biological research purposes. Lin and Singer, "Great Underwater Wall."

[43] Sam Bateman, "Submarine Acquisition in Southeast Asia: The Dangers," in *Naval Modernisation in Southeast Asia,* ed. Till and Koh, pp. 15-27.

[44] In Bitzinger's words, "arms acquisitions by one state, even if it has no desire to threaten its neighbours, can often lead to anxieties and insecurities being felt by nearby states." This is especially the case with systems as opaque as the submarine. Richard Bitzinger, "A New Arms Race? Explaining Recent Southeast Asian Military Acquisitions," *Contemporary Southeast Asia,* 32:1 (2010), p. 65.

[45] Aaron Beng defines an arms race as the "most extreme manifestations of the arms dynamic when actors are going flat out or almost flat out in major competitive investments in military capability." Aaron Beng, "Submarine Procurement in Southeast Asia: Potential for Conflict and Prospects for Cooperation," *Pointer* (Journal of the Singapore Armed Forces), 40:1 (2014), p. 59.

submarine arms race are already afoot, as implicitly shown in Table 1.[46]

Tactically, the acquisitions and operations of underwater warfare systems in general are laden with misunderstanding and miscalculation risks. Due to their clandestine nature, underwater military operations in peacetime, ranging from special commando ops to nuclear submarine patrols, are more likely to provoke risky reactions from military rivals. For example, the sabotage of the *Nordstream* pipelines in the Baltic Sea in 2021 could generate unintended effects in the Indo-Pacific, where China has multiple maritime claims against neighboring countries .[47] Using the *Nordstream* case as pretext, China could advance its claims by intensifying ISR measures of critical underwater infrastructure, such as seabed cables, near its coasts and claimed features. [48] China's measures, while seemingly defensive, could trigger countermeasures from the United States and its allies, who might accuse China of undermining freedom of navigation.[49] This action-reaction cycle could result in accidents or incidents involving submarines like in Chart 1. This cycle, and the accidents/incidents it could generate, partly motivates criticisms over British and American decisions to help Australia, a non-nuclear power, to obtain nuclear-powered submarines under the Australia-United Kingdom-United States (AUKUS) security partnership.[50]

More risks, Less Confidence

Several regional institutions, particularly ASEAN and its networked architectures, have developed CBRMs to alleviate interstate tensions arising from geopolitical problems and competitive defense acquisitions such as submarines. Reflecting the clandestine and hence, politically sensitive nature of underwater military operations, there are only few direct underwater CBRMs available, and fewer still that Indo-Pacific countries are *willing* to implement.

Submarine SAR Training and Exercises

Various bilateral and multilateral submarine SAR training and exercises may include interaction among foreign submarine crews. One example is Exercise *Pacific Reach* (PACREACH) which is "a triennial, multi-lateral submarine rescue exercise, sponsored by the Asia Pacific Submarine Conference" (APSC).[51] PACREACH "aims to demonstrate regional submarine abandonment and escape rescue capabilities by conducting simulated submarine rescue missions utilizing the Submarine Rescue Diving Recompression System and Pressurized Rescue Module." The French Navy hosted the 19th APSC in December 2022 (the latest as of April 2023), attended by 13 nations, including the United States.[52] While promoting inclusivity, the APSC in its 19th iteration did not have Chinese or Russian participation.

Submarine Safety Information Portal (SSIP)

Initiated by the Singapore navy on May 18, 2017, SSIP "is a non-binding and voluntary mechanism" to share information based on "real-time tracking of deep draft commercial vessels and hazards to prevent underwater accidents." [53] While the SSIP

---

[46] While dismissing the existence of an arms race in the Indo-Pacific, Collin Koh admits that the "geopolitical urges to push on with submarine programmes, remain considerable, and submarine proliferation is likely to become a norm". Collin Koh, "AUKUS and Risks of Submarine Proliferation: A Preliminary Assessment," *Policy Brief No. 85* (Seoul: Asia-Pacific Leadership Network, 2022), p. 9. https://cms.apln.network/wp-content/uploads/2022/09/PB-85-Collin-Koh.pdf

[47] Seymour Hersh's widely quoted self-published article alleges the US government and some European NATO allies as the saboteurs. Seymour Hersh, "How America Took Out The Nord Stream Pipeline," Feb. 8, 2023, https://seymourhersh.substack.com/p/how-america-took-out-the-nord-stream. However, Reuters "was unable to corroborate Hersh's self-published article." See, "Factbox: Seymour Hersh: who is the journalist who claims the US blew up the Nord Stream pipelines?" Reuters, Feb. 10, 2023. https://www.reuters.com/world/us/prize-winning-reporter-seymour-hersh-no-stranger-controversy-2023-02-09/

[48] Anna Gross et al., "China exerts control over internet cable projects in South China Sea," *Financial Times,* Mar. 14, 2023, https://www.ft.com/content/89bc954d-64ed-4d80-bb8f-9f1852ec4eb1.

[49] As the SCSPI report notes, "Against the backdrop of the Russia-Ukraine conflict, US military operations in the South China Sea continued unabated in 2022, significantly increasing the risk of maritime and air frictions and conflicts between China and the US." SCSPI, *Incomplete Report,* ii.

[50] While these critics mainly target the SSN component of AUKUS, these critics tend to miss AUKUS "Pillar II Advanced Capabilities", which put the

SSNs within the wider context of "underwater warfare." Australian Government, *National Defence: Defence Strategic Review 2023* (Canberra: Commonwealth of Australia, 2023), 72. Derek Grossman, "Why China Should Worry About Asia's Reaction to AUKUS," *Foreign Policy,* Apr. 12, 2023, https://foreignpolicy.com/2023/04/12/aukus-china-indo-pacific-asia-submarines-geopolitics/.

[51] Thomas Gooley, "The 10th Triennial Pacific Reach Exercise Kicks off in Australia," *US Indo-Pacific Command,* Nov. 7, 2019. https://www.pacom.mil/Media/News/News-Article-View/Article/2011651/the-10th-triennial-pacific-reach-exercise-kicks-off-in-australia/.

[52] Dispen Koarmada RI, "Delegasi TNI AL Hadir Dalam 19th Asia Pacific Submarine Conference di Tahiti, French Polynesia," *Kongkrit,* Dec. 23, 2022. https://kongkrit.com/delegasi-tni-al-hadir-dalam-19th-asia-pacific-submarine-conference-di-tahiti-french-polynesia/

[53] Koh Swee Lean Collin, "Commentary: Asia-Pacific's submarine aspirations make regional waters more congested - and riskier," *CNA,* Jan. 9, 2023. https://www.channelnewsasia.com/commentary/submarine-invincible-singapore-navy-asian-china-defence-3186236; Singapore Ministry of Defence, "Enhancing Maritime Security Through Closer Information Sharing," May 18, 2017. https://www.mindef.gov.sg/web/portal/mindef/news-and-events/latest-releases/article-detail/2017/may/18may17_nr2

"would not track the movement of submarines," it "would capture other hazards, such as seismic activity."[54] Five years on, however, Collin Koh states that the SSIP's real traction among Indo-Pacific countries and its "adoption cannot be assessed to be widespread due to varying national interests governing submarine operations."[55]

Underwater Code for Unplanned Encounters at Sea (CUES)

Adopted by the 21 member navies of the Western Pacific Naval Symposium (WPNS) on April 22, 2014, CUES is "a coordinated means of communication to maximise safety at sea."[56] Although not legally binding, CUES "offers safety measures and a means to limit mutual interference, to limit uncertainty, and to facilitate communication when naval ships or naval aircraft encounter each other in an unplanned manner." If applied in the underwater domain, for instance, "surfacing submarines are to release a red pyrotechnic to alert surface ships to give them time to clear away from the area."[57] However, the present CUES only applies to surface vessels and aircraft, and therefore is not relevant to underwater safety issues, such as submarine collisions.[58]

Waterspace Management (WSM)

As the US Department of Defense (DoD) puts it, WSM concerns the "allocation of waterspace in terms of antisubmarine warfare attack procedures to permit the rapid and effective engagement of hostile submarines while preventing inadvertent attacks on friendly submarines," i.e., a declared "kill box."[59] Reflecting the WSM in principle, in April 2017 Malaysia announced "three Permanent Submarine Exercise Areas" (PSEAs) off the coasts of Peninsular and East Malaysia, "aimed to provide a safe area for Malaysian submarines to conduct its operations," including "weapon firings, diving operations and

surveying."[60] Failure to comply with these requirements would not render Malaysia liable "for any damage or loss of ships, equipment, and life, caused as a result of an accident involving a Malaysian submarine." Since Malaysia's PSEAs are unilateral, however, it begs the question whether other countries would follow suit or even comply.

Prevention of Mutual Interference (PMI)

Quoting the DoD again, PMI refers to "procedures established to prevent submerged collisions between friendly submarines; between submarines and friendly, surface ship-towed bodies and arrays; and between submarines, unmanned systems, and any other hazards to submerged navigation."[61] While observing PMI, NATO's Submarine Operating Authority, for instance, "analyses movements within its area of responsibility, then identifying and resolving potential submerged collisions…through [prior] notification of intended activities, in lieu of dynamic de-confliction, like air traffic control."[62]

These CBRMs mainly focus on the safety dimension, not on defense, which is the crux of the problem. Safety and security may be "the lowest common denominator" that make present CBRMs possible, but not effective. The reason is that these CBRMs, to use Colin Koh's terms, "obfuscate the real crux of those realities playing out" in the Indo-Pacific underwater domain, namely the defence imperative and aspiration.[63] As Indo-Pacific countries acquire and operate more underwater warfare systems, especially submarines, there is a need to revisit present CBRMs. The gap between what current CBRMs wish to accomplish, and how the defense imperative and aspiration is creating new seascape realities has ushered in four paradoxes. Reconciling each paradox (detailed below) is crucial if new CBRMs are to be more effective. To illustrate these paradoxes we use the submarine as an example.[64]

[54] Valerie Koh, "Singapore Navy launches world's first submarine safety portal," *Today,* May 19, 2017. https://www.todayonline.com/singapore/rsn-launches-worlds-first-submarine-safety-portal

[55] Koh, "Commentary."

[56] WPNS, *Code for Unplanned Encounters at Sea: Version 1.0,* 5. https://maritimesafetyinnovationlab.org/wp-content/uploads/2016/12/cues_2014.pdf

[57] Ong Hong Tat, "Promoting Safer Submarine Operations," *Pioneer,* June 1, 2016. https://www.mindef.gov.sg/web/portal/pioneer/article/regular-article-detail/ops-and-training/2018-dm/01Jun2016_01180

[58] Graham Ong-Webb, Collin Koh and Bernard Miranda, "Incident Prevention and Mitigation in the Asia Pacific Littorals: Framing, Expanding, and Adding to CUES," *RSIS Working Paper No. 304* (Singapore: S. Rajaratnam School of International Studies, Aug. 15, 2017), p. 4.

[59] US Department of Defense (DoD), *DOD Dictionary of Military and Associated Terms As of November 2021,* p. 229. https://irp.fas.org/doddir/dod/dictionary.pdf.

[60] Sam Bateman, "New Moves to Provide Regional Submarine Safety," *RSIS Commentary No. 110,* June 2, 2017. https://dr.ntu.edu.sg/bitstream/10356/83328/1/CO17110.pdf. Also see, Malaysian Notice to Mariners, Monthly Edition 04 of 2017, 30th April 2017, pp. 8-10. https://hydro.gov.my/index.php/component/jdownloads/send/9-bulanan-2017/26-ntm-04-2017?Itemid=0.

[61] US DoD, *DOD Dictionary,* 171.

[62] Chris Walter, "The Prevention of Mutual Interference Within the Subsea Littoral," *Hydro International,* Nov. 2, 2010. https://www.hydro-international.com/content/article/the-prevention-of-mutual-interference-within-the-subsea-littoral

[63] Swee Lean Collin Koh, "Expanded CUES: A Worthwhile Idea but Challenging Exercise," *Asia Pacific Bulletin,* Sept. 15, 2016, https://scholarspace.manoa.hawaii.edu/server/api/core/bitstreams/d548a2df-1c09-4090-ba34-6c929db5d08f/content

[64] As Table 1 shows, the submarine remains quite a popular underwater weapon of choice for many Indo-Pacific countries.

Paradox #1: A submariner's risk is his safety, but the submarine's risk is its defense value

CBRMs among non-allied nations may focus on the safety of submariners, but it is not the crux of the problem. To be effective, CBRMs must also address operational and tactical questions regarding the submarine's defense value. The defense imperative compels countries to use risky tactics, such as intelligence collection of the enemy fleet or wiretapping of seabed communication cables. These tactics are risky since they could trigger miscalculation and misunderstanding. Chances are such tactics will grow in both frequency and sophistication when more UUVs join Indo-Pacific navies. Unlike manned nuclear-powered submarines which on occasion still need to return to base to rotate and replenish the crew, nuclear-powered UUVs can submerge in an almost limitless duration. [65] Consequently, CBRMs could include limitations on the tactical and technical means of underwater warfare. [66] For instance, countries could consider banning the use of nuclear-powered and/or armed UUVs and AUVs given the limitless endurance of these capabilities for ISR.

Paradox #2: Meeting the defense imperative and aspiration with security formulas and safety measures

While joint safety training and security exercises of submarine crews or officers among rival nations could foster inter-personal relationships and even lessen geopolitical tensions superficially, they are by no means relevant to the national defense imperative and aspiration for the submarine. [67] None of these crews have personal conflicts with their foreign counterparts. Rather, the conflicts lie on the political level that may lead these crews from different nations to deploy their submarines against each other. CBRMs must thus include frank dialogues among political and strategic policymakers, *rather than* just operational personnel, on why and how submarines or any other systems are relevant for the maritime defense of their respective nations. Transparency of

intent is the key. But few transparency measures at present, such as defense white papers, have ever disclosed the specific rationale behind the acquisition of weapon systems, not least the submarine. Perhaps, some common international guidelines, if not standards, of what to include or disclose in and through such measures are warranted for new CBRMs.

Paradox #3: Submarine safety cooperation with real or potential rivals is risky since it compromises the defense value of one's own submarine

Operating a submarine is risky, but exposing its clandestine operations is riskier. While submarine accidents and incidents necessitate more international cooperation on operational safety, which some CBRMs may have done, such cooperation rubs directly against the clandestine nature of submarine operations. Unlike surface warships or maritime aircraft, the submarine functions—indeed, survives—on stealth. [68] Cooperating with non-allies, let alone potential rivals, would render submarines vulnerable.[69] New CBRMs must be able to manage this stealth-first logic. By knowing the general area where each other's submarines operate, countries are less likely to deploy them in riskier operations, because anti-submarine warfare (ASW) units could locate and neutralize them more quickly. As such, improving shared UDA, like in PMI areas, could become CBRMs in themselves, but participation in these CBRMs should also discourage countries from turning this awareness into an offensive advantage in future naval warfare.

Paradox #4: Submarines operations are risky but necessary, which inevitably create distrust and even loss of confidence on the target states of these operations

The effectiveness of a submarine's capability can only be gleaned once it is deployed in realistic operational scenarios. Inevitably, this means deploying them in contentious areas of operations where their detection can provoke adverse reactions, diplomatic or military,

---

[65] Spadding et al., *Countering,* p. 37.

[66] CRDF study on ASW and strategic stability in SCS. However, Collin Koh cautions that any underwater arms control "would easily come to naught, as evidenced by the interwar history of successive naval arms control efforts." Koh, "AUKUS," p. 9.

[67] Submarines are thus an exception to the contention of Stubbs and Stephens that "naval interactions of all kinds lead to increased trust at the naval level and therefore enhance opportunities for cooperation." Matthew Stubbs and Dale Stephens, "Opportunities for Enhancing Naval Cooperation in the Indian Ocean Region in the Presence of Strategic Competition," in *Maritime*

Cooperation and Security in the Indo-Pacific Region: Essays in Honour of Sam Bateman, ed. John Bradford et. al (Leiden: Brill Nijhoff, 2023), p. 270.

[68] Till posits that "stealthiness is a relative rather than an absolute operational advantage" depending on the "resources a country devotes to develop it." Geoffrey Till, "Submarines and Their Acquisition: A General Introduction," in *Naval Modernisation in Southeast Asia,* ed. Till and Koh, pp. 6-7.

[69] Hence, submarine safety cooperation usually occurs only among allies or close military partners.

from the target state. If so, the next stage of CBRMs should address the political and security sensitivities over foreign submarine operations. Should, for instance, CBRMs cover such questions as: what can and how to make target states accept foreign submarine operations in their territorial waters? For the submarine operators, what rules of conduct or CUES—the dos and don'ts—must they agree with target countries while exercising extra-territorial deployments, including in the waters of the latter? These questions are difficult and may run counter to the principle of transparency in most CBRMs.

Conclusion

Reconciling these paradoxes is difficult, but not impossible. The difficulty lies in reconciling what may be the ultimate paradox that recaps all four above: the defense imperative to fight underwater works contradictorily with the present CBRMs to gain trust and confidence from rival countries. The more lethal one's underwater capabilities are, the less confident do rival countries feel that these capabilities would *not* be targeted against them. That Indo-Pacific submarine operators and fleets have grown apace shows its own silver lining, however. More navies are aware of (if not better prepared for) the risks in submarine and other underwater operations beyond their security and safety concerns. While these navies prepare for underwater battles, nations and regional institutions work to ensure that wars will be costly in political and diplomatic terms. Future CBRMs should ascertain these countries that such costs would be steep and dear. But if these CBRMs continue to assert the safety and security dimension, while tiptoeing around political sensitivities in defense, they are doomed to repeat the present ones.

 given to the perspective of regional states to avoid creating a stability-instability paradox, i.e., stability in US-China strategic relations and instability at the regional level. Failure to do so could lead regional states to seek to obstruct or object to US-China dialogue for fear that their own security will be undermined. That, in turn, could make arms control in Indo-Pacific more difficult or, worse, a stillborn project.

Annex

				Submarine accidents or incidents, 2001-2021					
No	Date	Vessel	Owner	Accident	Damage	Casualties	Fatalities	Status	Location
1	9-Feb-01	SSN USS *Greeneville*	USA	Collision	Minor	35	9	At Sea	Pacific
2	21-May-01	SSK USS *Dolphin*	USA	Flood	Major	43	0	Decommissioned	Pacific
3	6-Nov-02	SSN HMS *Trafalgar*	UK	Grounding	Minor	3	0	Decommissioned	Isle of Skye
4	13-Nov-02	SSN *Oklahoma City*	USA	Collision	Minor	0	0	Decommissioned	Gibraltar Strait
5	12-Feb-03	SSK HMAS *Dechaineux*	Australia	Flood	Minor	0	0	At Sea	Indian Ocean
6	16-Apr-03	SSK *No. 361 'Great Wall'*	China	Technical faults	Total	70	70	Lost	Yellow Sea
7	13-May-03	SSN HMS *Tireless*	UK	Collision	Minor	0	0	Decommissioned	Arctic
8	30-Aug-03	SSN *K-159*	Russia	Flood	Total	10	9	Lost	Barents Sea
9	25-Oct-03	SSN USS *Hartford*	USA	Grounding	Minor	0	0	At Sea	Mediterranean
10	5-Oct-04	SSK HMCS *Chicoutimi*	Canada	Fire	Minor	1	1	At Sea	Atlantic
11	8-Jan-05	SSN USS *San Francisco*	USA	Collision	Major	98	1	Decommissioned	Pacific
12	5-Aug-05	SSA *AS-28*	Russia	Snaring	Minor	0	0	At Sea	Kamchatka
13	5-Sep-05	SSN USS *Philadelphia*	USA	Collision	Minor	0	0	Decommissioned	Persian Gulf
14	6-Sep-06	SSN *K-414*	Russia	Collision	Minor	2	2	Decommissioned	Arctic
15	29-Dec-06	SSN USS *Minneapolis-St Paul*	USA	Man overboard	None	4	2	Decommissioned	Atlantic
16	8-Jan-07	SSN USS *Newport News*	USA	Collision	Minor	0	0	At Sea	Arabian Sea
17	21-Mar-07	SSN HMS *Tireless*	UK	Explosion	Minor	3	2	Decommissioned	Arctic
18	7-Jan-08	SSK INS *Sindhughosh*	India	Collision	Minor	0	0	At Sea	Diu Island
19	26-May-08	SSN HMS *Superb*	UK	Collision	Medium	0	0	Decommissioned	Red Sea
20	8-Nov-08	SSN *K-152 'Nerpa'*	Russia	Explosion	Major	61	20	At Sea?	Sea of Japan
21	3-Feb-09	SSBN HMS *Vanguard* & FNS	UK & France	Collision	Minor	0	0	At Sea	Atlantic
22	20-Mar-09	SSN USS *Hartford*	USA	Collision	Medium	15	0	At Sea	Hormuz Strait
23	26-Feb-10	SSK INS *Sindhurakshak*	India	Fire	Medium	3	1	At Sea	Visakhapatnam
24	22-Oct-10	SSN HMS *Astute*	UK	Grounding	Minor	0	0	At Sea	Isle of Skye
25	4-Jun-11	SSK HMCS *Corner Brook*	Canada	Grounding	Medium	2	0	At Sea	Nootka Sound
26	23-May-12	SSN USS *Miami*	USA	Self-sabotage	Medium	0	0	Decommissioned	Maine
27	7-Jul-12	SSK KRI *Cakra*	Indonesia	Workplace hazards	None	2	2	At Sea	Java Sea
28	13-Oct-12	SSN USS *Montpelier*	USA	Collision	Minor	0	0	At Sea	Florida
29	10-Jan-13	SSN USS *Jacksonville*	USA	Collision	Minor	0	0	Decommissioned	Persian Gulf
30	14-Aug-13	SSK INS *Sindhurakshak*	India	Explosion	Major	18	0	Lost	Mumbai
31	16-Sep-13	SSN *K-150 'Tomsk'*	Russia	Fire	Major	15	0	At Sea	Vladivostok
32	17-Jan-14	SSK INS *Sindhughosh*	India	Grounding	None	0	0	At Sea	Mumbai
33	26-Feb-14	SSK INS *Sindhuratna*	India	Fire	Major	7	2	Alongside	Mumbai
34	19-Feb-15	SSK INS *Sindhughosh*	India	Collision	Minor	0	0	At Sea	Mumbai
35	Apr-15	SSN HMS *Talent*	UK	Collision	Minor	0	0	Decommissioned	North Sea?
36	11-Mar-16	SSK?	DPRK	Technical faults?	Total?	?	?	Lost?	Sea of Japan
37	20-Jul-16	SSN HMS *Ambush*	UK	Collision	Minor	0	0	At Sea	Gibraltar Strait
38	18-Aug-16	SSBN USS *Louisiana*	USA	Collision	Minor	0	0	At Sea	Juan de Fuca
39	1-Feb-17	SSBN INS *Arihant*	India	Flood	Major	0	0	At Sea	Visakhapatnam
40	1-Sep-17	SSN INS *Chakra (K-152 'Ner)*	India	Collision	Medium	0	0	At Sea	Indian Ocean
41	16-Nov-17	SSK ARA *San Juan*	Argentina	Technical faults	Total	44	44	Lost	Atlantic
42	1-Jul-19	SSAN *Losharik*	Russia	Explosion	Major	14	14	Alongside	Barents Sea?
43	15-Jul-20	SSK *Jang Bogo*-class	ROK	Collision	Minor	0	0	At Sea	Busan
44	8-Feb-21	SSK JS *Soryu*	Japan	Collision	Medium	3	0	At Sea	Sea of Japan
45	21-Apr-21	SSK KRI *Nanggala*	Indonesia	Technical faults?	Total	53	53	Lost	Bali Sea
46	2-Oct-21	SSN USS *Connecticut*	USA	Collision	Medium	11	0	Alongside	South China Sea
				SUM		517	232		

Source: Author's compilation from various sources.

6

Next Steps for Nuclear Weapons Management and Nuclear and Radiological Security in the Indo-Pacific

George M. Moore

Introduction

This chapter addresses several levels of nuclear and radiological security issues for many of the countries of the Indo-Pacific region as well as Taiwan. Several of the smaller countries in the region will be assumed to have similar issues to those described in the paper unless specifically noted. Also, because of their influence in the region, issues relating to Australia, New Zealand, India, Pakistan, the Russian Federation, the United States, and to some extent the United Kingdom will be considered in light of their potential effect on the nuclear and radiological security issues in East and Southeast Asia. In addition to identifying issues, this chapter will make recommendations to address these issues when possible.

The chapter will address nuclear security issues in the manner that they are covered by the Nuclear Security Division of the Department of Nuclear Safety and Security (NSNS) at the International Atomic Energy Agency (IAEA). The IAEA uses the following definition of Nuclear Security that was developed by the IAEA's Director General's Advisory Group on Nuclear Security (ADSEC) in the early 2000s:

The prevention and detection of, and response to, theft, sabotage, unauthorized access, illegal transfer, or other malicious acts involving nuclear material, other radioactive substances, or their associated facilities.[1]

The IAEA's Fundamentals of Nuclear Security document published by the IAEA clarifies the subject matter of Nuclear Security in its introduction where it states[2]:

- Nuclear security focuses on the prevention of, detection of, and response to, criminal or intentional unauthorized acts involving or directed at *nuclear material*, *other radioactive material*, *associated facilities*, or *associated activities*. Other acts determined by the State

to have an adverse impact on nuclear security should be dealt with appropriately.

- Nuclear security and nuclear safety have in common the aim of protecting persons, property, society, and the environment. Security measures and safety measures have to be designed and implemented in an integrated manner to develop synergy between these two areas and also in a way that security measures do not compromise safety and safety measures do not compromise security.

It should be noted that the safety and security issues addressed this chapter may occur not only in the context of the military weapons development activities in a particular state, but also may arise from issues related to the states' broader non-military uses of nuclear and other radioactive material in industrial applications, nuclear power, and other applications.

Nuclear Weapons

Of Indo-Pacific states, only China is defined as a Nuclear Weapon State (NWS) under the Nuclear Nonproliferation Treaty (NPT), while North Korea, India, and Pakistan have tested nuclear weapons (both fission and thermonuclear devices), developed stockpiles of weapons, and are *de facto* nuclear weapon states although they are not members of the NPT[3]. While the United States may no longer have nuclear weapons stationed on land in the Indo-Pacific, both the Russian Federation and United States operate military units, such as aircraft and ballistic missile submarines,[4] that are capable of nuclear weapons delivery and may carry nuclear weapons in and through the area. In addition, the United States can rapidly re-introduce nuclear weapons to the region should host countries (such as Japan or South Korea) make a request in times of rising tension. Recently both Japan and South Korea have discussed the concept of nuclear weapons sharing along the lines of NATO sharing with the United States[5] Under the NATO concept, US-controlled weapons are

---

[1] See, for example, INTERNATIONAL ATOMIC ENERGY AGENCY, Objective and Essential Elements of a State's Nuclear Security Regime, Nuclear Security Fundamentals, IAEA Nuclear Security Series No. 20, IAEA, Vienna (2013). At flyleaf page where the definition is in the text.
[2] Id. at page 1.
[3] Note that although they are non-NPT states some do have IAEA Safeguards at some facilities due to pre-NPT safeguards from INFCIRC-66 and agreements with supplier states for some equipment. Although there are some who would argue that North Korea's withdraw from the NPT was

not effective due to notice issues, the better position is that North Korea has withdrawn.
[4] B. Lendon, "One of the US Navy's most powerful weapons makes a rare appearance in Guam," CNN online. Available at https://www.cnn.com/2022/01/16/asia/us-navy-ballistic-missile-submarine-guam-intl-hnk-mi/index.html
[5] Japan's prime minister Abe proposed that Japan should consider a nuclear sharing agreement with the United States similar to the US agreement with NATO. Under such a plan, weapons would be on Japanese soil under US control, but releasable to Japan in the event of hostilities. See, "A New

stationed in NATO countries and can be turned over to NATO units that are fully trained to employ them.

Both China and North Korea are currently working to increase their stockpiles of nuclear weapons and to improve their launch and delivery systems.[6] Along with the overall increase in the size of its navy (the PLAN), China has upgraded submarine bases and its attack (SSN) and ballistic missile submarine (SSBN) forces. North Korea also appears to have worked on, and perhaps mastered, the techniques for submarine launching of ballistic missiles. Japan, in response to what it perceives as an increasing maritime threat from China, has increased defense spending and is building up its navy (the JMSDF). Its navy now includes small jump-jet aircraft carriers.

Nuclear submarine development has contributed significantly to what may become a serious naval arms race in the region. India's recent development of its indigenous nuclear-powered submarines (ballistic missile submarines with class leaders INS Arihant and INS Arighat) and Australia's program to acquire nuclear powered attack submarines (AUKUS) may become significant driving forces in a regional race or sub-races that may result in increased development of nuclear weapons carrying ballistic missile submarines and increased stockpile levels to arm these submarines. India's path to nuclear submarines started when it leased an SSN from the Soviet Union and then leased a second SSN from the Russian Federation. Pakistan has shown interest in perhaps following India's lead by leasing an SSN from China.[7]

Obvious regional flash points are a potential Chinese invasion of Taiwan and the continuing threats from North Korea against South Korea as well as North Korea's broader threats to others, including the mainland United States. Additional minor trigger points for conflict can arise from China's aggressive

actions in the South China Sea and their rejection of international legal findings related to their actions such as their creation of artificial islands. Of course. from the perspectives of China and North Korea their respective actions and threats are justified by their perception that the United States and others are states that oppose their activities are the ones that are raising tensions and acting in an aggressive manor in regions where they have no justified right to exert military force.

Currently flash point tensions seem to be increasing and all states seem to be closely monitoring the Russian war in Ukraine to see what effect it could have on potential hostilities in the Indo-Pacific. Increased tensions have caused many states to consider if, or how, nuclear weapons might be involved if hostilities break out in the region and if that were to occur whether it would spread to a global nuclear war. Although neither China nor the United States has currently publicly discussed or threatened the use of nuclear weapons in the Indo-Pacific, there is a long history of the United States considering nuclear weapons use, particularly with regards to Taiwan.[8] As tensions increase, more non-nuclear countries may question the reliability of the United States' nuclear umbrella and may show an increasing interest in proliferation. Of Indo-Pacific states, Taiwan, South Korea, and Japan stand out as those with both a potential interest in proliferation and an obvious ability to rapidly produce nuclear weapons should they determine it to be in their interest.

A rapid development of nuclear weapons by these states would require them to reprocess spent reactor fuel for reactor grade plutonium since these countries currently do not possess facilities for uranium enrichment or nuclear reactors suitable to produce weapons-grade plutonium (on the order of 7% or less in plutonium-240). Despite many media and

Nuclear Debate in Japan," The Wall Street Journal, March 1, 2022. Available at: https://www.wsj.com/articles/a-new-nuclear-debate-in-japan-shinzo-abe-nato-us-russia-ukraine-vladimir-putin-china-xi-jinping-11646147202 . See, also, Shin Hyeong-cheol "Ruling party lawmaker pitches NATO-style nuclear sharing for Korea, "HANKYOREH online March 29, 2023. Available at: https://english.hani.co.kr/arti/english_edition/e_national/1085705.html.

[6] North Korean dictator Kim Jung Un has recently called for an "exponential increase" in North Korea's nuclear weapons stockpile. See, B. Lendon and G. Bae, "Kim Jong Un calls for exponential increase in North Korea's nuclear arsenal amid threats from South, US," CNN online, Jan. 2, 2023. Available at: https://www.cnn.com/2022/12/31/asia/north-korea-kim-jong-un-nuclear-expansion-intl-hnk-ml/index.html

[7] Ministry of Foreign Affairs of the People's Republic of China, "Foreign Ministry Spokesman Zhao Lijan's Regular Press Conference on August 29, 2022." Available at:

https://www.fmprc.gov.cn/mfa_eng/xwfw_665399/s2510_665401/202208/t20220829_10757209.html

Spokesman Lijan stated: "China firmly opposes the nuclear submarine cooperation between the US, the UK and Australia. During this review conference, China and many other countries expressed concern over their cooperation and viewed it as a violation of the object and purpose of the NPT which could impact the IAEA's safeguard and monitoring system and pose grave nuclear proliferation risks."

[8] See, for example, G. Kulaki, "Could US Nuclear Weapons Prevent an Attack on Taiwan?" Union of Concerned Scientists online March 7, 2022. Available at: https://blog.ucsusa.org/gregory-kulacki/could-us-nuclear-weapons-prevent-an-attack-on-taiwan/ See, also, D. Bandow, "Are Americans Prepared to Fight a Nuclear War Over Taiwan?," Cato Institute May 25, 2022. Available at: https://www.cato.org/commentary/are-americans-prepared-fight-nuclear-war-over-taiwan

publicity articles to the contrary, technically advanced states can create fission devices using spent reactor fuel by reprocessing fuel from the normal changeout of the fuel to recover what is typically referred to as reactor-grade plutonium. If a country with the technological capability of Japan or South Korea has already developed designs and arming and firing systems, the breakout time to add reactor grade plutonium and produce a fully capable fission weapon could be on the order of months or even weeks and the weapons would be workable without testing.

The use of reactor grade plutonium for nuclear weapons is a significant concern because Japan already has massive stockpiles of separated reactor-grade plutonium, China is planning to embark on a major civilian reprocessing program, and South Korea has long sought required US approval to engage in reprocessing.

Japan began a reprocessing program in the 1980s when it was believed that uranium would become scarce. Therefore, use of reprocessed plutonium mixed with uranium as Mixed Oxide fuel (MOX) or use of the plutonium as fuel in fast neutron reactors would be an economic means of getting greater energy output per ton of mined uranium. Since then, it has become evident that uranium is relatively abundant, MOX fuel has had only limited acceptance, and the construction of reprocessing facilities and fast reactors is no longer makes economic sense. Nonetheless, bureaucratic and political momentum has continued to sustain the Japanese reprocessing program, which has now focused on MOX fuel for use in conventional light water reactors. Several decades ago, Japan began construction of the gigantic reprocessing and fuel fabrication facilities at Rokkasho whose opening has been repeatedly postponed. In the meantime, Japan has shipped tons of spent fuel to France and the United Kingdom to be reprocessed and returned for fuel fabrication. As a result of all these factors, Japan's stockpile of reactor grade plutonium continues to increase.

South Korea (ROK) has been seeking for several decades to follow Japan's reprocessing model, despite the obvious potential proliferation and security concerns inherent in reprocessing. It has sought US approval to reprocess spent fuel[9] using a reprocessing technique known as pyroprocessing. Pyroprocessing is a form of reprocessing which does not separate pure plutonium but mixes it with some other transuranic elements. ROK officials have argued that the pyroprocessing technology is more proliferation resistant than traditional reprocessing but the US national laboratories have concluded that while the process may make it more challenging for terrorists to use the material in an improvised nuclear device, pyroprocessing offers little enhanced proliferation resistance for technically advanced states like South Korea.[10] As a result, Washington has resisted giving Seoul the requested approval although it has allowed the US national laboratories to conduct years of joint experiments with their South Korean counterparts to further investigate relevant technical and economic issues.[11]

As China's use of nuclear energy has increased to the point where it is the home to the second largest number of civilian nuclear power plants in the world (after the United States), China's interest in reprocessing spent fuel for civilian use has also increased. In addition, many analysts see China's interest in reprocessing as a means of potentially providing additional plutonium for what the US Department of Defense has assessed is a growing nuclear arsenal. China has opened a small pilot reprocessing facility in recent years with a major reprocessing facility slated to open this decade.

On the other hand, civilian holdings of the other typical fissile material used for weapons—highly enriched uranium (HEU)—have diminished thanks to US and Chinese efforts in this regard. Particularly noteworthy have been US supported efforts to convert some major Japanese facilities to low enriched uranium and to permit the importation of spent Japanese HEU fuel to the United States.

Finally, given the number of states in the region that possess nuclear weapons and the of separated reactor grade plutonium, a terrorist or substate actor's use of either a stolen nuclear weapon or making an Improvised Nuclear Device (IND) using stolen material should be considered.

---

[9] The United States has consent rights over ROK reprocessing because it involves reprocessing fuel that is covered by a bilateral US-ROK agreement which affords the US control over reprocessing.

[10] See, for example, "South Korea's pyroprocessing is not proliferation-proof, official says," Hankyoreh online, Oct. 30, 2014. available at: https://english.hani.co.kr/arti/english_edition/e_international/662159.html. See also, E. Lyman, "The Pyroprocessing Files," Union of Concerned Scientists, August 12, 3017. Available at: https://blog.ucsusa.org/edwin-lyman/the-pyroprocessing-files/

[11] Ibid.

As mentioned above, the difficulty of using of reactor grade plutonium for a nuclear weapon probably prevents a terrorist or substate actor from using the material in an IND. This, coupled with the decreased amount of HEU in the region, probably makes theft of material for use in a successful attack unlikely. However, theft could lead to use in a radiological dispersal device—a serious security concern.

There is no reason to believe that nuclear weapons that exist in China, North Korea, Pakistan, or India are not secure, but many have questioned whether the security and safety standards are at the same level as those in other nuclear-armed states. [12] Coupled with the technical issues involved, there is also a perception that some of the states, particularly Pakistan and North Korea, have governments that might lose control of nuclear weapons in an internal power struggle. In addition, questions have been raised as to whether nuclear weapons at exist in the Indo-Pacific contain equivalent safety and tamper prevention features that are assumed to be present in the designs by United States, United Kingdom, France, and the Russian Federation. Could a terrorist group or substate actor steal and then use one or more of the Indo-Pacific weapons?

Recommendations on Nuclear Weapons Management

Limitations on the number of nuclear weapons in Indo-Pacific countries can be considered at several levels. At the highest level is what can be negotiated with China for limits on its strategic and tactical nuclear weapons. At a lower level is what influence China might exert on other *de facto* nuclear weapons states to either limit or eliminate their nuclear weapons. Historically attempts to include China in strategic arms limitation talks with the Russian Federation have been unsuccessful. Direct talks with the Chinese government on these issues are currently problematic given the current tensions between the United States and China. However, arms limitation negotiations should be pursued at every opportunity.

At an arguably lower level, the history of talks, agreements, and broken agreements with North Korea reflects the difficulty of dealing with the North Korean dictatorship. However, this history also shows that when North Korea feels it is in their interest, they have been willing to negotiate. Without pressure from China, however, it is doubtful at this time that North Korea will feel the need to negotiate. Efforts should be made to involve the Chinese with its potential influence on North Korea to the greatest extent possible. However, China may be very reluctant to become involved and may consider that its non-involvement increases US problems in the region to China's advantage.

Finally, the Indian and Pakistani weapons programs should be considered. Here the question is what influence the United States and other states can bring to bear. Since stockpiles in both states are limited, negotiations for reductions may be difficult, if not impossible. However, there are two areas that might be considered for discussion. First, there may be common interests in safety and security that could be a focus of negotiations/ongoing discussions. Other nuclear weapons states might even consider sharing safety and security technology and practices to decrease the potential of inadvertent use or accident. Second, both India and Pakistan appear to be moving to seaborne launching systems to enhance their deterrence versus each other. [13] There may be some potential for negotiation at this point and it would focus, much like the older US/Russian agreements, on limitation on launch vehicles and warheads. Both states may be interested in avoiding the cost of the potential nuclear arms race at sea.

Beyond Pakistan and India, it is doubtful that in the current environment there could be any meaningful agreements in the region on naval buildups that would limit the increase of nuclear-powered submarines or perhaps nuclear-powered surface vessels.

---

[12] Concerns tend to be of two types. The first concern is for the security of the weapons stockpile, storage, and transport, with concerns about how susceptible the weapons are to theft by terrorists or from governmental instability. See, for example, Kalb, Marvin, "The Agonizing Problem of Pakistan's nukes, Brookings Institute online, September 28, 2021. Available at: https://www.brookings.edu/articles/the-agonizing-problem-of-pakistans-nukes/ . See also, Oriana Mastro, "Conflict and Chaos on the Korean Peninsula: Can China's Military Help Secure North Korea's Nuclear Weapons?" International Security Vol. 43, No. 2 (Fall 2018), pp.84–116. Available at: https://direct.mit.edu/isec/article-abstract/43/2/84/12205/Conflict-and-Chaos-on-the-Korean-Peninsula-Can?redirectedFrom=fulltext. The second

type of concern is about how safe the nuclear weapons designs and operational safeguards for the countries' weapons are. Countries such as the United States discuss their "One point safe" designs, use of Permissive Action Links (PALs), insensitive high explosive (IHE) and other safety measures taken to prevent inadvertent use or to block unauthorized use. The nuclear weapons possessing states in the Indo-Pacific, by contrast are secretive and silent on these issues which leaves an open question as to their weapons' safety in comparison to western weapons states.

[13] Note that this may not be a purely bilateral issue. China may view seaborne Indian systems as a theat.

The security of the materials necessary to build nuclear weapons or INDs may prove more amenable to negotiation. The key nuclear weapons players (except for North Korea) and many other states in the region have joined the Convention on the Physical Protection Materials and its 2005 Amendment (CPPNM/A). Although there is no enforcement procedure in the CPPNM/A, states have obligated themselves to protecting nuclear materials by methods that are defined in the treaty. The CPPNM/A establishes protection mechanisms based on the perceived risk of the nuclear materials being protected. In addition, as members of the IAEA (except again for North Korea) states in the region are encouraged to follow the guidelines of INFCIRC 225/Rev 5 which expands slightly on the CPPNM/A coverage. Also, most of the states of the region have ratified the International Convention for the Suppression of Acts of Nuclear Terrorism (ICSANT) which entered into force in 2007. ICSANT attempts to fill gaps that were perceived in prior conventions and treaties. Finally, states in the region are mandated by UNSCR 1540 to criminalize WMD activities including those that might lead to development of WMDs by substate actors. The IAEA Safeguards system in Nonnuclear Weapon States (NNWS) under the NPT provides additional assurances that nuclear material is being used for nuclear weapons.[14]

The current levels of support for the efforts to increase the safety and security of nuclear materials (and other radioactive materials) in the region are simply not adequate. More efforts by richer states, by the IAEA, by the UNSCR 1540 Committee and other international organizations are necessary to begin to approach acceptable levels of safety and security. Many states in the region, particularly the smaller states, require ongoing training, technical assistance, and hardware that they cannot afford without aid. Although IAEA Safeguards efforts arising from the NPT are relatively well funded, even those efforts need budgetary expansion so that more frequent and intense inspections can be carried out. The IAEA's nuclear security efforts are far less well funded and generally depend primarily on voluntary donations to procure equipment and training. States and donors

can benefit from the establishment of regional training and the development of local centers of excellence that can focus efforts and provide cost savings. Encouraging China to support these types of efforts may not be possible this time but should be pursued whenever possible.[15]

It is recommended that nonproliferation efforts need to be increased to offset the perceived need by some states to develop their own weapons for self-protection. The United States and its allies should reassess and firm up their commitments in the region. The time for ambiguity may be well past and ambiguous policies may now be doing more harm than good. Reassuring its allies that the nuclear umbrella and/or the ability to provide realistic adequate defense with conventional weapons is essential to lessen some states' feeling that they need to proliferate. More visibility of US nuclear capable assets and conventional assets in the area may be useful, but these efforts are expensive and could be counter-productive if they increase tensions by raising insecurity and are seen as increasingly threatening by potential aggressor states.

Trafficking of Nuclear and Other Radioactive Materials

Trafficking is the illegal movement of nuclear and/or other radioactive material. Trafficking can begin with a theft of the material or might begin with a loss of control of the material. Out of control material and trafficking creates nuclear security risks associated with the illegal use of the out-of-control materials.

There is a potential lethal risk that these out-of-control materials can be used directly for radiation exposure to people using a Simple Exposure Device (SED).[16] They can also be used like a poison such as the polonium 210 that was used to assassinate ex-KGB officer Alexander Litvinenko. However, the greatest concern is that out-of-control nuclear and other radioactive materials can be used in some type of Radiological Dispersal Device (RDD). The most well-known type of RDD is the "dirty bomb" where

[14] See, Pacific Forum Note however that the NPT allows military uses of nuclear material so long as the material is not used in a nuclear weapon. Military uses such as nuclear propulsion are allowed. Further, the NPT does not restrict state's ability to engage in either enrichment or reprocessing. Available at: https://pacforum.org/publication/issues-insights-vol-22-sr8-next-steps-for-the-us-china-strategic-nuclear-relationshipocessing so long as resulting materials are not used for nuclear weapons.

[15] For a recent overview of the potential for US-China relations going forward see, D. Santoro ed., "Next Steps for the US-China Strategic Nuclear

Relationship," Pacific Forum International Issues & Insights Vol. 22, SR8 (October 2022). Available at: https://pacforum.org/publication/issues-insights-vol-22-sr8-next-steps-for-the-us-china-strategic-nuclear-relationship In particular, note Chapter 5 by M. Pomper and S. Gogna, "US-China Areas of Cooperation: Nonproliferation and Nuclear Security."

[16] An SED is a device that merely exposes the potential victims to a dose of radiation without attempting to disperse the radioactive material.

radioactive material is dispersed by using explosives, but there are several other methods of dispersal. If successful an RDD may result in wide dispersal, contaminating large areas, and inflicting potentially huge economic losses.

RDD use either by state or substate actors is a real threat in the Indo-Pacific. Regional countries have seen both real and hoax attempts to sell both nuclear and other radioactive materials. Expanding use of radioactive materials for commercial and medical purposes in the Indo-Pacific increases the risk that these radioactive materials may be lost or stolen. Fortunately, there are also significant efforts in the Indo-Pacific to replace radioactive materials with non-radioactive devices that perform the same functions. For example, Japan has led the way in development of x-ray systems for blood sterilization replacing the use of radioactive materials. In cancer treatment some of the developed states in the region have units using radioactive materials with linear accelerators.[17] Such replacements are expensive and smaller states will undoubtedly need funding support from donor states or organizations to make these transitions.

Fortunately, IAEA assistance to states in the region includes states working with the IAEA to develop a state-specific security plan, the Integrated Nuclear Security Support Plan (INSSP). Working together, the state and the IAEA determine, without regard to cost, what is necessary for the state to have an adequate security plan for nuclear and other radioactive material security. Recommendations may include additions to or changes to regulatory agencies and their policies and procedures and may also include recommendations for needed hardware equipment such as radiation detectors, portal monitors, etc. With the state's permission, the IAEA will then seek donors to provide funding for new or upgraded equipment and training identified in the INSSP. In addition, the Technical Cooperation department of the IAEA engages in human capital development in nuclear and radiation uses. This can further assist in increasing a state's nuclear security regime and the development of a positive nuclear security culture.

There is concern about those areas of Indo-Pacific where detection capabilities for nuclear and other radioactive materials out of control are perceived to be ineffective. Ineffective detection such as at border crossings and in ports raises concerns that the region could be a point of origin for shipment of nuclear weapons or RDDs to be used not only within the Indo-Pacific, but also against the United States or other potential targets. To address this concern the United States has developed programs such as the Megaports Initiative, providing detection equipment to larger ports in the Indo-Pacific. Megaports provided equipment and initial training for personnel with the goal of ultimately transferring the equipment to the local agencies operating the port. Unfortunately, the Megaports program has suffered funding cuts and has fallen off the radar with little data collection about how effectively states are operating the systems that were provided under Megaports.

Although radiation detection equipment is essential in determining whether devices or materials are radioactive and what radionuclides may be involved, experience has shown that many of the actual arrests for real nuclear trafficking have resulted from police and intelligence work, with radiation detection equipment usually brought in after arrests have been made. Training of first responders on how to deal with scenarios involving nuclear and radioactive material is an ongoing need worldwide. INTERPOL, IAEA, and other organizations have been involved in CBRN training for police and security services in the Indo-Pacific in addition to the training provided by other states.

Other Nuclear Security Threats

Among other nuclear security concerns in the Indo-Pacific is the potential for large area dispersal of radioactive material by sabotage or attack by substate actors. Sabotage of nuclear facilities or nuclear and other radioactive materials in transit, such as ships carrying spent fuel enroute to reprocessing in Japan, are areas of concern. Several Indo-Pacific states have expressed an interest in acquiring nuclear power and when these interests materialize into real construction and operation of reactors the new power plant using states will need to develop nuclear security systems to protect these facilities.

---

[17] See for example, Nuclear Threat Initiative Fact Sheet "Replacing Cesium-137 Research Irradiators Part of Preventing a Dirty Bomb: Radiological Security for Hospitals and Research Centers," (October 8, 2021). Available at: https://www.nti.org/analysis/articles/replacing-cesium-137-research-irradiators/ See also, M. Pomper, F. Dalnoki-Veress, G. Moore, "Treatment, Not Terror," (2016). Available at: https://nonproliferation.org/treatment-not-terror/

An often-overlooked aspect of nuclear security is computer security. Modern security systems and control systems at nuclear facilities need to be protected against various forms of intrusion. While it is tempting to immediately think about the potential consequences of an outside group assuming control of the nuclear power plant and running it into meltdown, there are far more likely scenarios that might occur such as hacking security entry lists to add unauthorized persons, giving them access to a facility, or expanding their access within a facility. Successful hacking that, for example, adjusts maintenance records can have serious repercussions on plant operations and can lead to costly and dangerous equipment damage.

Finally, when nuclear or other radioactive materials go out of control the state must have a capable system of locating those materials and reestablishing control over them. Many states in the Indo-Pacific have very limited capabilities in this area and require training and hardware suitable to assist in reestablishing control.

Recommendations on Trafficking of Nuclear and Other Radioactive Materials and Other Nuclear Security Threats

The current political issues with the Russian Federation, China, and North Korea make immediate recommendations on nuclear security issues with nuclear weapons unrealistic. Most probably they must be differed for future action. However, there are significant benefits that might be gained in nuclear security from some recommended actions that could be taken immediately.

In considering recommendations for the region in these areas it is important to recognize that there are regional organizations that have and can facilitate cooperation and raise awareness of the efforts needed for future safety and security. Chief among these is the Association of Southeast Asian Nations (ASEAN) that has sponsored the Southeast Asian Nuclear Weapons Treaty (the Bangkok Treaty) which has established a Nuclear-Weapon-Free Zone (NWFZ) that includes the territories of the roughly dozen treaty ratifying states.[18]

Increasing the amount of detection equipment throughout the region is an obvious recommendation. Support and equipment can come from the IAEA, the 1540 Committee, or other entities such as the Global Initiative to Combat Nuclear Terrorism (GICNT), but only if the global community is willing to adequately fund these efforts. Detection systems of all types are needed. Personal dosimetry and detection equipment, portal monitors, air and vehicle mountable detection arrays, etc. beginning at a basic level are needed. Support must go beyond the donation of equipment and training and should attempt to develop regional production of the type of equipment that best suits operations in the Indo-Pacific.

Increasing the awareness of first responders (police, security, and fire for example) about nuclear security culture and awareness of trafficking and other nuclear security threats is essential. Such training is currently provided by INTERPOL, the IAEA, and various initiatives by out of area states such as the training provided by the US Department of State.

Since one of the main providers of nuclear security training in the Indo-Pacific is the Division of Nuclear Security at the IAEA, it is recommended that the Division should receive budgetary increases to support its efforts. Under the current system the Division's operations and personnel are not totally covered by the Agency's regular budget. The Division is forced to significantly rely on the Nuclear Security Fund (NDF), a fund to which nations voluntarily contribute to support the IAEA's nuclear security efforts. Not only are contributions to the NSF voluntary, but they may come with strings attached that mandate specifically how the contribution must be spent and therefore restrict the Division's ability to spend money where it may be needed most. Increases in IAEA's regular budget for personnel and operations will allow the Division to provide increased training in all aspects of nuclear security, including computer security.

The consequences of insufficient funding in nuclear security have foreseeable highly dangerous results. Unfortunately, dialogue about nuclear security issues seems to ebb and flow depending on what issues attract media attention. The Obama-era Nuclear Security Summits were a great boost to global interest in nuclear security, but the summits have not been followed by a suitable replacement and it is fair to say

---

[18] For more specific information about ASEAN and the Bangkok Treaty see, the ASEAN website at: https://asean.org/our-communities/asean-political-

security-community/peaceful-secure-and-stable-region/southeast-asia-nuclear-weapon-free-zone-seanwfz/

that there is currently a decreased international focus on nuclear security. It is recommended that the nuclear security summit procedure be renewed on a worldwide basis or on a regional basis to restore interest in improving nuclear security systems.

Conclusion

The Indo-Pacific is an area in flux and under tensions that are causing states to consider their proliferation options and raising issues about security of both existing weapons and the nuclear materials from which they can be made. As states' economies grow and develop more commercially, there will be an increasing demand for the use of other radioactive materials in areas such as medicine, manufacturing, construction testing and an expanding array of uses. These materials all must be secured to ensure that they are safely used only for their intended purposes and to ensure that illegal access to them nonstate actors and terrorists is prevented.

As outlined in the recommendations above, efforts can be immediately undertaken in some areas that can have an immediate impact on safety and security of other radioactive materials. Other efforts, such as those that might support nonproliferation efforts, may, as discussed above, take longer but attempts to move forward on nonproliferation efforts should be started as soon as possible whenever opportunities present themselves.
in Indo-Pacific more difficult or, worse, a stillborn project.

7

A Regional Effort Towards Nuclear Disarmament: The SEANWFZ Experience

Karla Mae G. Pabeliña

Introduction

Nuclear-weapon-free zones (NWFZ) were established in various parts of the world to insulate areas from the strategic, economic, and humanitarian consequences of nuclear conflict. The Treaty on the Southeast Asia Nuclear-Weapons-Free Zone (SEANWFZ), which entered into force on March 28, 1997, is an initiative of the Association of Southeast Asian Nations (ASEAN) to promote regional peace and security through nuclear nonproliferation and disarmament. Inspired by the 1967 Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (often referred to as the Tlatelolco Treaty), the SEANWFZ Treaty was considered "a milestone in the region's nuclear history."[1] It provides legal obligations for zonal states to ensure that the region remains free from nuclear weapons and all other weapons of mass destruction, as well as seeks to bind nuclear-weapon states not to use or threaten to use nuclear weapons against any Southeast Asian states, or to use or threaten to use nuclear weapons within the zone.

Challenges continue to beset the SEANWFZ Treaty's implementation, as none of the nuclear-weapon states have yet acceded to its protocol. Nonetheless, the treaty provides the normative framework to underpin Southeast Asian states' individual and collective efforts on the issues of nuclear governance and disarmament diplomacy.

This chapter seeks to explore the role of SEANWFZ in promoting and advancing the cause of nuclear disarmament, providing a detailed look at an existing regional risk reduction and confidence-building measure and its successes and challenges. The chapter will begin with a brief overview of how the Treaty came about. It will then discuss its key provisions, as well as give updates on progress towards its implementation. The paper will then situate the Treaty in the context of global nonproliferation and disarmament efforts, including the Treaty on the Prohibition of Nuclear Weapons (TPNW). Finally, it will assess the prospects for the full implementation of SEANWFZ within the context of recent regional strategic developments.

Imperatives for the Southeast Asia Nuclear-Weapons-Free Zone

The concept of a nuclear-weapon-free Southeast Asia dates back to 1971 when the then ASEAN member states (Indonesia, Malaysia, Singapore, Thailand, and the Philippines) issued a declaration for the region to be recognized as a Zone for Peace, Freedom, and Neutrality (ZOPFAN).[2] Then, Southeast Asia was one of the frontlines of great power rivalry between the Soviet Union and the United States, with the Vietnam War and several Soviet-supported communist insurgencies being fought. Vietnam (Da Nang and Cam Ranh Bay) and the Philippines (Subic Bay and Clark) were home to both Soviet and United States military bases. There were fears of nuclear weapons being used in the region, especially when Operation Vulture, an abortive plan to use US tactical nuclear weapons in support of French forces fighting the Viet Minh in 1954, came to light.[3]

Informed by observations of the Cuban Missile Crisis, and fearful of the catastrophe that may befall the region in an event of a nuclear war, the original ASEAN member states determined that a nuclear-weapon-free Southeast Asia would be crucial in advancing the aspiration of ZOPFAN—to be "free from any form or manner of interference of outside powers."[4]

In analyzing the rationale for SEANWFZ, it is necessary to understand the circumstances that impelled its creation. No Southeast Asian state possesses nuclear weapons, and all have committed to abide by international instruments on nuclear nonproliferation and disarmament.[5] In the absence of relying on nuclear deterrence, Southeast Asian states, exercising their sovereignty, placed their faith in normative and legal mechanisms to reduce the threat of nuclear conflict towards their own territories.[6]

[1] Carolina G. Hernandez, "Southeast Asia: The Treaty of Bangkok," in *Nuclear-Weapons-Free Zones*, ed. Ramesh Thakur, (Houndmills, Macmillan Press Ltd, 1998), p. 86.

[2] ASEAN, *1971 Zone of Peace, Freedom, and Neutrality Declaration*. Adopted in Kuala Lumpur, Malaysia on Nov. 27, 1971, https://cil.nus.edu.sg/wp-content/uploads/2019/02/1971-Zone-of-Peace-Freedom-and-Neutrality-Declaration-1-1.pdf

[3] Fredrick Logevall, '"We might give them a few." Did the US offer to drop atom bombs at Dien Bien Phu?," Bulletin of the Atomic Scientists, Feb. 21, 2016, https://thebulletin.org/2016/02/we-might-give-them-a-few-did-the-us-offer-to-drop-atom-bombs-at-dien-bien-phu/

[4] Marty Natalegawa, *Does ASEAN Matter? A View from Within* (Singapore: ISEAS Yusof Ishak Institute), pp. 70-74.

[5] Mely Caballero-Anthony and Julius Trajano, "Examining Southeast Asia's Diplomacy on Nuclear Disarmament and Nuclear Security: Shared Norms and a Regional Agenda" *Asian Journal of Peacebuilding* Vol. 10 No. 2 (2022), pp. 1-25.

[6] The establishment of a NWFZ should be agreed upon by the states covered in the zone, as indicated in the UN Disarmament Commission report of Apr. 30, 1999 on the principles and guidelines for the establishment of a nuclear-weapon-free zone. United Nations, *Report of the Disarmament Commission*, Fifty-Fourth Session, Official Records, Supplement No. 42 (A/54/42), 1999.

With the end of the Cold War, the collapse of the Soviet Union, the resolution of the Vietnam-Cambodia conflict, and the withdrawal of US forces in the Philippines, the prospects of a nuclear-weapon-free Southeast Asia became more tangible. Through the concerted efforts of the ASEAN Foreign Ministries, the SEANWFZ Treaty was signed by ASEAN leaders on December 15, 1995, and entered into force on March 28, 1997.

Key Features

Obligations for the State Parties

SEANWFZ obliges state parties not to "develop, manufacture, or otherwise acquire, possess or have control over nuclear weapons"; "station or transport nuclear weapons by any means"; and "test or use nuclear weapons" anywhere inside or outside of the zone[7] —the area comprising the territories of all Southeast Asian states, and their respective continental shelves and exclusive economic zones.[8]

SEANWFZ also prohibits all state parties from "dumping at sea, disposing on land, or discharging into the atmosphere anywhere within the zone any radioactive materials or wastes."[9] It condemns any deliberate disposal at sea, including seabed and subsoil insertion, of radioactive wastes or other matter from vessels, aircraft, platforms, or other man-made structures at sea.[10]

State parties are also obliged "not to seek or receive any assistance," or "take any action to assist or encourage the commission of any act in violation of the provisions" of the Treaty.[11]

Peaceful Rse of Nuclear Energy

SEANWFZ recognizes the right of the state parties to use nuclear energy for peaceful purposes. Specific measures were instituted to ensure that nuclear material and facilities will be used exclusively for such peaceful means.

Prior to embarking on its peaceful nuclear energy program, a state party to SEANWFZ will be subjected to "rigorous nuclear safety assessment conforming to the guidelines and standards recommended by the [International Atomic Energy Agency] IAEA…."[12] Upon request of another state party, a state party must make available the assessment "except for information relating to personal data, information protected by intellectual property rights or by industrial or commercial confidentiality, and information relating to national security."[13]

Furthermore, SEANWFZ also prohibits the provision of "source or special fissionable material, or equipment or material especially designed or prepared for the processing, use or production of special fissionable material" to any non-nuclear weapon state "except under conditions subject to the safeguards required by Paragraph 1 of Article III of the [Treaty on the Non-Proliferation of Nuclear Weapons] NPT" or "any nuclear weapon state except in conformity with applicable safeguards agreement with the IAEA."[14]

Geographic Scope

SEANWFZ built on aspects from previous NWFZs and features an expanded coverage. Consistent with the aspirations of ASEAN to insulate the region from extra-regional rivalries, SEANWFZ and its protocol sought "to create an area-wide denial for the deployment of nuclear weapons" and to discourage the Southeast Asian states from "acquiring and/or involving themselves in the forward deployment of nuclear weapons."[15]

SEANWFZ covers the land territories, internal waters, continental shelves, exclusive economic zones (EEZs), and the airspace of the state parties within the zone.[16] Such coverage will not be in prejudice to the rights or the exercise of rights by any state under the 1982 United Nations Convention on the Law of the Sea (UNCLOS), "in particular with regard to freedom of the high seas, rights of innocent passage, archipelagic sea lanes passage or transit passage of ships and

---

[7] NWFZs are considered complementary instruments to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and the Comprehensive Nuclear-Test-Ban Treaty (CTBT). NWFZ prohibits possession, testing, deployment and use of nuclear weapons. NWFZs goes beyond the NPT by not allowing the stationing of nuclear weapons, which the latter allows as long as control and jurisdiction are not exercised by the host state.

[8] Article 3 on "Basic Undertakings," *Treaty on the Southeast Asia Nuclear-Weapon-Free Zone,* https://treaties.unoda.org/t/bangkok

[9] *Ibid.*

[10] The international agreements on the regulation on dumping at sea include the 1972 Convention on the Prevention of Marine Pollution by Dumping of

Wastes and Other Matter and its 1996 Protocol, and the 1973 International Convention for the Prevention of Pollution from Ships (MARPOL).

[11] *Ibid.*

[12] Article 4 on the "Use of Nuclear Energy for Peaceful Purposes."

[13] *Ibid.*

[14] *Ibid.*

[15] Angela Pennissi di Floristella, *The ASEAN Regional Security Partnership: Strengths and Limits of a Cooperative System* (New York: Palgrave Macmillan, 2015), p. 65.

[16] Article 1 on the "Use of Tems" - (b) "territory."

aircrafts."[17] Article 7 of the Treaty further notes that "each state party…may decide for itself whether to allow visits of foreign ships and aircrafts to its ports and airfields, transit of its airspace by foreign aircraft, and navigation by foreign ships through its territorial sea or archipelagic waters and overflight of foreign aircraft above those waters in a manner not governed by the rights of innocent passage, archipelagic sea lanes passage, or transit passage."[18]

Nuclear-weapon states have objected to the coverage of the Treaty arguing that the inclusion of the continental shelves and EEZs are contrary to the principle of freedom of navigation, particularly as the region encompasses some of the world's key sea lines of communications (SLOCs), the Straits of Malacca and the South China Sea.[19]

Protocol to the Treaty

Another key element that distinguishes SEANWFZ from other NWFZs is the legally binding nature of its negative security assurances and position on reservations. Article 2 of the Protocol seeks to bind nuclear-weapon states not to "use or threaten to use nuclear weapons against any state party to the Treaty." It further undertakes "not to use or threaten to use nuclear weapons within the Southeast Asia Nuclear-Weapon-Free Zone." [20] Article 17 of SEANWFZ has indicated that the treaty will not be subject to reservations.[21]

There have been some initial strides indicating willingness of nuclear-weapon states to accede to the protocol, taking into consideration reservations and declarations, in the August 2011 consultations between the representatives of nuclear-weapon states and officials from ASEAN, as well as in 2012.[22] The late submission of the reservations and declarations of four nuclear-weapon states (France, Russia, the United Kingdom, and the United States) in July 2012

led ASEAN to postpone all protocol signing pending a review by the SEANWFZ Commission of the text and positions of the reservations and declarations.[23] In 2019, nuclear-weapon states again indicated their willingness to resume consultations with ASEAN member states on the protocol. However, continued internal disagreements among ASEAN member states on how to respond to nuclear-weapon states' reservations or declarations have stymied progress.

A reevaluation of the approach for encouraging accessions to the SEANWFZ Protocol may be seen in the SEANWFZ Commission meeting held on July 11, 2023. Cambodia promoted the idea of "first-come-first served" for accessions, and reaffirmed its support for China to sign the protocol first, to be conducted back-to-back with the 43th ASEAN Summit and Related Summits in September 2023.[24] Indonesia, the current ASEAN Chair, has indicated support for such a move, with Minister Retno L. P. Marsudi stating that Indonesia will not play the waiting game, and encouraged all ASEAN member states to "not let details obscure the bigger picture."[25]

The Joint Communiqué of the 56th ASEAN Foreign Ministers' Meeting have indicated that the SEANWFZ Commission is exploring the possibility for nuclear-weapon states willing to sign and ratify the Protocol without reservations to "provide prior formal assurances" of such a commitment "in writing" so as to commence with the signing.[26]

China continuously expressed willingness to sign the protocol and a Memorandum of Understanding with ASEAN indicating that the ratification of the SEANWFZ Treaty's protocol does not in any way undermine its territorial claims in the South China Sea. Following the announcement of the trilateral military-technical arrangement between the Australia, United Kingdom, and the United States security pact (dubbed AUKUS), China expressed

---

[17] Article 2 on the "Application of the Treaty."

[18] Article 7 on "Foreign Ships and Aircraft."

[19] *Protocols to the Nuclear-Weapon-Free-Zone Treaties,* https://www.un.org/nwfz/content/protocols-nuclear-weapon-free-zone-treaties

[20] *Protocol to The Treaty of the Southeast Asia Nuclear-Weapon-Free Zone,* https://treaties.unoda.org/t/bangkok_protocol

[21] Article 17 on "Reservations."

[22] "Bangkok Treaty," *Nuclear Threat Initiative,* https://www.nti.org/education-center/treaties-and-regimes/southeast-asian-nuclear-weapon-free-zone-seanwfz-treaty-bangkok-treaty/

[23] "Four nuclear states postpone signing of the SEANWFZ Protocol," *Carnegie Endowment,* July 10, 2012, http://carnegieendowment.org/2012/07/10/four-nuclear-states-postpone-signing-seanwfz-protocol-pub-48810

[24] Kingdom of Cambodia Ministry of Foreign Affairs and International Cooperation, "Press Release: Outcomes of the Plenary Session of the 56th

ASEAN Foreign Ministers' Meeting, Meeting of the Commission of the Southeast Asia Nuclear-Weapon-Free Zone and ASEAN Foreign Ministers' Interface Meeting with ASEAN Intergovernmental Commission on Human Rights Representatives," 11 July 2023, https://www.mfaic.gov.kh/Posts/2023-07-11-News-Meeting-of-the-Southeast-Asia-Nuclear-Weapon-Free-Zone--SEANWFZ--Commission---11-July-2023----14-52-54

[25] Luki Aulia, Laraswati Ariadne Anwar and Kris Mada, "Indonesia Affirms Nuclear-Free Southeast Asian Region," *Kompas.id*, Jul. 11, 2023, https://www.kompas.id/baca/english/2023/07/11/en-indonesia-tegaskan-kawasan-asia-tenggara-bebas-senjata-nuklir

[26] ASEAN, *Joint Communiqué of the 56th ASEAN Foreign Ministers' Meeting,* Jul. 11-12, 2023, Jakarta, https://asean.org/wp-content/uploads/2023/07/The-56th-AMM-Joint-Communique.pdf

again its readiness to "take the lead in signing the protocol of the SEANWFZ Treaty and work with ASEAN to advocate solidarity and win-win cooperation, jointly safeguarding regional security and stability." [27] Still, China has undermined the SEANWFZ Treaty with its deployment of nuclear-capable platforms, such as the 2018 use of PLA Air Force H-6 series strategic bombers at Woody Island in the Paracels.[28] There are also possible safety and security concerns associated with China's planned deployment of floating nuclear power plants in the South China Sea.[29]

The United States has maintained reservations to signing the protocol due to the nature of the negative security assurance provision, which it argues benefits non-SEANWFZ countries in the ocean area of the zone. The logic of US concerns stems from the impact of the Treaty to nuclear deterrence and how it might restrict US strategic options with regard to certain adversaries' systems and use of SEANWFZ as sanctuary. [30] However, since the United States has withdrawn tactical nuclear weapons in naval vessels and does not currently maintain nuclear anti-submarine warfare systems,[31] the US position could stand to be recalibrated. Accession to the SEANWFZ Protocol should not affect US nuclear deterrence capabilities. The US Navy currently does not maintain any non-strategic nuclear weapons, such as sea-launched cruise missiles (SLCM-N), in its inventory. While the Trump administration once planned to reintroduce retired weapon classes such as the SLCM-N, the Biden administration seeks to abandon such efforts, although Congress has included some funds to continue research and development, opening the possibilities for future deployment. [32] The question remains whether pursuing weapons like SLCM-N will serve the purpose of assuring the United States' allies and partners in Southeast Asia, or further complicate

their engagements in the region. Further, the investment required for developing new generation SLCM-Ns, recertifying crew members for nuclear operations, and building the necessary infrastructure to support such missions, could instead be used to address the increasing vulnerabilities of United States conventional forces, and support US allies and partners' maritime capabilities to deal with more urgent gray zone and conventional threats from China or North Korea. Furthermore, in both the 2019 Interim Strategic Guidance and the 2022 US National Security Strategy, the Biden administration has expressed readiness to play a constructive role in renewing dialogue on the existential threat posed by nuclear weapons, and on the future of the nuclear nonproliferation regime, and committed to re-establishing the country's credibility as a leader in arms control and nonproliferation.

Foreign Minister Sergey Lavrov has articulated the Russian Federation's readiness to sign the SEANWFZ Protocol on the condition that "all signatories comply with the Treaty's provisions not to have, not to create and not to deploy any elements of the nuclear weapons." He warned that should any Southeast Asian states violate its obligations, "the issue of caveat-free and unconditional guarantees would take on a different meaning."[33]

It can be surmised that France's and the United Kingdom's reservations to the Protocol are similar to their previously indicated reservations in other NWFZ treaties. For example, France consistently argues that "no provisions of the Protocol or articles" of NWFZ Treaty "shall impair its full exercise of the inherent right of self-defense provided for in Article 51 of the United Nations Charter." [34] The United Kingdom consistently argues that it will not be bound by the Protocol in an event of "an invasion or any other on the United Kingdom," or "if any party

---

[27] "China exemplar of responsible power as it backs a nuclear-free SE Asia," *Global Times,* Mar. 28, 2023, https://www.globaltimes.cn/page/202303/1288117.shtml

[28] Ankit Panda, "South China Sea: What China's First Strategic Bomber Landing on Woody Island Means," *The Diplomat,* May 22, 2018, https://thediplomat.com/2018/05/south-china-sea-what-chinas-first-strategic-bomber-landing-on-woody-island-means/

[29] Viet Phuong Nguyen, "China's Planned Floating Nuclear Power Facilities in South China Sea: Technical and Political Challenges," *Maritime Issues,* Nov. 21, 2018, https://www.belfercenter.org/publication/chinas-planned-floating-nuclear-power-facilities-south-china-sea-technical-and

[30] Tong Zhao, "Nuclear Weapon States and the Southeast Asia Nuclear-Weapon-Free-Zone," *Asia Pacific Leadership Network for Nuclear Non-Proliferation and Disarmament,* Policy Brief No. 28, Feb. 2017 http://www.a-pln.org/briefings/briefings_view/Policy_Brief_28_-_Nuclear_Weapon_States_and_the_South-east_Asia_Nuclear-Weapon-Free_Zone.

[31] Hans Kristensen and Matt Korda, "United States Nuclear Weapons 2021," *Bulletin of Atomic Scientists,* Volume 77, Issue 1, p. 46, https://www.tandfonline.com/doi/full/10.1080/00963402.2020.1859865

[32] Bryant Harris, "GOP moves to instate sea-launched cruise missile nuclear program," *Defense News,* June 22, 2023, https://www.defensenews.com/congress/budget/2023/06/22/gop-moves-to-instate-sea-launched-cruise-missile-nuclear-program/

[33] "Lavrov allows for option of Russia signing protocol on nuclear-free zone treaty in SE Asia," *TASS,* Jul. 13, 2023, https://tass.com/defense/1646317

[34] See for example, France's submitted interpretative declaration and reservations to the South Pacific Nuclear Free Zone Treaty Protocol 1 (https://treaties.unoda.org/t/rarotonga_p1/declarations/FRA_pifs_RAT), Protocol 2 (https://treaties.unoda.org/t/rarotonga_p2/declarations), Protocol 3 (https://treaties.unoda.org/t/rarotonga_p3/declarations); and Treaty on a Nuclear-Weapon-Free Zone in Central Asia Protocol (https://s3.amazonaws.com/unoda-web/wp-content/uploads/2015/02/R%C3%A9serves-fran%C3%A7aises-CANWFZ-Protocol.pdf)

to the Treaty is in material breach of its own non-proliferation obligations under the Treaty."[35]

Progress Towards SEANWFZ Implementation

SEANWFZ embodies the "collective will and concrete action of the ASEAN member states to keep Southeast Asia free of nuclear weapons and therefore contribute towards general and complete disarmament."[36] This aspiration is supported by the international community as demonstrated by the inclusion of the establishment of SEANWFZ in the Final Document of the 10th Special Session of the United Nations General Assembly; the Final Document of the 2010 Review Conference of the Parties of the Treaty on the Nonproliferation of Nuclear Weapons (NPT); and United Nations General Assembly Resolutions 62/31 (2008), 64/39 (2009), 68/49 (2010), 70/60 (2015).

On Aug. 5, 2022, the ASEAN Regional Forum which involves 10 ASEAN dialogue partners (Australia, Canada, China, the European Union, India, Japan, New Zealand, the Republic of Korea, Russian Federation, and the United States), and other regional states (Bangladesh, the Democratic People's Republic of Korea, Mongolia, Pakistan, Sri Lanka, Papua New Guinea, and Timor-Leste) also released a statement reiterating a commitment to and support for preserving Southeast Asia as a nuclear-weapon free zone.[37]

The Joint Communiqué of the 56th ASEAN Foreign Ministers' Meeting in July 2023 reaffirmed this need to preserve Southeast Asia as a region free from nuclear weapons and weapons of mass destruction,

in accordance with SEANWFZ and the ASEAN Charter.[38] The ASEAN Foreign Ministers in 2022 also agreed to extend the Plan of Action (POA) to Strengthen the Implementation of the Treaty of the SEANWFZ (2023-2027). The POA features actionable measures to ensure compliance with the undertaking of SEANWFZ.[39] The key areas of work include:

- Accession to international instruments that promote nuclear safety, security, and safeguards such as the Convention on Early Notification of a Nuclear Accident, [40] Convention on Nuclear Safety,[41] ratification of the Comprehensive Nuclear-Test-Ban Treaty, [42] conclusion of the International Atomic Energy Agency (IAEA) Additional Protocol[43];

- Accession to the other international instruments identified by the Executive Committee for recommendation to the SEANWFZ Commission;

- Implementation of a control system to verify their compliance in line with obligations listed in Articles 10-13 of the Treaty and submission of a national report on their respective implementation of the POA;

- Strengthen existing and prospective mechanisms within the ASEAN such as the Nuclear Energy Cooperation Sub-Sector Network (NEC-SSN) [44] and the ASEAN Network of Regulatory Bodies on Atomic

---

[35] See for example, the United Kingdom's submitted interpretative declaration to the Treaty on a Nuclear-Weapon-Free Zone in Central Asia Protocol (https://treaties.unoda.org/t/canwfz_protocol/declarations); the South Pacific Nuclear Free Zone Treaty Protocol 1 (https://treaties.unoda.org/t/rarotonga_p1/declarations), Protocol 2 (https://treaties.unoda.org/t/rarotonga_p2/declarations), and Protocol 3 (https://treaties.unoda.org/t/rarotonga_p3/declarations).
[36] Statement of Thailand during the Sixth ASEAN Regional Forum ISM on Nonproliferation and Disarmament, Jul. 8-9, 2014, Tokyo, http://aseanregionalforum.asean.org/files/Archive/21st/6th%20ARF%20ISM%20on%20NPD,%20Tokyo,%208-9%20July%202014/Annex%2012%20-%20Statement%20by%20Thailand.pdf
[37] *ASEAN Regional Forum Statement on Reiterating Commitment to Preserve Southeast Asia as a Nuclear Weapon-Free Zone,* Aug. 5, 2022, https://aseanregionalforum.asean.org/wp-content/uploads/2022/09/Final-StatementonReiteratingCommitmenttoPreserveSoutheastAsiaasaNuclearWeapon-FreeZone.pdf
[38] ASEAN, *Joint Communiqué of the 56th ASEAN Foreign Ministers' Meeting*
[39] ASEAN, *Plan of Action to Strengthen the Implementation of the Treaty on the Southeast Asia Nuclear Weapon-Free Zone (2023-2027),* Adopted by the SEANWFZ Commission on Aug. 2, 2022, https://asean.org/wp-content/uploads/2022/12/Plan-of-Action-to-Strengthen-the-

Implementation-of-the-Treaty-on-the-Southeast-Asia-Nuclear-Weapon-Free-Zone-2023-2027.pdf
[40] Indonesia (1993) and Thailand (1986) have ratified the Convention on Early Notification of a Nuclear Accident. Cambodia (2012), Lao PDR (2013), Myanmar (1997), Singapore (1997), the Philippines (1997), and Vietnam (1987) have acceded to Convention. Malaysia signed in 1987 but has yet to ratify; and Brunei Darussalam has neither signed or acceded to the Convention.
[41] Indonesia (2002) has ratified the Convention on Nuclear Safety. Cambodia (2012), Vietnam (2010), Thailand (2018), Singapore (1997), and Myanmar (2016) have acceded to the Convention; while the Philippines has signed but has yet to ratify. Meanwhile, Brunei Darussalam, Lao PDR, and Malaysia have neither signed nor acceded to the Convention.
[42] All ASEAN member states have signed and ratified the Comprehensive Nuclear-Test-Ban Treaty.
[43] All ASEAN member states, except Brunei, have concluded Additional Protocols with the IAEA. Malaysia, Lao PDR, and Myanmar have signed Additional Protocols, but they have yet to enter into force.
[44] The Nuclear Energy Cooperation Sub-Sector Network (NEC-SSN) is participated by ASEAN member states, focal point representatives from IAEA and non-regional partner organizations from Canada, Japan and China.

Energy (ASEANTOM)[45] to contribute to the eventual development of a regional nuclear safety regime to regulate and oversee the safety assessment requirements for those states parties which have embarked on peaceful nuclear energy programs, in accordance with Article 4 of the SEANWFZ.[46] (See details below).

The POA also commits state parties to continuously consulting with the nuclear weapon states and engaging among themselves to "resolve all outstanding issues in accordance with the objectives and principles of the SEANWFZ Treaty."[47]

The POA further stressed the need to cooperate with IAEA and other partners to "seek their support for the implementation of the provisions of the SEANWFZ" through capacity-building activities, exchange of information and experiences, and the provision of expertise, especially in the (1) "development of national/regional legal framework to meet international standards on nuclear safety"; (2) establishment of a "regional early warning radiation monitoring network"; (3) "operationalizing the ASEAN Protocol for Preparedness and Response to a Nuclear or Radiological Emergency"; and (4) "leveraging on nuclear science and technology for non-power nuclear applications in various relevant sectors."[48]

Contributions of ASEAN-led Mechanisms

ASEAN-led mechanisms and institutions, such as the above-mentioned ASEANTOM, NEC-SSN, and the ASEAN Centre for Energy (ACE) contribute to the strengthening of Southeast Asia's regional approach towards nuclear safety and security, and the full implementation of SEANWFZ.

ASEANTOM, formally established in 2013, seeks to "enhance regulatory activities and further strengthen nuclear safety, security and safeguards with the ASEAN Community, by enhancing cooperation and

complementing the work of existing mechanisms at the national, bilateral, regional and international levels." [49] ASEANTOM's five technical working groups established in 2021 supported nuclear capability development within ASEAN to respond to nuclear/radiological incidents in the following areas: (1) emergency preparedness and response; (2) radiation monitoring; (3) hazard assessment and radiological dispersion modeling; (4) radiological and nuclear security; and (5) public emergency communications.[50] ASEANTOM is also the primary implementing agency of the Practical Arrangements between ASEAN and IAEA on Cooperation in the Areas of Nuclear Science and Technology and Applications, Nuclear Safety, Security and Safeguards (PA) signed in 2019, supported by the ASEAN Secretariat and the IAEA Director General's Office for Coordination.[51]

Despite challenges, such as ASEANTOM members with varying degrees of knowledge and expertise on nuclear issues, lack of financial support, and widely different national infrastructure, ASEANTOM has made significant progress in devising tools to support decision-making during radiological emergency situations.[52] ASEANTOM is also critical in the development of a regional nuclear safety regime that strengthens the SEANWFZ Treaty's verification mechanism in accordance with the provision on the control system. The control system comprises the IAEA safeguards systems, the report and exchange of information, the request for clarification, and the request and procedures for a fact-finding mission.[53]

SEANWFZ in the Context of Global Nuclear Nonproliferation and Disarmament Efforts

The importance of NWFZs has been repeatedly reaffirmed by policymakers and experts. Michael Hamel-Green, publishing with the United Nations Institute for Disarmament Research, believes for

---

[45] The ASEANTOM comprises the nuclear regulatory bodies or their equivalents of ASEAN member states.
[46] ASEAN, *Plan of Action to Strengthen the Implementation of the Treaty on the Southeast Asia Nuclear-Weapon-Free Zone (2023-2027)*.
[47] *Ibid.*
[48] *Ibid.*
[49] Office for Atoms for Peace-Document, *ASEANTOM Terms of Reference (TOR)*, 2 June 2022, https://www.oap.go.th/en/aseantom/doucument
[50] James Kon, "ASEAN endorses emergency preparedness protocol," *Borneo Bulletin*, 21 July 2021, https://borneobulletin.com.bn/asean-endorses-emergency-preparedness-protocol/#:~:text=While%20on%20the%20establishment%20of%20dedicated

%20technical%20working,managing%20nuclear%20incidents%20and%20response%20to%20radiological%20emergencies.
[51] Alex Nitzche, "IAEA and ASEAN Strengthen Cooperation in Nuclear Science, Technology and Applications, and Nuclear Safety, Security and Safeguards," *IAEA*, Sept. 16, 2019, https://www.iaea.org/newscenter/news/iaea-and-asean-strengthen-cooperation-in-nuclear-science-technology-and-applications-and-nuclear-safety-security-and-safeguards
[52] ASEANTOM, *ASEAN Protocol for Preparedness and Response to a Nuclear or Radiological Emergency*, August 2023, https://asean.org/wp-content/uploads/2023/08/ASEAN-Protocol-on-EPR-.pdf
[53] Article 10 on "Control System".

instance that NWFZs are "quietly peeling back the nuclear orange" by gradually limiting and delegitimizing nuclear weapons at a regional level, working towards a nuclear-weapon-free world.[54]

In terms of horizontal proliferation, NWFZs dramatically reduced the areas of potential proliferation. They also reinforce global treaties through the establishment of region-specific verification, compliance, and confidence-building measures. NWFZs also provide additional normative and legally binding means of ensuring that regional states adhere to universal agreements. [55] In the context of SEANWFZ, there are obligations for mutual reporting and exchange of information among state parties, and fact-finding missions may be conducted to clarify and address doubts about state parties' compliance with the Treaty.

NWFZs are also believed to be crucial in promoting nuclear disarmament, given the fragility of the nonproliferation regime. The ninth and tenth Review Conferences (RevCon) of the NPT ended in disarray as member states were unable to reach consensus agreement on a final-outcome document.

Given the lack of progress towards disarmament by nuclear-weapon states, state-parties of NWFZs actively support initiatives that promote the complete elimination of nuclear weapons. The TPNW, adopted on July 7, 2017, and in force since Jan. 22, 2021, can be seen as a logical extension, consolidation and strengthening of NWFZ Treaties. The TPNW addresses the loopholes of the NPT by not allowing the stationing, installation, and deployment of nuclear weapons or nuclear explosive devices within the jurisdiction of state parties. It also encapsulates the prohibition to use or threaten to use nuclear weapons or other nuclear explosive devices, embedded in NWFZ Treaties' protocols. In ASEAN, nine of the ten Southeast Asian states have signed the

TPNW, and six members (Cambodia, Lao PDR, Malaysia, the Philippines, Thailand, and Vietnam) have already deposited their instrument of ratification. Most Southeast Asian states also see no conflict between their commitments to the NPT, SEANWFZ, and the TPNW. They see these instruments as complementary to achieve a world without nuclear weapons.[56]

Beyond the direct nonproliferation and security contributions of NWFZs, states parties to existing NWFZs can make contributions by sharing learning, expertise, and experiences on how to weather the challenges of engaging nuclear weapon states and by strengthening compliance and verification measures to their respective NWFZ arrangement. While the underlying motivations for the creation of NWFZs are different, there is a sense of communion and oneness among all zonal states for their regions to be spared from being ensnared in a nuclear web.[57]

However, given limited resources and different levels of institutionalization of their respective structures, formal cooperation among NWFZs is limited; it only occurs within the Conferences of Nuclear-Weapon-Free Zones and Mongolia, which are held every five years. [58] Thus far, three conferences have been held—in Mexico City (2005), New York (2010), New York (2015). The first conference adopted a declaration that included common objectives among NWFZs. The second conference successfully released an outcome document. The third conference, however, failed to commence formal discussions due to procedural disputes. [59] The fourth conference, originally scheduled on April 13, 2020 was postponed to a later date; it seeks to examine ways and means to enhance cooperation among NWFZ and Mongolia, as well as promote convergence in the implementation of NWFZ provisions as well as other non-proliferation and disarmament agreements.[60]

---

[54] Michael Hamel-Green, "Peeling the orange: regional paths to a nuclear-weapon-free world," *Disarmament Forum* Volume 2 (2011), pp. 3-14.
[55] Michael Hamel-Green, "Nuclear-weapon-free zone initiatives: Challenges and opportunities for regional cooperation on non-proliferation," *Global Change, Peace & Security*, Vol. 21, No. 3 (2009), pp. 357-376.
[56] See statements delivered by the Philippines (https://documents.unoda.org/wp-content/uploads/2022/06/Philippines.pdf), Malaysia (https://documents.unoda.org/wp-content/uploads/2022/06/Malaysia.pdf), and Indonesia (https://documents.unoda.org/wp-content/uploads/2022/06/INDONE1.pdf) at the First Meeting of State Parties to the TPNW, 21-23 June 2022. Mely Caballero-Anthony, "TPNW First Meeting of State Parties: A View from Southeast Asia," *Asia-Pacific Leadership Network- Commentaries,* 5 July 2023, https://www.apln.network/analysis/commentaries/tpnw-first-meeting-of-states-parties-a-view-from-southeast-asia

[57] An example of such expression of communion can be seen in the Outcome Document of the Second Conference of States Parties and Signatories of Treaties That Establish Nuclear-Weapon-Free Zones and Mongolia, adopted on 30 April 2010, https://undocs.org/en/NWFZM/CONF.2010/
[58] VCDNP Task Force, "Cooperation among Nuclear-Weapon Free Zones: History, Challenges, and Recommendations," *Vienna Center for Disarmament and Non-Proliferation,* March 2018, https://vcdnp.org/wp-content/uploads/2018/03/NWFZ-TF-Report-final-1.pdf
[59] UN, "Cooperation among the Nuclear-Weapon-Free Zones," *United Nations Platform for Nuclear-Weapon-Free Zones,* https://www.un.org/nwfz/content/cooperation-among-nuclear-weapon-free-zones
[60] UN, "Fourth Conference of Nuclear-Weapon-Free Zones and Mongolia," *United Nations Platform for Nuclear-Weapon-Free Zones,* https://www.un.org/nwfz/content/fourth-conf-nwfz

Recent Developments and the Future of SEANWFZ

More than a decade after nuclear-weapon states came close to signing the SEANWFZ protocol (2012), the strategic environment in the Indo-Pacific has undergone drastic changes that have altered their strategic calculations and the likelihood that they may accede any time soon.

Recent developments have renewed the risk of nuclear conflict. Nuclear-armed states have not made significant progress towards disarmament, and in certain cases seem set to reverse reductions of nuclear weapons. Russia is currently engaged in a long-running nuclear modernization, largely focused on a gradual replacement of ageing Soviet-era missiles and systems.[61] The United States is also engaged in a substantive effort to recapitalize its current triad of land, sea, and air-based strategic nuclear forces and the facilities that support them.[62] There are indications that other nuclear-armed states such as China,[63] India and Pakistan are *increasing* their arsenals. The Russia-Ukraine conflict raging since Feb. 24, 2022 has seen issuance of nuclear threats by Russia, raising the prospect of an active use of nuclear weapons in war. There is also some evidence indicating that the United States Air Force is preparing to reestablish tactical nuclear weapons storage in the United Kingdom to further support the NATO deterrence mission.

Fears have grown that Sino-American conflicts over the South China Sea and Taiwan could become violent and escalate to the nuclear level. Moreover, the continued refusal of North Korea to give up its nuclear capabilities runs the risk of encouraging further proliferation in Northeast Asia, and South Korea has expressed interest in acquiring its own nuclear weapons.[64] These trends, combined with the disappointing outcome of the ninth and tenth NPT RevCons have fueled growing concerns about the regime's fragility and future.[65]

Southeast Asia faces a difficult conundrum: strategic insecurity stemming from its geographic location and the complex webs of interests that entangle them with great powers. There are growing concerns that the tensions in the region, such as those between China and at least half of ASEAN countries over territorial and maritime claims in the South China Sea, may escalate into full-blown confrontation, especially in the wake of the ongoing Russia-Ukraine war. But even as Southeast Asian states resolve to not abandon their national interests in these disputes, they also do not have an appetite for unrestrained great power competition in the region because it undermines the cohesion among ASEAN and the organization's vaunted ASEAN Centrality. Collectively, ASEAN desires to maintain Southeast Asia as a zone of peace, freedom, and neutrality, and as far as possible, not to be engulfed by great power competition. That is why ASEAN countries continue to push for the timely signing and ratification of the SEANWFZ protocol by nuclear-weapon states.

For SEANWFZ to be credible, ASEAN needs to build support for and enhance the profile of the Treaty and its state parties. It must work ardently to secure the biennial adoption of resolutions on SEANWFZ in the First Committee of the UN General Assembly. It must develop the necessary diplomatic and political resolve to promote the region's interests, and not echo the rhetoric of any of the contending powers. ASEAN must promote its position on the issue of nonproliferation, disarmament, and peaceful use of nuclear energy in relevant multilateral regional fora and bilateral frameworks.

Even as the road ahead is difficult, ASEAN has always put primacy on a step-by-step process through confidence-building and consultation. Capacity-building and close coordination among ASEAN members are critical to produce a cohesive and assertive policy vis-a-vis all nuclear-weapon states. Indonesia, as the current ASEAN Chair, and as one of the champions of SEANWFZ, is in a strategic position to advance the objectives of the Treaty. With

[61] Hans Kristensen and Matt Korda, "Nuclear Notebook: How many nuclear weapons does Russia have in 2022?" Bulletin of the Atomic Scientists, Feb. 23, 2022, https://thebulletin.org/premium/2022-02/nuclear-notebook-how-many-nuclear-weapons-does-russia-have-in-2022/

[62] Hans Kristensen and Matt Korda, "Nuclear Notebook: United States nuclear weapons, 2023," Bulletin of the Atomic Scientists, Jan. 16 2023, https://thebulletin.org/premium/2023-01/nuclear-notebook-united-states-nuclear-weapons-2023/

[63] Hans Kristensen and Matt Korda, "Chinese Nuclear Forces 2021," *Bulletin of the Atomic Scientists*, Volume 77, No. 6, 318-336,

https://thebulletin.org/premium/2021-11/nuclear-notebook-chinese-nuclear-forces-2021/

[64] Janani Mohan, "Nuclear weapons gaffe in South Korea is a warning to leaders everywhere," *Bulletin of the Atomic Scientists*, Mar. 15, 2023, https://thebulletin.org/2023/03/nuclear-weapons-gaffe-in-south-korea-is-a-warning-to-leaders-everywhere/

[65] Manpreet Sethi, "Cornerstone' Cornered by the NWS," *Asia-Pacific Leadership Network Commentaries*, Sept. 7, 2022, https://www.apln.network/analysis/commentaries/cornerstone-cornered-by-the-nws

its non-aligned stance, Indonesia should engage the rival blocs.

The desire to secure the accession of nuclear-weapon states to the SEANWFZ protocol should not come at the price of undermining its objectives and principles. As articulated in the ASEAN's statement during the substantive session of the 2023 NPT Preparatory Committee, the commitment should be "unequivocal" not to use nuclear weapons against non-nuclear-weapon states and within nuclear-weapon-free zones."[66] Such commitment should also be without conditionalities, universal, and legally binding.[67]

ASEAN member states can do more together than alone, and SEANWFZ will be more effective if ASEAN learns the lessons of other NWFZs to build confidence and competency to bridge the discourse gaps between them and nuclear-weapon states. A step in this direction might be in the works following the adoption of the ASEAN Foreign Ministers of a concept note on the possible joint initiative between ASEAN and the Agency for the Prohibition of Nuclear Weapons in Latin America, known as OPANAL.[68] Furthermore, ASEAN-led mechanisms such as ASEANTOM might well become the core for a future regional nuclear safety regime, which strengthens SEANWFZ verification.

Conclusion

SEANWFZ represents an imperfect, but indispensable tool for ASEAN to attempt to limit the damage and risk from nuclear conflicts. It gives Southeast Asians agency to assert themselves amidst the pull and push of great power rivalries, and to preserve their space to act for their interests. The continued push for SEANWFZ represents an ASEAN drive to entrench norms of disarmament and nonproliferation, despite worrisome strategic developments across the Indo-Pacific. It is also a tangible Southeast Asian contribution to reducing risks, seeking to deny the region to all nuclear weapons regardless of origin. Further advancing the

Treaty's implementation would be an important step for international security and contribute to Hamel-Green's vision of slowly peeling back the nuclear orange towards the aspiration of a nuclear-weapon-free world.

[66] Statement on behalf of the Association of Southeast Asian Nations by H.E. Ambassador Maria Theresa T. Almojuela, Assistant Secretary of the Office of United Nations and International Organization (UNIO) of the Republic of the Philippines, at the 2023 Substantive Session of the Preparatory Committee for the 2025 Review Conference of Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, Jul. 31, 2023, Philippines_on_behalf_Member_States_of_the_Association_of_Southeast_Asian_Nations_(ASEAN)General_Debate_Statement.pdf (unoda.org)
[67] Statement by the Delegation of the Republic of Indonesia on behalf of the Non-Aligned Movement States Parties to the Treaty on the Non-Proliferation of Nuclear Weapons at the First Session of the Preparatory Committee for the 11th Review Conference of the Treaty on the Non-

Proliferation of Nuclear Weapons, Cluster I Issues, August 2023, Vienna, https://docs-library.unoda.org/Treaty_on_the_Non-Proliferation_of_Nuclear_Weapons_-_Preparatory_Committee_for_the_Eleventh_Review_ConferenceFirst_session_(2023)/Indonesia_on_behalf_of_the_Non-Aligned_Movement_StatesCluster_I_-_NAM_CLEAN.pdf
[68] Kingdom of Cambodia Ministry of Foreign Affairs and International Cooperation, "Press Release: Outcomes of the Plenary Session of the 56th ASEAN Foreign Ministers' Meeting, Meeting of the Commission of the Southeast Asia Nuclear-Weapon-Free Zone and ASEAN Foreign Ministers' Interface Meeting with ASEAN Intergovernmental Commission on Human Rights Representatives."

8

Measures to Enhance Chemical and Biological Security in the Indo-Pacific

Allison Berke

Introduction

The Biological and Toxin Weapons Convention (BWC) and Chemical Weapons Convention (CWC) are successful international disarmament treaties that underpin a network of state parties committed to providing support and fostering research and collaboration while working to prevent the development or use of biological and chemical weapons. These conventions can serve as the basis for a broader consideration of how international collaboration to prevent the proliferation of biological and chemical weapons can develop and improve. The Indo-Pacific includes both highly advanced biotechnological and chemical producers, such as China, Japan, India, and South Korea; a chemical weapons possessor, North Korea; smaller countries with large-scale chemical production and export, such as Singapore, Taiwan, and Thailand; and small island nations that are among the most recent signatories of the CWC, such as Tuvalu, Tonga, Vanuatu, and Timor-Leste.[1] The capabilities, concerns, and priorities of countries in the broader region vary widely, and each country's resources and level of technological sophistication will lead to variation in their ability to take on new monitoring tasks or risk reduction measures.

The confidence-building measures of the BWC and the declarations and verification measures of the CWC provide reassurances and information about biological and chemical security-related activities to other countries. They also guide countries in establishing internal reporting and monitoring procedures that standardize oversight of biological and chemical industries and help establish communication and reporting channels designed to be useful in the event of an incident involving dangerous biological or chemical materials.

Signing and ratifying a treaty involves a promise of compliance but leaves open the question of verifying it. While the CWC includes a structure for inspections and declarations of facilities and manufacturers that handle potentially dangerous chemicals at volumes above specified thresholds, the BWC does not require inspections or have a system for verifying compliance. The BWC's third review conference, in 1991, established a group of experts, known as VEREX, to identify and evaluate potential verification measures, and in 1994 a special conference convened to hear what VEREX had found. A draft protocol establishing a verification mechanism involving site visits and inspections to facilities working on potentially dangerous biological materials was proposed in 2001. The United States opposed the draft protocol, however, over concerns that site visits and inspections would harm the informational security and commercial interests of the US biomedical and pharmaceutical industries, and potentially also harm US national security interests, presumably by making public the details of US-based research into vaccine and medical countermeasure development. The lack of US support for the draft protocol led to its failure, and no verification measures were added to the BWC.

Because the BWC lacks verification measures and does not have a full-scale organization charged with its implementation that can offer substantial resources to offer states parties, individual countries could devote more care to developing support and inspection protocols that also serve a domestic function of monitoring potentially risky research; providing assurance of security and safety protocols around research, manufacturing, import and export, and transport; and guarding against criminals and terrorists who may seek to acquire or use chemical and biological materials.

The threat landscape posed by chemical and biological weapons and precursor materials varies across the Indo-Pacific. While North Korea is an outlier as a possessor of chemical weapons and an occasional user, such as in the killing of North Korean leader Kim Jong-un's brother Kim Jong-nam with VX, terrorism is a prominent concern for the Indo-Pacific. Terrorist groups may seek to acquire or cultivate biological materials and produce chemical weapons, as the Aum Shinrikyo group did in Japan; they may attempt to use toxic chemicals in combination with explosives, as ISIS factions have done; and they may use chemicals for targeted killings or attempts, as with Kim Jong-nam or Russia's alleged assassination of former Russian military officer and UK double agent Sergei Skripal.

One arrangement that works to strengthen export controls of potentially dangerous chemical and

---

[1] CWC ratification: In the Indo-Pacific, North Korea is the only non-signatory to the CWC; Taiwan is ineligible to become a state party but has declared that it attempts to comply with the CWC. BWC ratification: In the Indo-Pacific, Kiribati, Micronesia, and Tuvalu have begun the process of signing; Taiwan has signed and ratified the BWC, but its ratification is not uniformly recognized due to Taiwan's status of recognition. North Korea has acceded to the BWC, but the US Department of State believes it to be in violation of the Convention.

biological materials is the Australia Group, established in 1985 and consisting of 42 individual countries as well as the entire European Commission (Australia, Japan, South Korea, and New Zealand are all members). The Australia Group agrees on and maintains a list of materials, currently comprising 87 compounds that it believes should be controlled because of their potential for misuse in chemical or biological weapons. Australia Group members agree to enforce export controls on these compounds to reinforce one another's decisions (if an export was denied by one member of the Group, that member must be consulted before the same trade can be approved by another member of the Group), and to prevent any exports that might lead to the proliferation of chemical or biological weapons or precursors.

Monitoring the production and trade of potentially dangerous chemical and biological materials, sometimes termed dual-use materials, is therefore important to ensuring that these materials do not fall into the hands of those who would use them to cause harm. Export controls and strategic trade controls can help achieve this. The difficulty of this type of monitoring is enhanced by the number of chemical producers in a large and diversified industry, and by the difficulty of securing long land and coastal borders, particularly in Indonesia and the Philippines.

The continued success of the BWC and CWC is threatened by technological developments that lower the barriers to designing and producing harmful biological and chemical materials, laxness in monitoring and inspection requirements for chemical transfers, continued construction and operation of high-containment biological laboratories, and animal health practices that increase the risk of zoonotic spillover and viral recombination, as we have seen with several pandemics that have originated in the Indo-Pacific, including SARS and COVID-19. Each of these threats can be addressed through more sophisticated BWC and CWC confidence-building and verification regimes; individual nations, meanwhile, will need to shape regulation and procedures to fit the scope of their industries and research activities.

An emerging concern for CWC and BWC enforcement, and for nonproliferation of dual-use compounds and materials, is the increasing capability of artificial intelligence (AI)-enabled design tools to identify novel compounds with similar effects to known chemical weapons or toxins. Recent work by Collaborations Pharmaceuticals and researchers from King's College and Spiez Laboratory[2] demonstrated the potential for an AI-enabled drug discovery tool to design chemical weapons and potentially weaponizable chemicals from scratch. The program designed VX, as well as several other compounds predicted to be more toxic than VX, but which are not on the CWC schedules. This implies that AI-enabled tools could help bad actors identify and design chemical weapons that would fall "under the radar" of current export controls and restrictions. Similar capabilities exist for biological compounds; AI-enabled protein folding tools can design binding compounds that resemble toxins, or design modifications to viral proteins that help them bind more tightly to receptor proteins on human cells that mediate infection. Neither the CWC nor the BWC is well set up to address new or theoretical compounds quickly, and the range and variety of such compounds will make it difficult to distinguish efficiently novel and potentially very hazardous chemical and biological materials from ones that are harmless.

The following recommendations for confidence and security building measures and risk reduction measures are meant to enhance chemical and biological security in the Indo-Pacific. They will require additional resources, both financial and administrative, to develop and implement. As an example of the scope of potential costs, the United States recently completed the destruction of its chemical weapons stockpile, at a cost of $42 billion, significantly above the initial projection of $1.4 billion. Any decision to deploy resources toward these goals rather than others requires a consideration of tradeoffs, risk models, and near-term and long-term predictions of the trajectories of evolving national priorities.

Recommendations

Tighten Monitoring and Record-Keeping for Chemical Transfers, Imports, and Exports to Reduce Discrepancies

Data from the Organization for the Prevention of Chemical Weapons (OPCW) analyzed by the Stimson Center[3] show that around 70% of the transfers of schedule 2 and schedule 3 chemicals declared by

[2] https://www.nature.com/articles/s4225/6-022-00465-9/

[3] https://www.stimson.org/2022/transfer-discrepancies/

states parties each year have discrepancies, meaning that the import declaration information does not match the export declaration information for transfers between two state parties. These discrepancies can result from differences in calculation methods, differences in customs procedures, clerical errors, and differences in when declarations are made and analyzed. Working with international trade partners to standardize how chemical imports and exports are logged and measured, and standardizing when declarations are made, would help resolve these discrepancies and increase confidence in the quality and accuracy of chemical transfer data. Discrepancies can result in chemicals being lost or misappropriated; revenues, taxes, and tariffs being misapplied or under-applied; and unnecessary administrative burden and uncertainty to reconcile discrepancies or incorporate inaccurate data into broader data collection efforts.

Proposals to resolve discrepancies in chemical transfers range from the technologically advanced, such as the Stimson Center's proposal to use a blockchain to track and record chemical shipments, to the more prosaic, such as proposals to standardize procedures for measuring chemicals and universal units for reporting those measurements. The coordination of an effort to standardize chemical transfers should include the OPCW and CWC national authorities, as well as customs services in countries with extensive chemical production and transfers, such as South Korea, Singapore, and Vietnam. Efforts to streamline and standardize tracking chemical transfers are occurring outside of the Indo-Pacific as well; Canada[4] and the European Union[5] are both developing tools to standardize chemical transfers data, and these tools may be useful to other countries. Challenges to the success of these tools include the sustained adoption of additional record-keeping, resources to store and maintain data, and agreement on a single system that the largest number of state parties will be willing and able to adopt.

As a technologically advanced region, it may be beneficial for a group of Indo-Pacific countries to develop guidelines for adapting chemical export controls to consider novel and potentially AI-designed chemicals. Such guidelines could be designed by using the same AI tools that can design

compounds predicted to be dangerous, a process termed "violet-teaming."[6] Chemicals identified by AI design, or that AI tools identify as being similar to known toxic chemicals and precursors (beyond a certain threshold) could be subjected to enhanced trade scrutiny.

Develop a Roadmap Toward OPCW Laboratory Certification for State-Run Laboratories, and Consider Expanding Biotoxin Identification Capabilities

The OPCW offers a certification program for laboratories that identify and test chemicals, enabling official recognition of their capabilities to test and detect chemical weapons agents and precursors. The OPCW also offers training and capacity-building support[7] to laboratories wishing to receive this status as designated labs. The OPCW does not publish a public list of its designated laboratories, but discussions with officials from the Philippines, Indonesia, and Malaysia suggests that even these countries with well-developed chemical industries and forensic investigative agencies may not have OPCW designated laboratories in-country and rely on sending samples to laboratories in Australia when an investigative need arises. For that matter, many Indo-Pacific countries do not have an OPCW designated laboratory, requiring them to send samples overseas when investigating cases involving potential use of chemical weapons agents or precursors. This additional investigatory step can complicate the chain of custody during evidence gathering, prolong investigation timelines, and reduce countries' capabilities to maintain end-to-end control over their own incident response. Countries that have experienced incidents involving the use or suspected use of toxic chemicals should encourage their state laboratories to pursue OPCW designated laboratory certification and take advantage of the resources and support offered by the OPCW and by states parties with designated labs that support knowledge sharing and collaborative training.

Because the BWC does not provide resources for inspections or verification measures, some chemical security experts have advocated for CWC designated laboratories to be certified in the detection and analysis of some biotoxins. Although this would increase the workload for designated laboratories

---

4   https://www.stimson.org/2023/the-nonproliferation-compliance-cheminformatics-tool-completes-a-second-test/

5   https://strategictraderesearch.org/wp-content/uploads/2020/01/Cheminformatics.pdf

6 https://www.researchgate.net/publication/372592054/

7   https://www.opcw.org/resources/capacity-building/international-cooperation-programmes/laboratory-twinning-initiative

and necessitate the development of detection and attribution criteria for toxins that are naturally occurring, adding to the range of materials that can be detected and analyzed by OPCW designated labs is one way to increase investigative capabilities and deter the use of biotoxins.

Monitor the Development of Technologies and Capabilities to Engineer Novel Chemicals and Biomaterials

Recent developments in machine-learning-enabled protein folding and chemical synthesis tools, synthetic biology, and on-demand manufacturing including benchtop DNA synthesis, as well as the democratization of scientific and technological expertise through online learning and video platforms have lowered the barriers to acquiring the skills and knowledge to produce chemical and biological materials. Some of these tools can also be used to prospectively design novel chemicals and peptides with selected characteristics, including toxicity or binding capabilities. Along with recent research that has provided proof-of-concept demonstrations of the capability to direct computational tools to design toxic chemicals, resulting in unpublished predicted structures with predicted toxicities exceeding that of VX, large language models may be used in the future to help proliferators evade export controls, by convincingly falsifying documentation, or to obtain knowledge about developing chemical weapons using alternate synthesis methods that require uncontrolled precursor substances.

The prospect of near-universal access to computational tools to design—and benchtop synthesis machines to produce—toxic chemical and biological materials that may even be unknown to scientists and investigators raises security concerns. Monitoring the development of these technologies and their improving capabilities is the first step in developing plans to limit the destructive potential of any misuse of these tools. Using the rapid development of technologies like cryptocurrency and 3D printing as an example, regulators and policymakers may be able to foresee potential criminal uses or concerning applications of new synthetic biology tools and head off misuse by implementing early guardrails and usage guidelines.

Track Research in BSL-3+ and BSL-4 Laboratories, and Build off of Global Efforts to Register and Advise Risky and Dual-Use Research

There are currently 20 BSL-3+ and BSL-4 laboratories in the Indo-Pacific,[8] with plans for more to be built in the near future,[9] in some cases prompted by the COVID-19 pandemic and a desire for more research into medical countermeasures for viral diseases. These high-containment laboratories conduct experiments on deadly disease-causing agents and can be targets of mistrust and misinformation about the content and purpose of their work. On the other hand, their work may legitimately be dangerous or improperly controlled, and it is also possible that experiments that should be performed at higher biosafety levels are being performed (dangerously) at lower biosafety level labs. Russia has repeatedly accused the United States of using Ukrainian labs to develop weaponizable biological materials, and suspicions around the origins of the COVID-19 pandemic have included accusations that gain-of-function research at a BSL-4 lab led to the release of the disease.

Comprehensive national regulatory guidance on the operation of BSL-4 and BSL-3+ labs, as well as policies on the reporting and oversight of dual-use research, are lacking in some parts of the Indo-Pacific, including in countries that operate high-containment laboratories. This guidance can include oversight and advice of dual-use research, policies to track edited viral constructs and provide evidence of origin in the event of a new pandemic or novel virus, procedures to scan DNA synthesis orders to ensure that orders for dangerous materials are tracked, and frequent safety inspections to prevent laboratory accidents and infections. Even in the United States, government-funded dual-use research is subjected to oversight that privately funded dual-use research is not, creating a loophole for dangerous experiments that are able to avoid public funding. Implementation of and compliance with bio-risk regulations for high-containment laboratories depend on local, regional, and national authorities cooperating and holding laboratories to high standards, but this increased scrutiny is well worth the benefit of protecting lab workers and the public from the dangerous and sometimes deadly pathogens studied at these laboratories.

---

[8] https://www.globalbiolabs.org/map

[9] https://thebulletin.org/2023/01/despite-risk-management-gaps-countries-press-ahead-with-new-labs-that-study-deadly-pathogens/

Develop Inspection Procedures for Biomedical Facilities, in Anticipation of the BWC Adopting an Inspection Regime

The lack of an inspection regime in the BWC[10] can be traced back to concern over the security of intellectual property being developed at pharmaceutical and biotechnology facilities and the reliability of tests for detecting biomaterials. The latter have improved considerably since inspections were considered in the 1990s,[11] but concerns about the former remain. This may be an opportunity for national inspection regimes to be developed in advance of an international agreement, with reports shared between countries that agree to similar inspection criteria. Inspections could initially be limited to BSL-3+ and BSL-4 facilities and vaccine production facilities, though individual countries could expand the scope of facility inspections if particular dual-use concerns arise. Inspection reports could also be encrypted before sharing, with countries agreeing on what conditions would have to be met for reports to be decrypted and accessed. As an example, concerns about the origin of a future virus might prompt the decryption of a report containing information about when that virus had been identified, or whether variants were being studied or worked on and how they were being used.

Pursue a Decrease in Reliance on Animal Agriculture and Discourage Live Animal Trade and Live Meat Markets

The spread of avian influenza from birds into mammals, including farmed mink and wild sea lions, joins a long list of viruses that have spread and experienced "spillover"—jumping between species—due to animal agriculture and the live animal trade. SARS, MERS, H5N1, H1N1, and Influenza D have all been traced back to animals grown for food, and animals raised on open-air pens or grazed in pastures that border wild habitats are particularly vulnerable to zoonotic transfer of diseases from wild birds, bats, boars, and other animals. The globally increasing demand for meat[12] has led to wild habitat destruction and encroachment of domesticated animals on wild habitats, further heightening the risk of contagion and spillover from wild animals to animals raised by, and regularly in contact with, humans. Bringing live animals to markets in cities and transporting live animals for sale presents additional opportunities for human contact and additional risks of disease transmission. Animal agriculture practices, particularly those involving the transport of live animals, pose a serious risk to human health but are under-considered as an opportunity to prevent future pandemics and decrease the risk of zoonotic disease spillover.

Asking people to voluntarily change their dietary habits out of concern for food safety and agricultural practices has failed to gain traction. However, investment in plant-based meat and dairy products has been successful in increasing interest and consumption of plant-based products in countries such as Israel, Singapore, Canada, India, and Germany. [13] [14] Though non-intuitive, national investment in, and promotion of, plant-based meat production could successfully reduce the biosecurity risk posed by the scale of animal agriculture. Coupled with tighter surveillance of animal health, an elimination of the live animal trade, and restrictions on grazing domestic animals in areas where they could come into contact with wild animals, the chance that the next pandemic is traced back to an animal sold at a meat market can be greatly decreased.

Miles Pomper and Richard Pilch have suggested additional recommendations for monitoring and controlling potentially dangerous biomaterials [15] based on the framework of "dissuasion, disarmament, denial, disruption, deterrence, detection, and defense." [16] Notable among their suggestions are tracking scientists with relevant expertise, particularly those that may be leaving dangerous research programs, and aiding them in the establishment of legitimate research enterprises; strengthening environmental and epidemiological detection systems, including communication protocols and early warning systems; and enhancing response capabilities including the delivery of healthcare and therapeutics, incident response, forensics, and decontamination, all of which serve to lessen the potential effects of a BW incident.

---

[10] Meeting of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on Their Destruction, Report on Universalization Activities, U.N. Doc. BWC/MSP/2019/3

[11] https://www.armscontrol.org/act/1997-01/features/fourth-bwc-review-conference

[12] https://www.technologyreview.com/2021/04/26/1023636/sustainable-meat-livestock-production-climate-change/

[13] https://www.marketsandmarkets.com/Market-Reports/plant-based-meat-market-44922705.html

[14] https://www.effectivealtruism.org/articles/varun-deshpande-clean-and-plant-based-meat-in-the-developing-world

[15] https://www.tandfonline.com/doi/full/10.1080/25751654.2021.1880787

[16] Pilch, R.F.. (2016). Arms Control Measures. 10.1016/B978-0-12-803678-5.00024-2.

Conclusion

Indo-Pacific countries are actively working toward improving chemical and biological security through, for instance, the establishment of the CBRN Center of Excellence in Southeast Asia by the Philippines,[17] or Sri Lanka's development of a national inventory of dangerous pathogens [18] to advance its implementation of the BWC. The region has an opportunity to break new ground in implementing inspection procedures, regulatory guidance, and technological monitoring that advance the state of the art in security compliance and risk reduction. As leading producers of chemicals and developers of biotechnology, Indo-Pacific countries play a crucial role in upholding the goals of the BWC and CWC to deter the development and use of dangerous biological and chemical materials.

---

[17] https://www.apln.network/analysis/the-korea-times-column/advancing-biological-weapons-convention-bwc-the-philippine-role

[18] https://www.un.org/disarmament/update/sri-lanka-establishes-national-inventory-of-dangerous-pathogens-in-key-step-to-implement-the-biological-weapons-convention-with-support-from-unoda-and-the-netherlands/

9

Science Diplomacy Initiatives in the Indo-Pacific

Ferenc Dalnoki-Verses

Introduction

This chapter explores science diplomacy possibilities for the Indo-Pacific. It begins with a description of the significance of science diplomacy and confidence-building measures (CBMs) in addressing security challenges. Then, it moves on to discuss an alternative taxonomy for science diplomacy, one that prioritizes national interests and expertise. Finally, the chapter focuses on two initiatives on risk reduction and supply chain resilience, and one focused on a public health improvement initiative in North Korea, which is particularly relevant now given reports that North Korea is selling munitions for food.[1]

CBMs have gained significant importance in science diplomacy and risk reduction in the Indo-Pacific, which demands cooperative solutions to address shared concerns such as climate change, resource management, and public health. Policymakers and security experts prioritize global cooperation, ranging from disaster response to national security affairs and cybersecurity, to leverage each participating nation's unique expertise and promote peace and stability. Noteworthy examples of this in arms control abound, such as the lab-to-lab exchanges that established methods and technologies to allow the verification of nuclear treaties and the International Monitoring System (IMS) with more than 330 sensors globally that monitor nuclear testing and verify the global moratorium on nuclear testing. The very nature of non-intrusive, remote verification of arms control agreements necessitates the need for science and technology. It is also important to remember that climate agreements such as the Paris Climate Agreement and the Arctic Council require science diplomacy as well.[2] [3] (The latter is an agreement with the Russian Federation, seven Western states, and six indigenous groups that conducts many science-based investigations to sustainably manage the Arctic.[4]) CBMs can reduce

tensions and prevent further escalation in protracted conflicts by providing a means of information exchange and verification, making behavior predictable, and reducing anxiety and suspicion.[5] [6]

Science diplomacy is a key part of building trust, improving sustainable development, and encouraging cooperation between countries. Nonetheless, successful science diplomacy demands coordination of various government agencies and the recognition of national interests.[7]

Taxonomy of Science Diplomacy

In 2010, the Royal Society and the American Association for the Advancement of Science suggested a taxonomy for science diplomacy that consists of three dimensions: science in diplomacy, diplomacy for science, and science for diplomacy.[8] [9]

Many international science efforts serve multiple purposes, however, limiting the impact of the traditional taxonomy on government agencies covering science and foreign affairs. A more "pragmatic reframing" of science diplomacy looks at three groups: actions that directly help a country's national needs, actions that address cross-border interests, and actions that are mostly meant to meet global needs and challenges.[10] This conceptualization is useful because it recognizes that functions will be coordinated by different government agencies and the "essential driving role of national interests in science diplomacy."[11] Even though some diplomats have science backgrounds, few ministries of foreign affairs have their own scientific advisory mechanisms. There is thus a need for more access to experts and efforts to build capabilities.[12] Also, and significantly, while not explicitly mentioned, each of the science diplomacy initiatives needs government support to succeed and, in turn, open lines of communication, education, and boosted resources can help governments take an active, decision-making role.

[1] AP NEWS. "White House: Russia's Wagner Received Arms from North Korea," Dec. 22, 2022. https://apnews.com/article/russia-ukraine-business-north-korea-e6a068d91bc9828ecadfb67c929a4162

[2] https://www.un.org/disarmament/cbms/

[3] "Https://Unfccc.Int/Process-and-Meetings/the-Paris-Agreement," n.d. https://unfccc.int/process-and-meetings/the-paris-agreement

[4] Unfortunately, the work of the Arctic Council has suspended because of the War in the Ukraine. https://arctic-council.org/

[5] https://www.un.org/disarmament/convarms/transparency-cbm

[6] https://www.un.org/disarmament/cbms/

[7] Gluckman PD, Turekian VC, Grimes RW, Kishi T (2017) Science diplomacy: a pragmatic perspective from the inside. Sci Diplomacy 6(4), pp.1-13

[8] The Royal Society, The American Association for the Advancement of Science (2010). New frontiers in science diplomacy. The Royal Society, London.

[9] Copeland D (2016) Science Diplomacy. In: Constantinou CM, Kerr P, Sharp P (eds) The SAGE handbook of diplomacy. SAGE Publications Ltd, London. pp. 628–640.

[10] Gluckman PD, Turekian VC, Grimes RW, Kishi T (2017) Science diplomacy: a pragmatic perspective from the inside. Sci Diplomacy 6(4):1–13.

[11] Ruffini, Pierre-Bruno. "Conceptualizing science diplomacy in the practitioner-driven literature: a critical review." Humanities and Social Sciences Communications 7, no. 1 (2020), pp. 1-9.

[12] The exception is the establishment of the Foreign Ministries Science and Technology Advisors Network (FMSTAN) in 2016, a global network of science advisors within foreign ministries to integrate science advice into foreign policy. However, the accomplishments of FMSTAN, which involves at least 20 countries and has been operational for seven years, have not been officially reported.

The aim is to share knowledge both ways, without talking down.[13] This kind of effort can earn important government support for many science diplomacy initiatives, especially the ASPIRE-IP initiative, described in this report. In the end, active involvement from governments at all levels is vital to make science diplomacy work.

Past Science Diplomacy Exchanges in the Indo-Pacific

Science diplomacy initiatives have the potential to offer significant benefits to Indo-Pacific countries. These benefits include access to extra resources, funding, and expertise, which may not be readily available locally. Moreover, these initiatives can create opportunities to supplement capacity and facilitate knowledge transfer among partnering nations. This can also lead to critical training opportunities and skill-development exercises for local scientists and researchers. There are numerous examples of science diplomacy initiatives in the Indo-Pacific, but this report only discusses a handful.

Bhutan-India

The Bhutan Remote Sensing Centre (BRSC) is a significant science diplomacy initiative in the Indo-Pacific, established in 2014 by the Indian Space Research Organization and Bhutan. The initiative promotes the utilization of space technology in environmental monitoring and natural resource management practices throughout Bhutan.[14] The BRSC uses geographic information systems and remote sensing technologies to monitor land-use changes, which can be traced more effectively through high-resolution satellite images than aerial photography.

Indonesia, Malaysia, Papua New Guinea, the Philippines, the Solomon Islands, and Timor-Leste

Six countries in the Indo-Pacific are working together on the Coral Triangle Initiative on Coral Reefs, Fisheries, and Food Security (CTI-CFF). The goal of the initiative is to protect coral reefs and the ecosystems around them in the Coral Triangle area and make sure they are managed well. This marine zone is home to some of the world's most diverse wildlife populations. The CTI-CFF prioritizes conservation zones in the sea, responsible fisheries management, adaptation to climate change, and supporting sustainable ways of life for communities.

Pacific Islands Forum nations and the European Union

PACE-net was set up as a partnership between the European Union and 16 Pacific Islands Forum (PIF) countries to improve research, management, and communication in the area. One of the concrete outcomes of this endeavor to address climate change is the promotion of "science as a development tool, to ensure that the decisions around climate are based on rigorous facts."[15] The initiative aims to facilitate the incorporation of science in the decision-making process and to increase the region's appropriation of science.

Democratic People's Republic of Korea, the United Kingdom, Germany, China, and the United States

The Mount Paektu Geoscientific Group, an international research collaboration that includes North Korean scientists as equal partners in fieldwork and data analysis, is highlighted as a successful example of collaboration.[16] The group published its first scientific paper in March 2016, and a follow-up publication in 2021.[17] [18] This plan includes temporary deployment of broad-band

---

[13] The author, in the role as science advisor for the PIF, has observed the importance in clarity and openness. Japan's presentations to PIF members regarding the release of 1.3 million tons of ALPS treated water were complex and lacked clarity making it difficult for PIF members to understand the consequences of the release. HE Henry Puna, Secretary General of the PIF, subsequently expressed, "We have identified certain information gaps and substantial concerns with the suggested release into the ocean." [Op Ed in the Guardian Newspaper, https://www.forumsec.org/2023/02/06/op-ed-japan-must-work-with-the-pacific-to-find-a-solution-to-the-fukushima-water-release-issue-otherwise-we-face-disaster/

[14] SERVIR Science Coordination Office (SCO) Provides Remote Sensing Virtual Training as Part of Science, Technology, Engineering, and Math (STEM) Capacity Building for Bhutan – Marshall Science Research and Projects Division. "SERVIR Science Coordination Office (SCO) Provides Remote Sensing Virtual Training as Part of Science, Technology, Engineering, and Math (STEM) Capacity Building for Bhutan – Marshall Science Research and Projects Division," Jan. 12, 2022.

https://science.msfc.nasa.gov/2022/01/12/servir-science-coordination-office-sco-provides-remote-sensing-virtual-training-as-part-of-science-technology-engineering-and-math-stem-capacity-building-for-bhutan/

[15] Horizon Magazine. "The Pacific Region Is a Perfect Example of Science Diplomacy in Action – Prof. Jean-François Marini," Nov. 22, 2016. https://ec.europa.eu/research-and-innovation/en/horizon-magazine/pacific-region-perfect-example-science-diplomacy-action-prof-jean-francois-marini

[16] https://themprc.org/about/

[17] Ri Kyong-Song, James O. S. Hammond, Ko Chol-Nam, Kim Hyok, Yun Yong-Gun, Pak Gil-Jong, Ri Chong-Song, Clive Oppenheimer, Kosima W. Liu, Kayla Iacovino and Ryu Kum-Ran, Evidence for partial melt in the crust beneath Mt. Paektu (Changbaishan) Volcano, Democratic People's Republic of Korea/China, Science Advances, 2, doi:10.1126/sciadv.1501513 (2016).

[18] Richard N. Holdaway, Ben Kennedy, Brendan M. Duffy, Jiandong Xu, and Clive Oppenheimer. Evidence for old carbon contamination in 14 C wiggle-match age series for the 946 CE eruption of Changbaishan volcano. Geochronology Discussions, doi:10.5194/gchron-2021-13 (2021).

seismometers to the volcano.[19] The future plan is to deploy a much larger number of seismometers to northern North Korea and Northeast China. One of the specific initiatives that we will discuss later is a public health initiative with North Korea, which was also emphasized as a field of possible cooperation in the Pyongyang Joint Declaration of 2018.[20]

Specific Ccience Diplomacy Initiatives

The proposed initiatives to promote CBMs and risk reduction in the Indo-Pacific reflect the growing recognition of the importance of regional cooperation and coordination in addressing common challenges and promoting stability and security. The *Advanced Supply Chain Predictive Intelligence for Resilience Enhancement in the Indo-Pacific (ASPIRE-IP)* is a proposed early warning system to predict and plan for disruptions in the supply chain. Such a project is unique from the IMS global verification system mentioned earlier, or other mutually sensitive data sharing because it deals with sharing data related to commercial interests as well, complicating data sharing and necessitating government explicit involvement. Additionally, a proposed *Public Health Initiative with North Korea* aims to deliver medical supplies in return for North Korea producing computerized tomography (CT) scanners for Low- or Middle-Income Countries (LMICs). This initiative illustrates the potential of science diplomacy to address public health crises and foster collaboration despite political tensions.

Smaller economies in the Indo-Pacific have a unique opportunity to leverage their well-developed science and innovation systems for economic and social advancement. However, the lack of resources and abilities, especially in LMICs, to build necessary scientific knowledge has led to a reliance on international scientific research. This may not be applicable, accessible, or affordable for specific circumstances, creating disparities between developed and developing countries. Addressing

this gap requires a concerted global effort to ensure that all countries have access to scientific knowledge and products, reducing disparities and promoting the achievement of the Sustainable Development Goals through science diplomacy.[21]

Supply chain resilience in the Indo-Pacific: A Supply Chain Early Warning System (ASPIRE-IP)

The maritime routes connecting Eastern Asia to the Americas, Europe, and the Middle East all traverse the Indo-Pacific.[22] The abundant ports and significant metropolitan areas in the region make it a crucial hub for international commerce. The United Nations Conference on Trade and Development indicates that in 2019, 41% of all freight loaded and 62% of all cargo discharged in global marine trade transited in the Indo-Pacific. [23] This highlights the importance of supply chain resilience in this area for international business and economic growth in the region. During the pandemic, we saw global disruption in the supply chains, especially in the semiconductor industry, with widescale impacts in multiple industries, especially the auto industry. At the heart of this were increases in the cost of shipping, where in 18 months the average cost of shipping increased by a factor of 7, difficult to manage for large companies but catastrophic for small and medium enterprises. [24] There were also problems in the logistics and transportation sectors, which led to severe disruptions in the global shipping of merchandise goods. Pandemic-related restrictions on economic activity, such as port closures due to localized and asynchronous outbreaks of COVID-19. [25] All these effects led to global imbalances in supply and demand and led to significant turmoil in the markets.

Also, the effects of climate change will get worse over time and cause more problems in the supply chain. One prediction by the McKinzie Global Institute is that the probability that a hurricane significantly disrupts the highly transnational and integrated

---

[19] Note that the International Monitoring System (IMS) uses similar detectors to monitor nuclear tests. It is impressive that North Korea allows this level of transparency.

[20] Pyongyang Joint Declaration of September 2018 | NCNK. "Pyongyang Joint Declaration of September 2018," Sept. 19, 2018. https://www.ncnk.org/node/1633

[21] "Science Diplomacy to Support Global Implementation of the Sustainable Development Goals (SDGs)." n.d. https://sustainabledevelopment.un.org/content/documents/6654135-Saner-Science%20diplomacy%20suggested%20revisions%203%20final.pdf

[22] See following site for a visualization of global shipping in 2012: Plumer, Brad,"This is an incredible visualization of the world's shipping routes" Vox,

April 25, 2016. https://www.vox.com/2016/4/25/11503152/shipping-routes-map

[23] United Nations Conference on Trade and Development, "UNCTAD's Review of Maritime Transport 2020: highlights and figures on Asia and the Pacific," UNCTAD, https://unctad.org/press-material/unctads-review-maritime-transport-2020-highlights-and-figures-asia-and-pacific

[24] "How Soaring Shipping Costs Raise Prices around the World." n.d. IMF. https://www.imf.org/en/Blogs/Articles/2022/03/28/how-soaring-shipping-costs-raise-prices-around-the-world

[25] United Nations Conference on Trade and Development, "UNCTAD's Review of Maritime Transport 2020: highlights and figures on Asia and the Pacific," UNCTAD, https://unctad.org/press-material/unctads-review-maritime-transport-2020-highlights-and-figures-asia-and-pacific

semiconductor industry will increase by a factor of 2 to 4 by 2040.[26] There are also geopolitical changes that could disrupt supply chains. For example, there is the potential for any country to shut down or close off technology supply chains, such as those for critical minerals and rare earths, which are essential to electronics. This occurred in 2010 when China engaged in an informal embargo on rare earth materials following a territorial dispute with Japan.[27] It also occurred in March 2023 when the Netherlands blocked all the sales of high-end semiconductor equipment, to which China responded via its ambassador in the Netherlands: "This will not be without consequence. I will not speculate on countermeasures, but China will not take this lightly." [28] Collectively, these issues create disruptions in the supply chain, leading to significant economic and social consequences.

Numerous organizations in the Indo-Pacific work to improve the safety and reliability of supply networks. Among them is the Regional Comprehensive Economic Partnership, which is comprised of all countries from the Association of Southeast Asian Nations as well as Australia, China, Japan, South Korea, and New Zealand; its objective is to increase trade within the Indo-Pacific, while strengthening economic relationships in the region.[29] [30]

Complementing these initiatives is the Supply Chain Resilience Initiative (SCRI), a collaborative effort between India, Australia, and Japan that employs a variety of methods to increase supply chain resilience. The Biden Administration has also introduced the Indo-Pacific Economic Framework for Prosperity (IPEF), a new economic framework aimed at deepening economic integration in the Indo-Pacific across four pillars: connected economy, resilient supply chains, clean energy, and fair economy.[31]

Need for Confidence Building

However, initiatives like SCRI and those of other organizations face challenges that can be addressed via CBMs and capacity building across the Indo-Pacific. The SCRI, for instance, aims to establish alternatives to China-centric supply chains, but rivalry among regional powers could derail its focus.

Additionally, the SCRI's founders have an opportunity to complement their global multilateral practices by incorporating perspectives from the influential PIF members. PIF nations play a key regulatory role in critical fishing areas and supply chain routes in the Pacific, giving them significant economic and geopolitical influence in the region. Their participation and insights will be vital for developing unified, cooperative approaches. By proactively engaging the PIF and embracing their authority on regional issues, the SCRI could thus be strengthened.

Confidence-building fosters trust and cooperation among stakeholders, reducing misunderstandings and conflict through preventative diplomacy. [32] Enhancing collaboration between shipping firms, ports, and governments, for example, can address logistics and transportation issues. Dialogue promotes mutual understanding, potentially mitigating political instability and trade tensions. A regional early warning system could also build confidence by supplying information to avert potential crises.

Need for a Supply Chain Early Warning System: The 2021 Urea Crisis

The 2021 urea crisis in the Republic of Korea serves as a powerful illustration of the urgent need for resilient supply chain and a well-tuned early warning system. When China enforced export restrictions on urea, a critical element for reducing greenhouse emissions in diesel-powered vehicles, it set off an

---

[26] McKinsey & Company. "Could Climate Become the Weak Link in Your Supply Chain?" n.d. https://www.mckinsey.com/capabilities/sustainability/our-insights/could-climate-become-the-weak-link-in-your-supply-chain

[27] Stephen R. Nagy, "Territorial Disputes, Trade and Diplomacy: Examining the Repercussions of the Sino-Japanese Territorial Dispute on Bilateral Trade," China Perspectives, April 2013, http://journals.openedition.org/, DOI:10.4000/chinaperspectives.6321

[28] https://nltimes.nl/2023/03/20/asml-export-ban-will-hurt-netherlands-relationship-china-ambassador-warns

[29] "RCEP is transforming trade in Asia Pacific and creating advantages for companies" Thomson Reuters. Accessed on Mar. 18, 2023. https://www.thomsonreuters.com/en-us/posts/international-trade-and-supply-chain/rcep-asia-pacific-advantages/

[30] Park, Cyn-Young,"Three Areas Where RCEP May Help Region's Post-Pandemic Recovery." Asian Development Blog. Asian Development Bank, Nov. 17, 2020. https://blogs.adb.org/blog/three-areas-where-rcep-may-help-region-s-post-pandemic-recovery

[31] "Indo-Pacific Economic Framework." U.S. Department of Commerce. https://www.commerce.gov/ipef

[32] Encyclopaedia Britannica. "Confidence-Building Measure | International Relations," n.d. https://www.britannica.com/topic/confidence-building-measure

extreme shortage in Korea. As a result, the country's logistics nearly came to a standstill, threatening everything from daily deliveries to the wider manufacturing sector. The resulting scramble to secure alternative urea sources underscored the critical importance of both diversifying supply sources and fostering robust public-private sector collaboration in times of crisis.[33]

In such a scenario, the benefits of an early warning system for supply chain resilience become abundantly clear. If such a system were operational during the urea crisis, the impending effects of China's urea export restrictions could have been predicted and appropriate preparatory actions could have been initiated sooner. Moreover, an early warning system, equipped with advanced predictive modelling capabilities, could have significantly eased the impact of the crisis. It could have foreseen the supply disruption, prompting strategic actions such as stockpiling of urea, diversification of suppliers, or even modifications in production processes in advance. In essence, an efficient early warning system, underpinned by real-time predictive tools, has the potential to avert a crisis or, at the very least, mitigate its impact on crucial economic activities.

Details of the Science Diplomacy Initiative

One effective way forward is the development and application of advanced predictive modelling tools—a kind of early warning system for the supply chain dubbed ASPIRE-IP (Advanced Supply chain Predictive Intelligence for Resilience Enhancement in the Indo-Pacific). This proposal is similar to the early warning system suggested by Han-Koo Yeo and Wendy Cutler from the Asia Society and to the Global Supply Resiliency Initiative discussed later (GSRI).[34] It involves the creation of a platform for real-time monitoring of supply chain developments and swift information exchange. This collaborative initiative includes both international countries and public and private sectors.[35]

Unifying expertise from various countries across the Indo-Pacific will be critical for this initiative. These experts, each with unique perspectives, collaborate to formulate models based on real-time data extracted from multiple sources that affect supply chain resiliency and agility. These models are capable of simulating and predicting potential disruptions in supply chains caused by natural disasters, geopolitical tensions, or trade conflicts. Bilateral and regional mechanisms such as the PIF, IPEF, and Americas Partnership for Economic Prosperity provide an ideal platform for such collaborations.[36] These models described below will act as an early warning system for supply chain disruptions and will integrate data from a variety of sources.

Access to reliable data will be critical in this process. Governments, businesses, and other stakeholders should join forces to collect and share this data.[37] Information on supply chain vulnerabilities, including details on critical infrastructure, critical imported materials, trade policy, transportation routes, and inventory levels, is of high importance and the challenge will be to share it in a way it does not give any party a competitive advantage.[38] Addressing competing interests within the ASPIRE-IP initiative requires a multifaceted approach. Data anonymization and aggregation can protect individual stakeholder information, while clear governance and legal frameworks provide structure and enforce fairness. GSRI is a coalition of stakeholders sharing to create resilient supply chains has dealt with similar concerns.[39]

The GSRI pilot, while less broad than the proposed ASPIRE-IP initiative, demonstrated the power of collaborative data sharing for supply chain visibility. It focused on improving visibility in UN Children's Fund (UNICEF)'s supply chain for ready-to-use therapeutic foods (RUTF) in West Africa. By aggregating data on shipment locations, disruptions, and risks into a centralized dashboard, the pilot gave UNICEF greater awareness. Supply chain managers could see potential issues and make quick, informed decisions, like the early warning system envisioned.

[33] Ibid.

[34] United States Department of Commerce. "Pillar II – Supply Chains." Accessed July 19, 2023. https://www.commerce.gov/ipef/pillar-ii

[35] Han-koo Yeo, Wendy Cutler, Asia Society Policy Institute. "Strengthening Regional Supply Chain Resiliency Through the Indo-Pacific Economic Framework (IPEF)." Accessed July 28, 2023. https://asiasociety.org/policy-institute/strengthening-regional-supply-chain-resiliency-through-indo-pacific-economic-framework-ipef

[36] US Department of State. "Supply Chain Ministerial," Accessed Jul. 28, 2023. https://www.state.gov/supply-chain-ministerial/

[37] CSIS. "Building Resilient Global Supply Chains in the Geopolitics of the Indo-Pacific Region." Accessed Jul. 28, 2023. https://www.csis.org/analysis/building-resilient-global-supply-chains-geopolitics-indo-pacific-region

[38] CSIS. "Building Resilient Global Supply Chains in the Geopolitics of the Indo-Pacific Region." Accessed Jul. 28, 2023. https://www.csis.org/analysis/building-resilient-global-supply-chains-geopolitics-indo-pacific-region

[39] "Shared Intelligence for Resilient Supply Systems." n.d. World Economic Forum. Accessed Jul. 30, 2023. https://www.weforum.org/reports/shared-intelligence-for-resilient-supply-systems/

For instance, when border closures were reported due to Ebola, contingency plans were swiftly initiated. The dashboard enabled more dynamic, resilient management of the RUTF supply chain. UNICEF could better respond to events that might impede the timely delivery of these life-saving foods. The success shows the promise of shared data to create visibility across entire supply networks. When disparate sources are brought together, all stakeholders benefit with actionable intelligence. That was proven by UNICEF's enhanced supply chain operations. This was accomplished by using a combination of tools (cloud, block-chain, analytics, and security protocols) enabled the GSRI to securely combine data across a network of stakeholders while respecting competitive boundaries.[40]

A novel approach could involve the implementation of an appropriately trained artificial intelligence (AI) agent to serve as a third-party mediation mechanism. This AI mediator would oversee data sharing and collaboration, ensuring neutrality and unbiased oversight. The ASPIRE-IP initiative also emphasizes secure data sharing, with the development of platforms equipped with information barriers for sensitive integrity and confidentiality similar to the GSRI pilot initiative.[41] [42] This secure environment will foster collaboration without compromising competitive advantage among the stakeholders. The GSRI pilot provides a valuable proof of concept but had a more limited scope than ASPIRE-IP aims for. Expanding from the RUTF case to broader commercial supply chains will entail greater data sensitivity and competitive concerns. ASPIRE-IP will need to implement even more robust governance, security, trust-building, and stakeholder engagement to achieve its ambitions.

Utilizing AI and machine learning for adaptive predictions using the cross-sector shared data is a cornerstone of the ASPIRE-IP initiative, allowing for the creation of models that can accurately forecast potential supply chain disruptions. [43] [44] Computational tools can identify vulnerabilities to political upheaval, disease outbreaks, critical material disruptions that caused the urea crisis, and other destabilizing events. Additionally, these systems allow for the planning and simulation of response strategies to address these predicted disruptions. Implementing stress tests of the system strengthens supply chain resiliency by accounting for expected policy and political changes. Integration of meteorological and supply chain data further enhances the system's ability to predict how weather events may affect regional supply chains. [45] If the integrated tool predicts a potential supply chain disruption, geospatial and satellite analysis can identify vulnerable areas in real-time so businesses and governments can take proactive steps to enable an effective response. [46] [47] Simultaneously, the implementation of IoT devices, sensors, and satellite imagery analysis provides real-time tracking of transportation routes, inventory levels, and shipping pathways. [48] Dynamic modelling tools like *AnyLogistix* and others are employed to simulate various disruption scenarios, including geopolitical risks and trade conflicts in close to real-time.[49] These tools have the potential to generate dynamic, almost real-time models of supply chains from the production of the product, to the transport, to delivery and can include port congestion, border crossing issues, shipment data, regulatory issues, inventory data and other relevant data. The author used this tool to model the California dairy supply chain during the COVID-19 pandemic and mitigation scenarios when nodes in the model became inoperative. [50] These technologies enable swift response to emerging challenges, ensuring that the

---

[40] "Maximizing Collaboration through Secure Data Sharing | Accenture." n.d. www.accenture.com. Accessed Jul. 29, 2023. https://www.accenture.com/us-en/insights/digital/maximize-collaboration-secure-data-sharing

[41] Ibid.

[42] Dutta, Pankaj, Tsan-Ming Choi, Surabhi Somani, and Richa Butala. 2020. "Blockchain Technology in Supply Chain Operations: Applications, Challenges and Research Opportunities." Transportation Research. Part E, Logistics and Transportation Review 142 (1): 102067. https://www.sciencedirect.com/science/article/pii/S1366554520307183

[43] Wuest, Thorsten, et al. "Impact of COVID-19 on Manufacturing and Supply Networks — The Case for AI-Inspired Digital Transformation." SSRN, May 5, 2020, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3593540

[44] Camur, Mustafa Can, et al. "Enhancing Supply Chain Resilience: A Machine Learning Approach for Predicting Product Availability Dates Under Disruption." arXiv, Apr. 28 2023, https://arxiv.org/abs/2304.14902

[45] "It's Time to Make Weather Forecasts Part of Your Supply Chain Planning - Gary Wollenhaupt | Procurement & Supply Chain News and Insights." n.d. Www.procurious.com. https://www.procurious.com/procurement-news/weather-forecasts-part-of-supply-chain-planning.

[46] "Staying ahead of the next Disaster — How GIS Is Advancing in Disaster Management." 2021. Industry Blogs. May 11, 2021. https://www.esri.com/en-us/industries/blog/articles/staying-ahead-of-the-next-disaster-how-gis-is-advancing-in-disaster-management/

[47] Li, Bo, and Ali Mostafavi. 2022. "Location Intelligence Reveals the Extent, Timing, and Spatial Variation of Hurricane Preparedness." ArXiv.org. Mar. 18, 2022. https://doi.org/10.48550/arXiv.2203.06567

[48] Jagdale, Saumitra. 2023. "The Role of IoT in Building a Resilient Supply-Chain System." IoT Times. Jan. 17, 2023. https://iot.eetimes.com/the-role-of-iot-in-building-a-resilient-supply-chain-system/

[49] Ivanov, Dmitry. "Supply chain simulation and optimization with anyLogistix." (2021).

[50] https://nonproliferation.org/modeling-the-food-supply-chain-during-the-pandemic/

supply chain across the Indo-Pacific remains resilient and agile.[51]

One possible framework that may be used to visualize the ASPIRE-IP early warning system is the OODA (Observe, Orient, Decide, Act) Loop.[52] Such a loop can help to react quickly to changes and stay one step ahead, which is crucial in mitigating supply chain disruptions. In the "Observe" phase, the system integrates multiple forms of data, including meteorological information, Internet-of-Things devices, and satellite imagery, to monitor the supply chain in real time. During the "Orient" phase, this data is analyzed to understand the current state of the supply chain, identifying potential vulnerabilities and risks. The "Decide" phase involves the application of AI and machine learning to create predictive models, allowing for the formulation of proactive strategies. These strategies are then implemented in the "Act" phase, where planning and mitigation efforts are executed to ensure supply chain resilience. By employing the OODA loop, ASPIRE-IP can swiftly respond to emerging challenges, adapt to unforeseen disruptions, and maintain alignment with the unique dynamics of the Indo-Pacific. This cyclical process fosters continuous improvement and agility, essential attributes for a robust and responsive supply chain management system.

A Dedicated Barter Channel for Medical Resources Involving North Korea and Low-to-Middle Income Countries (Cats4Meds Initiative)

The *Cats4Meds Initiative* aims to establish a dedicated barter channel involving North Korea and LMICs for the exchange of essential medicines, medical equipment, and indigenous CT scanners. [53] This science diplomacy effort seeks to address pressing humanitarian concerns and contribute to CBMs between North Korea and the international community. By fostering a cooperative environment, the initiative also aims to pave the way for resolving

conflicts related to nuclear weapons, human rights, and other issues.[54]

Need for Confidence Building

The Cats4Meds Initiative is designed to build trust between North Korea and the international community after years of isolation due to the pandemic and international sanctions. The latter have added to the challenges of providing medical care to North Korea and resulted in limited access to essential medical supplies and equipment. Drug-resistant TB, cancer, and maternal and infant mortality have worsened the country's healthcare problems. In LMIC's, the lack of CT scanners makes the diagnosis and treatment of diseases an arduous task, thereby jeopardizing the achievement of the United Nations' sustainable development goals by 2030/2035.

Details of the Science Diplomacy Initiative

North Korea's hospitals suffer from a lack of medicines and supplies, but the country has begun to develop a low-cost manufacturing base for certain types of medical equipment, which could be sold to LMICs. During one of his many visits to North Korea, Dr. Kee Park of the Harvard University's Department of Global Health and Social Medicine was shown a picture of a locally produced, low-cost CT scanner. Although CT scanners are enormously valuable for diagnosing strokes and other life-threatening ailments, the major manufacturers do not supply low-cost versions, which denies these lifesaving instruments for many LMIC's.[55]

In this Science Diplomacy Initiative, an exchange (a "barter channel") was initiated through a trusted agent, notionally the World Health Organization, that would allow North Korea to export low-cost CT scanners of the head and in return receive much-needed medicines—all without gaining access to foreign currency, thereby avoiding the risk that this money might be diverted to other purposes such as funding weapons of mass destruction or delivery systems. CT scans of the head use special X-ray

---

[51] "Weather-Proofing Supply Chains against Climate Risk." 2022. Supply & Demand Chain Executive. Sept. 15, 2022. https://www.sdcexec.com/safety-security/risk-compliance/article/22445364/resilinc-weatherproofing-supply-chains-against-climate-risk

[52] "How Do You Use the OODA Loop to Make Fast and Adaptive Decisions in Dynamic Situations?" n.d. Www.linkedin.com. Accessed Jul. 29, 2023. https://www.linkedin.com/advice/1/how-do-you-use-ooda-loop-make-fast-adaptive-decisions

[53] During one of his many visits to North Korea, Dr. Kee Park of the Harvard University's Department of Global Health and Social Medicine) was shown a picture of a locally produced, low-cost CT scanner. It is based on his idea that this barter channel is proposed.

[54] J. H. Pollack and F. Dalnoki-Veress, Public-health engagement with North Korea in the COVID-19 era: challenges and opportunities, CNS Occasional Paper #53, 33p, Dec. 2021.

[55] This idea draws from the report: Kee Park, Andrew Duggan, Sunguook Wee, Diagnostics for All, ID 511 Course, Harvard University, unpublished.

equipment to help assess traumatic brain injuries, severe headaches, dizziness, stroke, and brain tumors.[56]

Conclusion

In the Indo-Pacific, science diplomacy is a promising way to improve trust, sustainable development, and regional cooperation. For science diplomacy to work, policymakers and security experts must put CBMs at the top of their lists in all fields to make sure that multilateral cooperation works well. The success of the Arctic Council is an example of effective science diplomacy, but it has been suspended in the context of the war in Ukraine. There can be other science diplomacy initiatives, however, including the one on North Korea discussed in this chapter. A pragmatic reframing of science diplomacy is also essential, one that focuses on actions designed to cater to national needs. Such an approach has proven useful in recognizing the fundamental role of national interests in science diplomacy. These initiatives can help highlight the importance of regional cooperation and coordination to address common challenges and promote stability and security in the Indo-Pacific.

---

[56] Park, K.B. and Ham, E.I., 2021. North Korea's Surprisingly Robust Healthcare System. Global Asia, 16(3), pp. 66-72.

Conclusion: Key Findings and Recommendations

Michiru Nishida

T he purpose of this chapter is to summarize the volume's key findings and, on that basis, recommend broader practical policy measures.

As described in Chapter 1, arms control is, to Schelling and Halperin, "all the forms of military cooperation between potential enemies in the interest of reducing the likelihood of war, its scope and violence if it occurs, and the political and economic costs of being prepared for war." That term, therefore, encompasses not only arms control in the narrow sense of legal instruments that regulate or reduce the number and capabilities of weapons, but also confidence and security building measures (CSBMs) and risk reduction measures. In this chapter, arms control is considered in a narrow sense, and CSBMs and risk reduction measures as an interim step on the way to arms control.

As Russia's invasion of Ukraine has shown, neither arms control, CSBMs, nor risk reduction measures can prevent deliberate aggression. That does not mean these measures are meaningless, however. While wars are sometimes initiated by deliberate aggression, they are also often initiated by miscalculations, misunderstandings, misperceptions, and accidents. To deter deliberate aggression, military capabilities should be strengthened, but doing so can also lead to miscalculations and misunderstanding. Herein lies the crucial role of CSBMs, risk reduction measures, and arms control. That is, they are aimed at reducing these risks by making mutual intentions and actions as clear as possible, thereby reducing the risk of military conflict and war.

As discussed in this volume, there are current and looming security threats in the Indo-Pacific that require CSBMs, risk reductions measures, and arms control. These threats are not limited to those arising from "things" such as weapons and materials, but also from "behaviors" and (perceived or non-perceived) intentions that lead to distrust and tensions.

The most serious threat is the risk of a major invasion or military clashes, which could lead to the use of nuclear weapons or nuclear exchanges. In this regard, as discussed in Chapter 1, the European experience during the Cold War has lessons for today's Indo-Pacific. Of course, the chapter highlights that "it will not be possible to transfer those measures wholesale to today's Indo-Pacific because the strategic and technological context is too different." Still, some measures can be adapted to the modern Indo-Pacific.

In the medium-to-long terms, arms control that directly addresses the large-scale development and buildup of nuclear weapons in the Indo-Pacific is essential, while, in the short term, and as discussed in Chapter 3, CSBMs are needed to mitigate the risk of nuclear use and of advanced missiles that carry non-nuclear weapons.

In addressing the risk of military conflict, CSBMs in the maritime domain, as discussed in Chapters 4 and 5 are important given the outsized importance of naval and commercial traffic in the Indo-Pacific. Preventing unintended military conflicts in the maritime domain requires effective constraints on the behavior of regional countries. In this regard, an operational approach that focuses on behavior rather than on weapons is crucial. Although there are still many points of contention regarding the Code of Conduct (CoC) for the South China Sea between the members of the Association of Southeast Asian Nations (ASEAN) and China, progress will require agreement on a definition of "militarization" so that the CoC can function as an effective CSBM.

One problem is underwater activities, which are highly secretive and not compatible with CSBMs that call for openness. As a result, an approach that focuses on technologies and intentions is preferable in this case. For example, nuclear-powered and/or nuclear-armed unmanned underwater vehicles and autonomous underwater vehicles could be prohibited, and at the same time, each country could clarify how they view undersea actions as relevant to their defense.

Directly addressing nuclear threats will require some highly challenging and unlikely near-term developments, including the denuclearization of North Korea and an arms control agreement to curb China's nuclear capability buildup. In the interim, it will be necessary to build functional cooperation among regional countries on peripheral matters to foster trust and create an environment where more ambitious issues can be addressed. Such measures include, for example, regional cooperation on nuclear and radiological safety and security, as discussed in Chapter 6, biological and chemical security, as detailed in Chapter 8, and science diplomacy initiatives, as unpacked in Chapter 9.

What is the appropriate platform for advancing regional cooperation in the Indo-Pacific?

As discussed in Chapter 2, the Indo-Pacific has been dominated by ASEAN-led institutions. More recently, more agile mini-lateral frameworks such as the Quadrilateral Security Dialogue ("Quad") or the Australia, United Kingdom, United States trilateral security pact (AUKUS) have emerged. They are not mutually exclusive with ASEAN-led institutions, but rather complementary. To advance the various CSBMs, risk reduction measures, and arms control proposed in this volume, it is important to take advantage of ASEAN-led institutions, while at the same time utilizing mini-lateral frameworks. Although the ASEAN-led institutions are not adapted to offer practical solutions in this area, it might be possible to make progress through the East Asia Summit, which both Chinese and US leaders attend. Moreover, although the ASEAN Regional Forum (ARF) is often equated to a talk shop, it could nonetheless provide an opportunity for regional countries to share threat assessments. Through the ARF intersessional process, regional countries could then focus on more specific issues in a bottom-up manner and reach consensus on framework risk reduction agreements.

When it comes to the goal of a nuclear-weapon-free world, one option is to invest in the Southeast Asia Nuclear-Weapon-Free Zone (SEANWFZ), as discussed in Chapter 7. Peripheral issues such as nuclear safety and security can be addressed in SEANWFZ, in cooperation with the ASEAN Network of Regulatory Bodies on Atomic Energy (ASEANTOM), other nuclear-weapon-free zones, and the International Atomic Energy Agency (IAEA).

With these considerations in mind, this chapter now provides policy proposals on CSBMs, risk reduction measures, and arms control, organized around three factors: (1) timelines (short-term and medium-to-long-term), (2) targets of measures (weapons, behaviors, intent, among others), and (3) platforms (ASEAN-led framework, mini-lateral, bilateral), with the goal of getting to a more secure future.

In the short term, priority should be given to crisis management dialogue to reduce the growing risk of military conflict and nuclear use. In this regard, reaching agreement specific risk reduction measures is the goal. In the medium-to-long term, promoting bilateral and regional dialogue on regional security

should be given centerstage, with the aim of involving China in arms control.

Short-Term Work

- Advance dialogue on strategic risk reduction among the permanent members of the United Nations Security Council (the so-called "P5"). On the margin of P5 meetings, start bilateral strategic dialogue between the United States and China.

  o This is important because, regardless of how meaningful P5 discussions really are, this dialogue process allows for engagement of China.

- Deepen dialogue between the United States and its allies, making full use of bilateral, trilateral, mini-lateral frameworks.

  o As discussed in Chapter 1, it is critical to ensure regional allies' perspectives are in focus, especially if (and when) the United States and China hold bilateral strategic dialogue. In the longer term, consider including Australia to create a new "Quad" with Japan and South Korea and/or perhaps add Japan and South Korea to AUKUS.

- The following is a list of topics to discuss:

  o Mutual clarification of strategic intent in the region.
    ▪ To reduce the risk of nuclear use, military conflict must be avoided in the first place. To this end, it is necessary to clarify mutual strategic intent, particularly around Taiwan and in the Western Pacific.

  o Mutual clarification of US-China nuclear doctrine.
    ▪ China should clarify its posture, which appears inconsistent with its stated no-first-use policy and negative security assurances (e.g., an apparent shift to launch on warning, deployment of numerous intermediate-range missiles with range over Japan, among other developments and deployments.)
    ▪ The United States should clarify its intent regarding a nuclear attack to decapitate China's nuclear forces, the future

direction of its conventional precision global strike program, and the circumstances in which nuclear use could be contemplated.

▪ The pros and cons of embracing "mutual vulnerability." If such a decision were made, prior consultations with allies would be essential.

o US-China dialogue on escalation management.

▪ Address the "entanglement" caused by the co-mingling of nuclear and conventional systems or dual use of missile systems for both purposes (with a view to agreeing on the need to clarify the distinction between conventional and nuclear weapons).

▪ Establish communication channels, especially at the operational level, to help manage crises (in addition to a hotline between heads of state).

▪ Develop an advance notification system for missile launches.

• China already has an agreement with Russia, so concluding one with the United States should be within reach. As a start, the launch notification can begin at the level of the one agreed upon between the United States and the Soviet Union in the early Cold War days.

• Due to increasing diversification of missiles, regional countries should make all missiles, not just ballistic missiles (i.e., including cruise missiles and hypersonic glide vehicles), nuclear-armed or not, as well as interceptors of missile defense subject to notification.

o Emerging technologies.

▪ Reduce the risk of nuclear use via emerging technologies such as cyber and artificial intelligence, and anti-space technologies.

▪ Address how the offense/defense relationship can be affected by emerging technologies (notably hypersonic weapons and missile defense).

▪ Focus on underwater weapon systems, which have been left out.

• Nuclear-powered/armed unmanned underwater vehicles and

autonomous underwater vehicles should be in focus. Begin by unpacking why and how they are relevant for the maritime defense of each country, and how they will be employed.

• Enhance transparency as a regional CSBM to ease mutual suspicion.

o The total number of nuclear stockpiles and deployed nuclear weapons should be made public. At a minimum, an approximate/aggregate number or upper ceiling (or rounded-up number) should be made public. The idea that doing so could help the United States decapitate Chinese nuclear forces might have had some grounding years ago, when China's arsenal was small. It has none today. North Korea would likely resist this the most, but this should not stop other nuclear-armed states (notably the P5) from increasing transparency in this regard.

o The amount of fissile material, i.e., plutonium and highly enriched uranium (HEU) produced for nuclear weapons, their current status, and future projections should be made public, especially in light of reported Chinese rapid increase in nuclear stockpiles. Conducting negotiations on a moratorium on fissile material production would be a good start. To initiate negotiations, Beijing should publicly commit to such a moratorium as well as disclose the amounts of reactor grade plutonium it possesses from civilian reprocessing.

o Regional countries should be pressed to report their civil plutonium stockpiles to the IAEA in accordance with INFCIRC/549.

▪ In addition, create a new norm to place plutonium and HEU under IAEA safeguards even if they are civilian and owned by nuclear-weapon states. This would help to keep them from being diverted to nuclear weapons under the guise of civilian purposes.

o Creating an open skies regime with sniffer aircraft would be another way of supporting/verifying these limits.

- Promote regional cooperation on "easy" issues such as nuclear and radiological safety security or science diplomacy in the region, with the aim of advancing cooperation on "tougher" issues.

  o ASEANTOM, SEANWFZ, and the ARF should work in closer cooperation with the IAEA on these issues.

  o Regional cooperation on biological and chemical security should also be in focus. Advancing the "health" dimension associated with these issues will be essential.

- Start a dialogue with North Korea on risk reduction measures in a crisis, beginning with creating a communication channel.

  o Current calls for a dialogue without preconditions by the United States, Japan, and South Korea continue to have as a goal the denuclearization of North Korea. Pyongyang is unlikely to respond to such a call, however, especially as it is now seemingly receiving stronger support from China and Russia. While the denuclearization goal should remain (if anything to avoid incentivizing nuclear proliferation in the region), the immediate objective should be limited to risk reduction measures in a crisis.

Medium-to-Long-Term Work

- Dialogue on regional nuclear arms control.

  o Negotiate a US-China bilateral nuclear test moratorium. A shorter-term step could be technical cooperation between Washington and Beijing on verifying very low yield nuclear tests on behalf of the Comprehensive Nuclear Test Ban Treaty Organization Preparatory Commission.

  o Remove nuclear warheads from short-, medium-, and intermediate-range missile delivery systems.

  o Advance the framework convention for the conclusion of a Northeast Asia Nuclear-Weapon-Free Zone.

  o Negotiate US-China legally binding agreement on risk reduction measures and CSBMs similar to those between the United States and the Soviet Union, as described in Chapter 1.

- Regional dialogue mechanism.

  o Reform of the ARF (standing dialogue mechanism).
    ▪ The ARF is the only regional security dialogue framework in which all regional countries, including North Korea, participate, but it has not produced sufficient tangible results. It should be reformed with the aim of becoming a permanent dialogue mechanism similar to the Commission on Security and Cooperation in Europe in the Cold War and the Organization for Security and Cooperation in Europe today, so that it can better contribute to regional peace and stability.
    ▪ Regarding nuclear issues, the ARF currently holds an intersessional meeting once a year, but since the three pillars of the Nonproliferation Treaty—nuclear disarmament, nuclear nonproliferation, and the peaceful use of nuclear energy—are rotated over a three-year period, the opportunity to talk about nuclear disarmament, for example, comes only once every three years. More regular meetings should be held, and the dialogue should be made permanent given the increased relevance of nuclear issues in the region.

- Familiarization with arms control.

  o Create a separate version of the Global Partnership Against the Spread of Weapons and Materials of Mass Destruction that includes China, with the goal of creating a Cooperative Threat Reduction program for North Korea.
    ▪ Create a regional version of US-Russia lab-to-lab cooperation (starting with the United States and China, and eventually Japan and South Korea).
    ▪ Enhance scientist-to-scientist contacts, starting with non-nuclear scientists on issues such as climate change, disaster

prevention, supply chains, and medical and public health.

- ASEAN-led institutions would be the best platform for these proposals, complemented by a mini-lateral framework, such as the Quad.

o Give China observer participation in US-Russia New START inspections (if the latter are resumed).

o Develop societal verification with the participation of scientists and civil society.

ABOUT THE AUTHORS

DR. AKIYAMA NOBUMASA is the Dean and Professor of the School of International and Public Policy at Hitotsubashi University. He is also an Adjunct Research Fellow at Japan Institute of International Affairs. Before appointed to the current position, he served as Minister-Counsellor at the Permanent Mission of Japan to the International Organizations in Vienna and Special Advisor to Ambassador on Nuclear Security.

DR. ALLISON BERKE is the Director of Chemical and Biological Weapons Nonproliferation at the Middlebury Institute of International Studies at Monterey, and a bioengineer. She previously directed technology policy research at the Stanford Institute for Economic Policy Research and at the Stanford Cyber Initiative.

DR. MELY CABALLERO-ANTHONY is Professor of International Relations at the S. Rajaratnam School of International Studies, Nanyang Technological University, and holds the President's Chair in International Relations and Security Studies. Her latest publication includes *Nuclear Governance in the Asia-Pacific* (London: Routledge, 2022).

DR. FERENC DALNOKI-VERESS is a Scientist-in-Residence and Adjunct Professor at the Middlebury Institute of International Studies, and a recent author of *Nuclear Choices for the Twenty-First Century* (MIT Press). He was a member of the SNO Collaboration that won the Nobel Prize in 2015 and received a share of the 2016 Breakthrough Prize in Fundamental Physics. Previously, he worked at Princeton, Gran Sasso, and Max Planck Institute of International Studies.

DR. COLLIN KOH is Senior Fellow at the S. Rajaratnam School of International Studies, based in Nanyang Technological University, Singapore. His research interests focus on maritime security and naval affairs in the Indo-Pacific, especially Southeast Asia.

DR. GEORGE M. MOORE is a Scientist-in-Residence and Adjunct Professor at the Middlebury Institute of International Studies at Monterey. He is a former staff member at Lawrence Livermore National Laboratory and the International Atomic Energy Agency.

DR. NISHIDA MICHIRU is Professor at School of Global Humanities and Social Sciences of Nagasaki University. He specializes in arms control, disarmament, and nonproliferation. He is the author of "Nuclear Transparency: Practices of US-USSR/Russia and NPT as well as their Potential Applicability to China" and co-author of "NPT: The Global Governance of Nuclear Weapons." He has worked as a Special Advisor for Disarmament and Non-Proliferation at the Ministry of Foreign Affairs of Japan.

MS. KARLA MAE G. PABELIÑA is an Associate Fellow of the Asia-Pacific Leadership Network. She is a recipient of the UN Office for Disarmament Affairs Women Scholarship for Peace (Global South: Asia-Pacific), as well as the 2017 United Nations Fellowships on Disarmament. She has been actively involved in Track II dialogues on Nonproliferation and Disarmament in the Asia-Pacific through the Council for Security Cooperation in the Asia-Pacific.

MR. MILES POMPER is a Senior Fellow in the Washington DC office of the James Martin Center for Nonproliferation Studies and an Adjunct Senior Fellow at Pacific Forum. He is the author of numerous book chapters, papers and articles on NATO's nuclear deterrence and arms control policies including recently serving as lead author of *Everything Counts: Building a Control Regime for Nonstrategic Nuclear Warheads in Europe*.

DR. DAVID SANTORO is President and CEO of the Pacific Forum. He specializes in deterrence, arms control, and nonproliferation. His current interests focus on great-power dynamics and US alliances, particularly the role of China in an era of nuclear multipolarity. His latest volume *US-China Nuclear Relations – The Impact of Strategic Triangles* was published by Lynne Rienner in 2021. Previously, Santoro worked in France, Australia, Canada, and the United Kingdom.

MR. RISTIAN ATRIANDI SUPRIYANTO is Lecturer with the Department of International Relations at Universitas Indonesia. Previously, he was a maritime security researcher with the S. Rajaratnam School of International Relations at Nanyang Technological University in Singapore, and a fellow with the Australian Strategic Policy Institute in Canberra. His numerous works on maritime security include *Naval Modernisation in Southeast Asia: Problems and Prospects for Small and Medium Navies* with Geoffrey Till.

PACIFIC F☀RUM

INTERNATIONAL