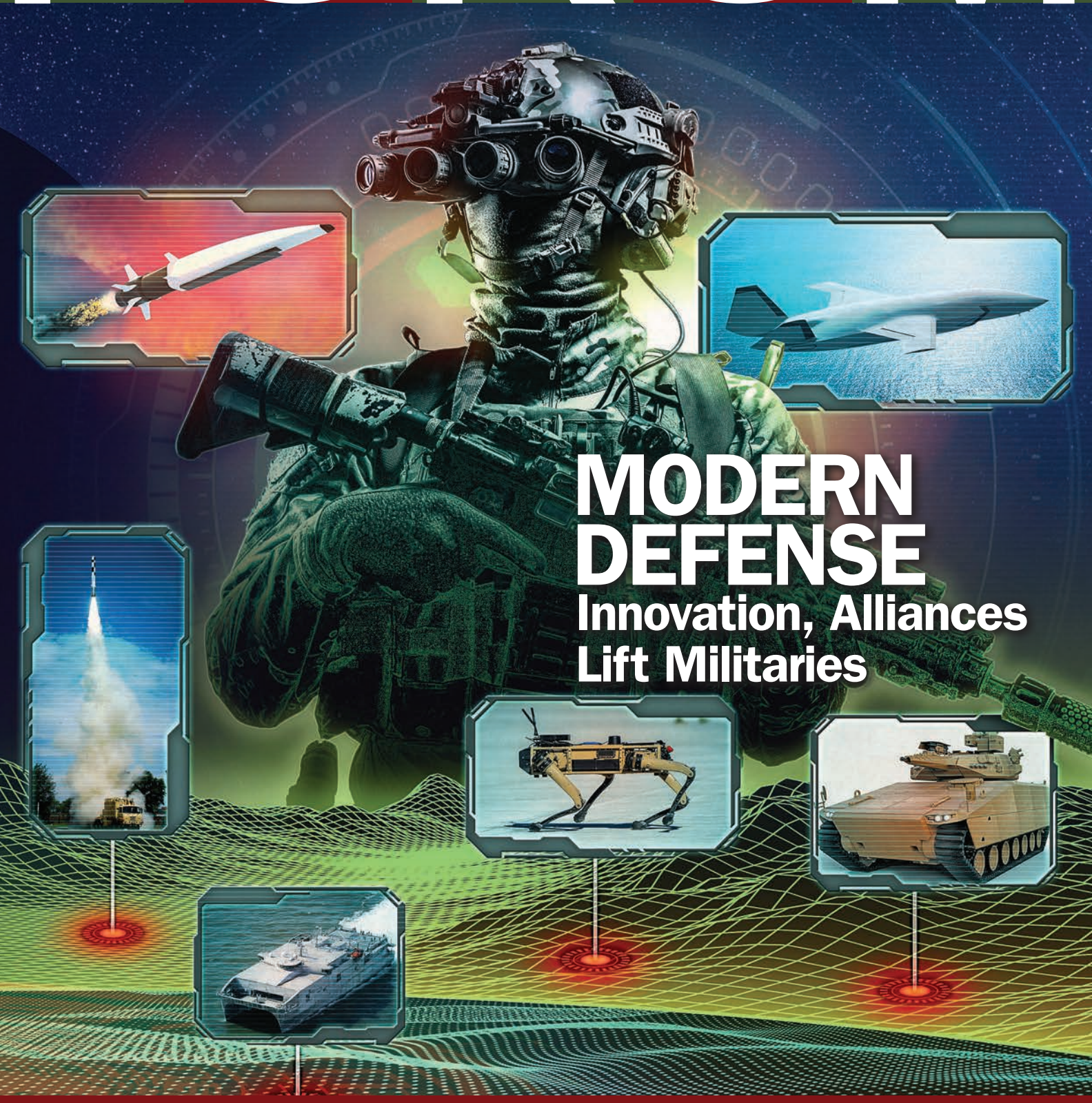
INDO-PACIFIC DEFENSE

VOLUME 48, ISSUE 3, 2023

FORUM



MODERN DEFENSE

Innovation, Alliances Lift Militaries

Defense Transformation

features

departments

ABOUT THE COVER: Technology is revolutionizing the battlespace, from uncrewed Australian Loyal Wingman and Japanese fighter jets to South Korean tanks and U.S. robotic dogs, laser cannons and satellite melters. FORUM ILLUSTRATION

Dear Readers,

Welcome to Indo-Pacific Defense FORUM's issue on defense transformation.

The United States, and its allies and partners have placed special emphasis on technological advances to transform how armed forces engage in peacetime operations, conflict resolution and warfare.

Technology is strengthening militaries. Rapid force modernization is offering game-changing capabilities across the battlespace, including the use of artificial intelligence, uncrewed vehicles and enhanced cyber defenses. A FORUM staff article opens this edition by highlighting regional efforts to boost defense capabilities, from Japan's call to upgrade and mass produce advanced missiles to plans to develop a next-generation conventionally armed, nuclear-powered submarine fleet through the Australia, United Kingdom and U.S. security partnership.

Defense spending across the Indo-Pacific and worldwide has seen record increases as budgets realign to navigate this era of strategic competition. Record defense spending by the Chinese Communist Party is part of General Secretary Xi Jinping's plan to transform the People's Liberation Army (PLA) into a world-class force by 2049. Another staff article examines the implications of the PLA's aspirations and the urgency other regional defense forces have adopted to keep pace.

Commercial off-the-shelf (COTS) products provide opportunities for militaries to transform through inexpensive technology that's publicly available and readily accessible. Ukraine, for example, has used COTS devices such as aerial drones to track invading Russian tanks. While the use of COTS devices is not new, their increasing availability is bolstering otherwise overmatched forces in the battlespace.

Militaries are also pivoting to sustainable energy to enhance capabilities and increase readiness. Singapore is at the forefront of such efforts with plans to replace the military's administrative vehicle fleet with electric vehicles by 2030. The Singapore Armed Forces (SAF) are also partnering with other government agencies to generate energy with biogas produced from food waste. These are among the initiatives the SAF and other regional militaries are exploring to modernize operations and simultaneously mitigate climate change.

We hope these articles encourage regional conversations on the importance of defense transformation. We welcome your comments. Please contact the FORUM staff at **ipdf@ipdefenseforum.com** to share your thoughts.

All the best,
FORUM Staff

IPD FORUM

Defense Transformation
Volume 48, Issue 3, 2023

CONTACT US

IPD FORUM
Indo-Pacific Defense FORUM
Program Manager,
HQ USINDOPACOM Box 64013
Camp H.M. Smith, HI 96861 USA
ipdefenseforum.com
email:
ipdf@ipdefenseforum.com

Indo-Pacific Defense FORUM is a professional military magazine published quarterly by the commander of the U.S. Indo-Pacific Command to provide an international forum for military personnel of the Indo-Pacific area. The opinions expressed in this magazine do not necessarily represent the policies or points of view of this command or any other agency of the U.S. government. All articles are written by FORUM staff unless otherwise noted. The secretary of defense has determined that the publication of this magazine is necessary for conducting public business as required by the Department of Defense.

ISSN 2333-1593 (print)
ISSN 2333-1607 (online)

DR. ARNAB DAS served for over two decades with the Indian Navy and is a retired commander. He earned master's and doctorate degrees from the Indian Institute of Technology (IIT) Delhi while a uniformed officer. He is the founder and director of the Maritime Research Center, which is developing a unique underwater domain awareness. He also runs Nir Dhwani Technologies, a startup that provides maritime security solutions, and marine conservation support and services. He has led research projects at IIT Delhi, Tokyo University and the National University of Singapore's Acoustic Research Lab, and for the Indian Navy after his retirement. He has written over 70 reports, two book chapters and a book.
Featured on Page 24

CAPT. PATRICK HINTON is Chief of the General Staff's visiting fellow in the Military Sciences Research Group at the Royal United Services Institute (RUSI), an independent think tank in the United Kingdom. He is an officer in the British Army's Royal Artillery and has worked with ground-based air defense systems and remotely piloted air systems.
Since joining the Army in 2014, he has held appointments including troop commander, executive officer and adjutant. He has a master's degree in international relations from the University of Staffordshire and a master of business administration from the University of Warwick.
His research interests include the integration of remote and autonomous systems into land forces, as well as military personnel issues.
Featured on Page 36

PROFESSOR KERRY K. GERSHANECK is a fellow with NATO's Supreme Headquarters Allied Powers Europe in Belgium and a senior fellow with the Global Risk Mitigation Foundation in Hawaii. For the past decade he has been a visiting scholar at National Chengchi University in Taiwan, and at Thailand's Thammasat University, Chulachomklao Royal Military Academy and Royal Thai Naval Academy. A former United States Marine Corps officer, he has extensive operational experience from the infantry platoon level to the Office of the Secretary of Defense, with command and staff experience in special warfare, counterintelligence, intelligence, infantry, armor and strategic communications. He has also worked with the U.S. Information Agency and in U.S. embassies in the Indo-Pacific. Featured on Page 50

AUSTRALIA TO BOOST DEFENSE WITH PURCHASE OF ADVANCED SYSTEMS

Australia will boost its defense capabilities by spending more than U.S. $700 million on advanced missile and rocket systems, including the United States-made High Mobility Artillery Rocket System (HIMARS), which is proving crucial in enabling Ukrainian forces to hit key Russian targets.

The Australian government said in January 2023 that the HIMARS will include launchers, missiles and training rockets, and will be deployed by 2026. It said the system's range of 300 kilometers is expected to increase with technological advances.

Canberra said it also signed a contract with Norway-based Kongsberg to buy Naval Strike Missiles for destroyers and frigates, which would replace Harpoon anti-ship missiles beginning in 2024.

Australian Defence Minister Richard Marles, who also is deputy prime minister, said in a statement that the "Naval Strike Missile and HIMARS launchers will give our Defence Force the ability to deter conflict and protect our interests."

Australia and the U.S. have become increasingly concerned about the People's Republic of China's growing assertiveness in the Pacific. Those concerns were heightened after Beijing signed a security pact in 2022 with the Solomon Islands.

The U.S. State Department in 2022 approved the potential sale to Australia of 20 HIMARS and related equipment at an estimated cost of U.S. $385 million.

"This proposed sale will support the foreign policy and national security objectives of the United States," the U.S. Defense Department said at the time. "Australia is one of our most important allies in the Western Pacific. The strategic location of this political and economic power contributes significantly to ensuring peace and economic stability in the region."

The Associated Press

Vanuatu, Australia Sign Security Agreement

Vanuatu signed a broad security agreement with Australia in December 2022 and said it hadn't discussed a similar arrangement or any security issues with the People's Republic of China (PRC).

The pact, signed in the Pacific Island Country's (PIC) capital, Port Vila, covers an extensive range of areas for cooperation, from disaster relief to policing, defense and cybersecurity.

"As nations committed to democracy, accountability and transparency, the agreement will be publicly available," the Australian government said in a statement.

The text of a PRC-Solomon Islands security pact, which alarmed Australia and the United States after it was signed in April 2022, has not been released by either government.

The PRC has been a significant infrastructure investor in Vanuatu, building roads, sports arenas and government buildings as part of its broader push for influence in the Pacific. Private Chinese investment in Vanuatu has also increased.

Analysts say Vanuatu is one of several PICs that Beijing might see as a candidate for allowing a Chinese military presence as the PRC seeks to counter the Australia-U.S. alliance in the region.

Australian Foreign Minister Penny Wong and other senior ministers visited the Federated States of Micronesia, Palau and Vanuatu in mid-December 2022.

Australia is the largest aid donor to Vanuatu.

At a joint news conference in Port Vila, Vanuatu Foreign Minister Jotham Napat said there had been no security talks with the PRC.

"We have not established any security agreement [with China]. We have not even discussed any matter in relation to security," he said, according to a transcript released by the Australian government.

Other areas covered by the Australia-Vanuatu agreement include border, maritime, aviation and resource security. (Pictured: Australian Army and Vanuatu Mobile Force personnel plan a humanitarian assistance and disaster relief activity during Exercise Vanuatu Alliance in Port Vila in November 2022.)

Chinese police have become a visible presence in the Solomon Islands capital Honiara since the security pact was signed, and the PRC has provided training and equipment such as water cannons and vehicles to the Pacific country's police force.

Australian Soldiers and police also are stationed in Honiara at the request of the Solomon Islands government following anti-PRC and anti-government rioting in November 2021. Australia gifted high-powered rifles to the Solomon Islands police in November 2022, and Wong attended the handover in Vanuatu for a new police wharf and police boat, RVS Matawali, also gifted by Australia.

She characterized the assistance as "part of Australia's enduring cooperation on shared regional security interests."

Napat said the visit took the bilateral relationship to "another level."

He said the top security challenge for Vanuatu, which has a population of 300,000 spread across dozens of islands, is climate change and its consequences, such as rising sea levels and an increase in the frequency and intensity of tropical cyclones.

Napat also said Vanuatu hopes to tap into Australian infrastructure financing "in the not-too-distant future." Benar News

AUSTRALIAN DEFENCE DEPARTMENT

U.S. FORCES Expand Space Unit IN SOUTH KOREA

U.S. Forces Korea launched a new space forces unit in December 2022 as allies South Korea and the United States ramp up efforts to counter North Korea's evolving nuclear and missile threats.

U.S. Space Forces Korea is an overseas component of the U.S. Space Force and is tasked with detecting and tracking incoming missiles, as well as bolstering the military's overall space capability.

U.S. Forces Korea commander Gen. Paul LaCamera said the unit will enhance the U.S.'s ability to ensure peace and security on the Korean Peninsula and in Northeast Asia.

"The U.S. military is faster, better connected, more informed, precise and legal because of space," LaCamera said during a ceremony at Osan Air Base in South Korea.

Seoul and Washington are boosting security cooperation to deter North Korea, which conducted a record number of missile launches in 2022, including of intercontinental ballistic missiles capable of reaching the U.S. mainland.

The Republic of Korea Air Force also established a space unit in December 2022 to bolster its space power and operational capability with the U.S. Space Force.

U.S. officials have expressed concern over rising security activity in space, including the People's Republic of China's development of hypersonic weapons and Russia's test of anti-satellite technology in 2021.

About 28,500 U.S. troops are stationed in South Korea under a mutual defense treaty forged after the 1950-53 Korean War ended in an armistice.

U.S. Indo-Pacific Command and U.S. Central Command established space units in November 2022 in Hawaii and Florida, respectively. Reuters

Japan's Leader Vows Deeper Defense Alliance with U.S.

Japanese Prime Minister Fumio Kishida in January 2023 pledged to deepen his country's alliance with the United States under Japan's new defense policy, which significantly enhances its exclusively self-defense stance in the face of growing regional tensions.

Kishida's comments came ahead of his mid-January visit to Washington, D.C., for talks with U.S. President Joe Biden to underscore the strength of the Japan-U.S. alliance and highlight closer cooperation between the countries under Japan's new security and defense strategies adopted in December 2022.

The two leaders also discussed North Korea's nuclear and ballistic missile programs amid concerns over a potential nuclear test by the reclusive nation, as well as Russia's invasion of Ukraine, stability across the Taiwan Strait, climate change and economic issues.

The U.S. visit was part of Kishida's trip to most of the Group of Seven countries. Japan is chair of the organization of major industrial nations in 2023, including hosting the G7 summit in Hiroshima in May.

"We will show to the rest of the world an even stronger Japan-U.S. alliance, which is a linchpin of Japanese security and diplomacy," Kishida said. "We will also show our further cooperation toward achieving a Free and Open Indo-Pacific." (Pictured: Japanese Prime Minister Fumio Kishida rides on a Type 10 tank during a review at the Japan Ground Self-Defense Force's Camp Asaka in Tokyo in November 2021.)

Under its new security and defense plans, Japan is buying hundreds of U.S.-developed Tomahawks and other long-range cruise missiles to preempt possible attacks and also building up defenses in southwestern Japan amid growing worries of a Taiwan emergency. The Associated Press

MODERN MILITARIES, REINFORCED ALLIANCES

Indo-Pacific Partners Prepare for Emerging Security Threats

FORUM STAFF

Technology is strengthening militaries tasked with maintaining security and stability in the Indo-Pacific. Rapidly modernizing nations are transforming arsenals with advancements from cutting-edge aircraft and game-changing submarines to unmanned vehicles, space awareness tools and cyber defense upgrades. Meanwhile, security partnerships are encouraging scientific cooperation among like-minded militaries, and leaders are relying on the power of regional alliances to maintain a Free and Open Indo-Pacific.

Underscoring efforts to modernize defense capabilities in the region is Japan's December 2022 approval of an updated security strategy that calls for adopting weapons with the power to respond to any attack by counterstriking an opponent's territory. Japan plans to buy up to 500 United States-made Tomahawk cruise missiles by the end of fiscal 2027 and to triple by 2031 the number of Self-Defense Force units that can intercept ballistic missiles. Japan's defense plan also calls for adding, upgrading and mass-producing advanced missiles, as well as development of stealth aircraft, hypersonic weapons and uncrewed vehicles.

Tokyo plans to spend U.S. $58 billion on cross-domain defense including cybersecurity and space by the end of 2027, according to the Associated Press news agency. Having launched its Cyber Defense Command in March 2022, the country will more than quadruple

During Garuda Shield 22 in Baturaja, Indonesia, special forces from Indonesia and the U.S. conduct a nighttime assault and sabotage rehearsal. STAFF SGT. MATTHEW CRANE/U.S. ARMY

the number of people tasked with deterring cyberattacks, The Japan News newspaper reported. Japan created the Space Operations Squadron in 2020 to monitor space and protect Japanese satellites from attack or damage by space debris. A deep-space radar expected to begin operating in 2023 will reinforce space awareness not only for Japan but for the U.S., Yuka Koshino wrote in 2020 on the Military Balance Blog for the International Institute for Strategic Studies. The moves represent stronger cooperation between Japan and the U.S. in space and cyberspace, which the Defense of Japan 2022 white paper identified as key to deterring and countering security threats.

Underlying Japan's defense policy overhaul is the nation's recognition of the People's Republic of China (PRC) as "the biggest strategic challenge" to peace, safety and stability in Japan and across the region. The PRC's menacing of self-governed Taiwan, which it claims as its territory, threatens Japan, as evidenced by

Japanese and U.S. fighter jets conduct a joint exercise over the Sea of Japan in May 2022.
THE ASSOCIATED PRESS

the ballistic missiles Beijing fired into waters inside Japan's exclusive economic zone during People's Liberation Army (PLA) drills around Taiwan in August 2022. The PRC's provocative actions also spark unease over maritime trade routes that are vital to Japan, the Indo-Pacific and the global economy. Unprecedented missile tests and nuclear threats from North Korea, which has also fired ballistic missiles over Japan, and Russia's invasion of Ukraine could "shake the foundation of stable post-war international order in the Indo-Pacific," according to Japan's December 2022 National Defense Strategy.

"No country can now protect its own security alone," it said. "As challenges to the post-war international order continue, it is critical for Japan to deepen cooperation and collaboration with its ally and like-minded countries with whom Japan shares universal values and strategic interests."

On Guard Against Coercion

Smaller militaries in the region have been outpaced by the PLA and aren't likely to match its advancements alone, experts contend. "However, backed by U.S. capabilities and resolve, the deployment of key systems — often asymmetric in nature — can serve to stabilize the region by deterring PRC threats and allowing regional countries to protect their national interests," Bates Gill, a professor of Asia-Pacific security studies at Macquarie University in Sydney, Australia, wrote in a January 2022 report for the National Bureau of Asian Research.

Beijing's attempts to claim most of the resource-rich South China Sea, along with PRC incursions into waters around Indonesia's Natuna Islands, have Jakarta on guard. In 2021, the PRC demanded that Indonesia stop drilling for oil and natural gas near the islands, asserting that the area was Chinese territory, according to Reuters. The PRC's claims are based on its arbitrary nine-dash-line boundary, which the Permanent Court of Arbitration in The Hague, Netherlands, ruled in July 2016 has no legal basis.

Indonesia is building a submarine base near the islands and relocated a naval fleet to the area, Bloomberg news agency reported. The island nation, which has Southeast Asia's largest economy, also plans to spend U.S. $125 billion on defense projects by 2024. Indonesia is negotiating for up to six Scorpene-class combat submarines, a representative for the French company Naval Group said in November 2022.

A planned purchase of 36 U.S.-made F-15 fighter jets was in advanced stages at the same time, Indonesian Defense Minister Prabowo Subianto said, according to news reports. An order for dozens of French-made Rafale fighter jets was also moving forward, an Indonesian defense official told FORUM in November 2022.

"Indonesia's security sector, if not all of its political leadership, has woken up to the threat of China's gray-zone coercion," Greg Poling, head of the Southeast Asia program at the Center for Strategic and International Studies (CSIS), told Bloomberg in a December 2022 report, referring to incremental acts of aggression that

A Tomahawk missile launches from the U.S. Navy guided-missile destroyer USS Curtis Wilbur during exercise Pacific Vanguard 2019. Japan plans to procure U.S.-made Tomahawks and other long-range cruise missiles.
PETTY OFFICER 2ND CLASS TAYLOR M. DIMARTINO/U.S. NAVY

In 2023, Japan plans to increase its defense spending by 20%, which includes buying additional F-35 fighter jets.
THE ASSOCIATED PRESS

Republic of Korea and U.S. aircraft conduct training in October 2022, following a ballistic missile test launch by North Korea.

JEREMY BUDDEMEIER/ U.S. FORCES KOREA

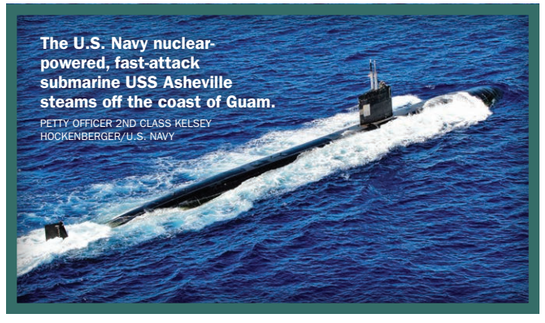
erode the status quo.

"Its planned naval and air procurements seem pointed at enhancing domain awareness, patrol and deterrence capabilities with regard to China."

Adm. Yudo Margono, on the day he was sworn in as chief of the Indonesian military in December 2022, alluded to plans for securing the border around the Natuna Islands, according to the Nikkei newspaper. He also said he expected the annual military exercise Garuda Shield to continue growing. The long-running bilateral exercise between Indonesia and the U.S. expanded in 2022 to include 4,000 personnel from more than a dozen nations, including Australia, India and Japan.

Critical Technology Competition

The security partnership among Australia, the United Kingdom and the U.S. is at the core of Australia's most significant security development in decades. A plan to share U.K. design and U.S. nuclear-propulsion technology will help develop Australia's next fleet of conventionally armed submarines, making the vessels stealthier than traditional submarines by allowing them to travel faster and farther without surfacing. The first partnership submarine could go into U.K. service in the late 2030s. The Australian Navy is expected to receive an Australian-built SSN in the early 2040s.



The U.S. Navy nuclear-powered, fast-attack submarine USS Asheville steams off the coast of Guam.

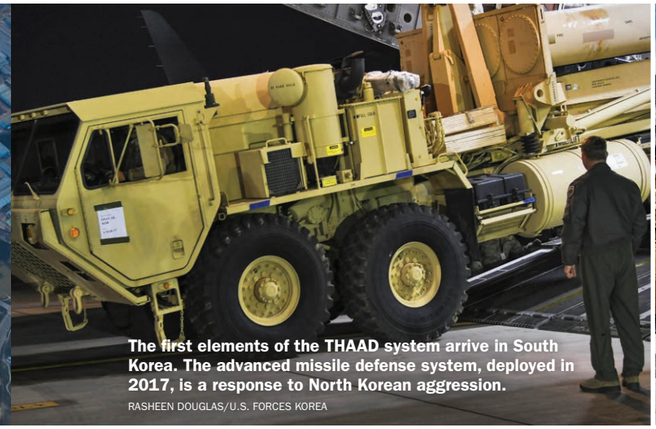
PETTY OFFICER 2ND CLASS KELSEY HOCKENBERGER/U.S. NAVY

The U.S. also plans to sell at least three nuclear-propelled Virginia-class submarines to Australia within the next decade. In the meantime, Australian military and civilian personnel have embedded in the allies' navies for training, the U.K. and U.S. are increasing Australian port visits by nuclear-powered submarines and the nations will begin a regular submarine rotation through Australia as early as 2027. The final result, according to the U.S. Department of Defense, will be three highly interoperable submarine fleets operating in the Indo-Pacific.

Australia, the U.K. and U.S. have pledged to collaborate on undersea capabilities beyond submarines, along with cyber, artificial intelligence (AI) and other advanced technologies. Experts say it could fortify Australia's strategic and technological landscape for decades.

"There's a growing realization that emerging and critical technologies will be extraordinarily important for societies, economies and national security," the Australian Strategic Policy Institute's Fergus Hanson and Danielle Cave wrote. "This is making the race to master them a geopolitical issue. And nowhere is this race more contested than in the Indo-Pacific region, which incubates much of the world's technological innovation and has become a hotbed of strategic technological competition."

In 2021, Canberra said that it would begin building guided missiles in collaboration with the U.S. A year later, the Australian Defence Force revealed plans to domestically produce an extra-large autonomous undersea vehicle, partnering with U.S. defense firm Anduril Industries. In its "Meeting China's Military Challenge" report, the National Bureau of Asian Research, a U.S.-based think tank, called unmanned technology and guided missile systems "essential for reversing China's advantage from new capabilities and high-volume production capacity to support its forces during conflict."



The first elements of the THAAD system arrive in South Korea. The advanced missile defense system, deployed in 2017, is a response to North Korean aggression.

RASHEEN DOUGLAS/U.S. FORCES KOREA

'Game-Changing Weapons'

South Korea, the world's eighth-largest defense exporter from 2017 to 2021, has a long history of developing new capabilities. "In the midst of intensifying competition for technological supremacy, it is crucial to secure technological competitiveness to develop game-changing weapons systems for future warfare," South Korean President Yoon Suk Yeol said in late 2021, according to Bloomberg.

Spurred by North Korea's barrage of missile testing — with more than 90 cruise and ballistic missile launches in 2022, according to the British Broadcasting Corporation — Seoul is accelerating development of a system to track and intercept missiles. The existing Terminal High Altitude Area Defense (THAAD) system, which South Korea and the U.S. deployed in 2017, was modernized in late 2022 to improve its interoperability with U.S. Patriot missile defense, U.S. Forces Korea reported. South Korea has also developed a submarine-launched ballistic missile that, paired with the nation's undersea technology, analysts called a milestone for the increasingly sophisticated military. And Seoul has called for spending billions on AI, drones and autonomous weapons in the coming decades.

The U.S.-South Korea Mutual Defense Treaty, which marks its 70th anniversary in 2023, emphasizes technology development between the allies, David A. Honey, the U.S. deputy undersecretary of defense for research and engineering, said during a June 2022 address at the CSIS.

"Fully recognizing that [the] scientists, researchers and engineers of [their] countries are among the most innovative in the world," he said, "both presidents agreed to leverage this comparative advantage to enhance public and private cooperation to protect and promote critical and emerging technologies, including leading-edge semiconductors, eco-friendly EV [electric vehicle] batteries, artificial intelligence, quantum technology, biotechnology, bio-manufacturing and autonomous robots."

South Korea's Indo-Pacific Strategy released in late December 2022 highlighted the nation's partnerships with the U.S. and Japan and vowed to build regional order based on internationally accepted norms and rules, expand security cooperation, and strengthen collaboration in science and technology.

Indonesian President Joko Widodo visits the Indonesian Navy ship KRI Usman Harun in the Natuna Islands in January 2020.

INDONESIAN PRESIDENTIAL OFFICE VIA THE ASSOCIATED PRESS

A Shared Vision

Security and defense dynamics are transforming all corners of the Indo-Pacific. India commissioned its first domestically built aircraft carrier in 2022, test-fired an extended-range cruise missile from the air and inducted its homegrown light combat helicopter. Vietnam has showcased high-tech defense assets including drones, radars and a domestically produced anti-ship cruise missile. The Philippines in 2022 commissioned two fast-attack interdiction vessels and plans to add 22 more, in addition to its newly acquired ground-based air defense system and the Philippine National Defense Department's calls to purchase new multirole fighter aircraft.

Meanwhile, leaders throughout the region have bolstered security ties. Examples include training and military exercises among forces including Australia, Canada, France, India, Indonesia, Japan, Malaysia, New Zealand, Papua New Guinea, the Philippines, Singapore, South Korea, Timor-Leste, the U.S. and Vietnam. Notably, the Thailand- and U.S.-sponsored Cobra Gold, the longest-running multilateral exercise in the world, has included as many as 10,000 members of armed forces from as many as 29 nations.

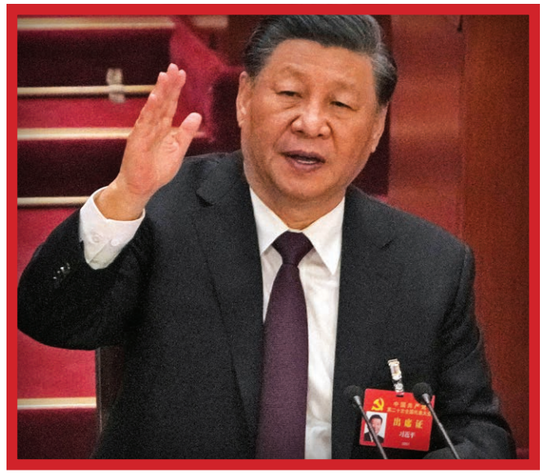
U.S. Defense Secretary Lloyd Austin has emphasized the role of partnerships in maintaining peace in the Indo-Pacific. "We've moved together toward our shared vision for the region," he said during the 2022 Shangri-La Dialogue in Singapore. "The journey that we've made together in the past year only underscores a basic truth: In today's interwoven world, we're stronger when we find ways to come together." □

Implications of PLA MODERNIZATION

Assessing How CCP Military Upgrades Affect the Regional Balance of Power

FORUM STAFF

The rise of an assertive People's Republic of China (PRC) over the past decade and the Chinese Communist Party's (CCP) pursuit of large-scale military capabilities challenge the international security order throughout the Indo-Pacific and beyond, experts contend. People's Liberation Army (PLA) modernization could have near- and long-term implications for regional stability that impact the South China Sea, Taiwan and the vision of a Free and Open Indo-Pacific shared by the United States and its allies and partners.



CCP General Secretary Xi Jinping attends the closing ceremony of the CCP's 20th Party Congress in October 2022.

THE ASSOCIATED PRESS

The PLA's path to a more prominent force — outlined in the PRC's 14th Five-Year Plan that covers 2021-25 — has prompted militaries to assess the implications and adjust national defense strategies and budgets to meet potential challenges as the PLA evolves.

"In this decisive decade, it is important to understand the contours of the People's Liberation Army way of war, survey its current activities and capabilities and assess its future military modernization goals," according to the 2022 edition of an annual U.S. Department of Defense (DOD) report titled "Military and Security Developments Involving the People's Republic of China."

During the 19th Party Congress in 2017, CCP General Secretary Xi Jinping announced a PLA modernization timeline to improve combat readiness. It called for accelerating the integrated development of mechanization (weapons and vehicles), informatization (information warfare) and intelligentization (applying the speed and processing power of artificial intelligence, or AI, to military planning) by 2027. The timeline also committed to comprehensively modernizing military theory, organizational structure, military personnel, and weaponry and equipment in step with the nation's modernization and for completing national defense and military modernization by 2035. The aim: Transform the PLA into a world-class force by 2049. The CCP's guiding military theory represents its systemic thinking about warfare and national defense, incorporating the thoughts of CCP leaders Mao Zedong, Deng Xiaoping, Jiang Zemin, Hu Jintao and now Xi, according to a Rand Corp. report titled "People's Liberation Army Operational Concepts."

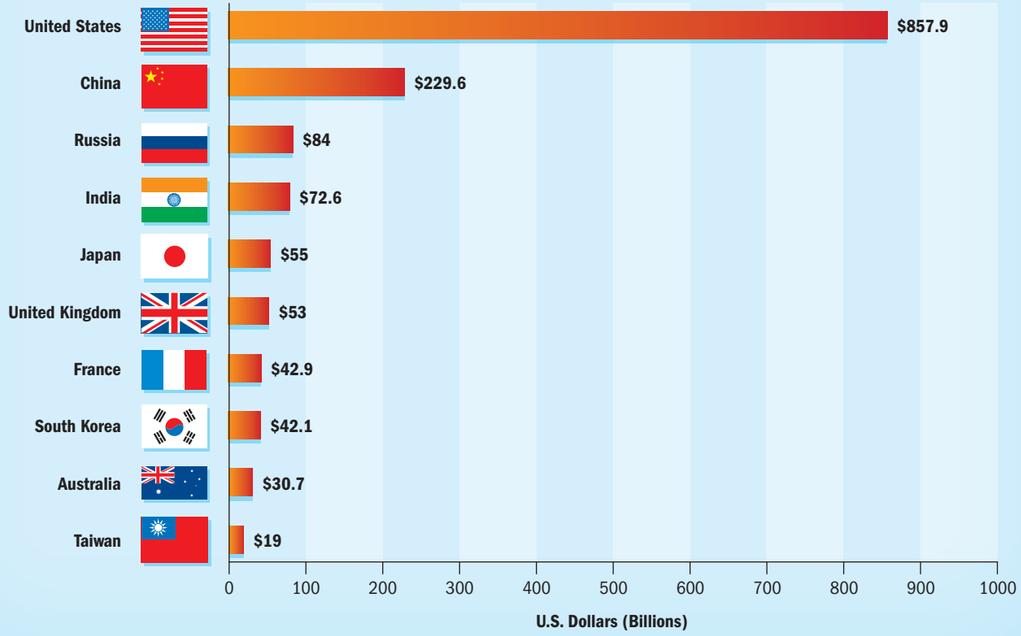
The CCP's 2027 goals align with the 100th anniversary of the PLA's founding. Chinese media, citing a military source, "connected the PLA's 2027 goals to developing the capabilities to counter the U.S. military in the Indo-Pacific region and compel Taiwan's leadership to the negotiation table on Beijing's terms," according to the DOD report. In essence, Xi wants the military positioned and prepared by 2027 to invade Taiwan, "but that doesn't mean he's decided to invade in 2027 or any other year as well," CIA Director

Military attendees leave the opening ceremony of the CCP's 20th Party Congress in Beijing, where Xi vowed to "work faster" to modernize the People's Liberation Army.

THE ASSOCIATED PRESS

National Defense Spending

Defense budgets are increasing at record rates as militaries enhance capabilities through technology and equipment purchases to better protect citizens and national interests. The United States remains the biggest spender with a defense budget that dwarfs that of China and Russia combined. Here's a snapshot of some of the largest defense budgets among militaries operating in the Indo-Pacific in early 2023.



Sources: Australian Defence Magazine; Center for Strategic and International Studies China Power Project; Janes; MarketWatch.com; The Defense Post; The Economic Times newspaper; Time magazine; United States Senate; Voice of America

William Burns told Face the Nation, a CBS television program, during a February 2023 interview.

"It's a capability, not an intent to attack or seize," U.S. Army Gen. Mark Milley, chairman of the Joint Chiefs of Staff, told the U.S. Senate Appropriations Committee in June 2021. "My assessment is an operational assessment. Do they have the intent to attack or seize in the near-term defined as the next year or two? My assessment of what I've seen right now is no, but that could always change. Intent is something that could change quickly."

Beijing allocated U.S. $229.6 billion for its defense budget in 2022, an increase over its 2021 budget of U.S. $202.2 billion, according to the China Power Project at the Center for Strategic and International Studies (CSIS). The 2022 funding marked the first time in a decade that the budget's growth rate increased for two consecutive years, China Power noted.

"The CCP has now directed 2027 as the target for the PLA to deliver the capabilities needed to counter the U.S. military in the Indo-Pacific and project power across the globe," Adm. John Aquilino, Commander of U.S. Indo-Pacific Command, testified before the U.S. House Armed Services Committee in April 2023. "In October 2022, the 20th National Congress of the CCP set objectives focused on accelerating the PLA's modernization goals over the next five years, including strengthening its 'system of strategic deterrence.' With the 14th Five-Year Plan, the Chinese government has doubled down on multiple national strategies already being implemented to ensure the CCP achieves a globally dominant position in the emerging technologies that it believes are necessary for enabling complex modern military operations. The PRC continues to target technology and talent around the world to secure these technologies in pursuit of advanced military capabilities."

MILITARY BUDGETS ON THE RISE ACROSS THE REGION

Nations have allocated more money for armed forces throughout the region. The U.S. remains the largest spender, with legislators approving a fiscal year 2023 national defense budget of nearly U.S. $858 billion — U.S. $45 billion more than U.S. President Joe Biden's administration requested. The total amounted to a nearly 10% increase over the 2022 national defense budget.

"Now more than ever, at a time when global democracy is under attack and the rules-based international order is being threatened, we need a strong national security and defense strategy, and this bill helps us deliver on that front," U.S. Rep. Adam Smith, then chairman of the Armed Services Committee, said in December 2022.

The U.S. had the world's biggest military budget in 2021, followed by the PRC, India, the United Kingdom and Russia, according to the Stockholm International Peace Research Institute. Australia, South Korea and Japan also rank high among defense spenders.

India's defense budget is U.S. $72.6 billion, according to The Economic Times newspaper. India has prioritized boosting defense capabilities through domestic development and partnerships. The country announced in January 2023 plans to spend U.S. $522 million on missiles, air defense and naval weapons, according to Defense News magazine.

The approved projects, to be acquired solely from domestic companies, include Helina anti-tank guided missiles, short-range air defense systems for the Army, and the Brahmos missile launcher and a fire control system for Navy ships, Defense News reported. India cited ongoing border clashes with Chinese troops as a reason to upgrade air defenses.

Australia boosted its defense budget by 8% for the fiscal year ending June 2023 and to more than 2% of gross domestic product (GDP) through mid-2026, Reuters news agency reported. The increased spending helps Australia's efforts to expand diplomatic ties with Pacific Island Countries and to counter the PRC's attempts to gain economic and strategic influence in the Pacific, Reuters reported.

Analysts suggest that much of Australia's defense budget will fund research and development of naval vessels and submarines as it works to procure nuclear-powered submarines, modernize capabilities and upgrade its fleet.

"Rapid military modernization and technological developments in countries such as Russia, China and North Korea are expected to create strategic challenges for Australia," Akash Pratim Debbarma, an aerospace and defense analyst at GlobalData, told the website Army Technology. "Being an island nation, modernization of its naval prowess is a necessity for Australia."

South Korea's Ministry of National Defense announced a 2023 defense budget of U.S. $42.1 billion, an increase of 4.6% over 2022, according to Janes, an intelligence analysis website. South Korea attributed the increase to the "severe security situation" on the Korean Peninsula, a reference to North Korea's destabilizing nuclear and missile programs. In addition to modernization, the Republic of Korea Armed Forces will see more spending on strengthening operational response capabilities, procuring combat reserve ammunition, and developing capabilities in areas including AI, electronic warfare, robotics and automated systems, Janes reported.

Japan outlined a record defense budget for fiscal year 2023, with a commitment of doubling its spending to 2% of GDP by 2027. Tokyo cited security challenges from North Korea, the PRC and Russia as the impetus for the 20% increase to U.S. $55 billion for defense facilities, maritime defense ships and other vessels.

"Unfortunately, in the vicinity of our country, there are countries carrying out activities such as enhancement of nuclear capability, a rapid military buildup and unilateral attempt[s] to change the status quo by force," Japanese Prime Minister Fumio Kishida said in December 2022, according to the BBC. He said Japan would implement a U.S. $332.5 billion buildup over the next five years "to fundamentally reinforce our defense capabilities."

Tokyo identified the PRC as the greatest strategic challenge ever to Japan's security and stability.

Taiwan also budgeted record military spending, setting aside U.S. $19 billion for defense, a 15% increase over 2022, Time magazine reported. To improve readiness, Taiwan is implementing institutional military reforms and also extended compulsory military service for men 18 and older from four months to a year. The change, spurred by increasing threats from the PRC, takes effect January 2024 and could add up to 70,000 recruits annually to Taiwan's Armed Forces of 165,000, according to Reuters.

"Taiwan stands on the front lines of authoritarian expansion, at the vanguard of the global defense of democracy," Taiwan President Tsai Ing-wen said in December 2022. "Only by preparing for war can we avoid it — only by being capable of fighting a war can we stop one."

Security personnel march past a Type 15 tank at a Beijing exhibition titled "Forging Ahead in the New Era," which showcased national achievements ahead of the CCP's 20th Party Congress. AFP/GETTY IMAGES

Taiwan Air Force F-16V fighter jets taxi during preparedness drills amid rising threats from the PRC. REUTERS

An Indian Army convoy moves in Ladakh, the site of a border dispute between India and the PRC. THE ASSOCIATED PRESS

The U.S. defense budget includes up to U.S. $10 billion in security assistance for Taiwan and provisions to fast-track weapons procurement for the self-governed island.

CHINESE FORCES, CAPABILITIES AND POWER PROJECTION

The PLA seeks to modernize its capabilities and improve proficiency across all domains to conduct land, air, maritime, nuclear, space, counterspace, electronic warfare and cyberspace operations.

"The PLA is aggressively developing capabilities to provide options for the PRC to dissuade, deter, or, if ordered, defeat third-party intervention in the Indo-Pacific region," according to the DOD. "The PLA is also developing the capabilities to conduct military operations deeper into the Indo-Pacific region, and in some cases, globally."

Here's a glimpse at the PLA's force capacity, according to the DOD's annual report, also known as the "China Military Power Report."

- **The PLA Army (PLAA)** has approximately 975,000 active-duty personnel in combat units and is the PLA's primary ground-fighting force. In 2021, the PLAA emphasized realistic and standardized training.
- **The PLA Navy (PLAN)** has approximately 340 ships and submarines, including 125 major surface combatants. By numbers, it is the world's largest navy.
- **The PLA Air Force (PLAAF)** and PLAN Aviation together constitute the largest aviation force in the region and the third-largest in the word. The component has more than 2,800 aircraft, excluding

Taiwan Navy personnel conduct an amphibious landing drill as part of the July 2022 Han Kuang exercise, which simulates a PLA invasion of the self-governed island. REUTERS

A People's Liberation Army Navy intelligence collection vessel operates off northwest Australia in May 2022.
AUSTRALIAN DEFENCE DEPARTMENT/THE ASSOCIATED PRESS

China's state-run Global Times newspaper reports on an August 2022 conventional missile test by the People's Liberation Army Rocket Force. REUTERS

training aircraft and uncrewed aerial systems. The PLAAF in 2019 revealed its first nuclear-capable, air-to-air refuelable bomber.

- **The PLA Rocket Force (PLARF)** operates, equips and trains the CCP's strategic land-based nuclear and conventional missile forces, associated support forces and missile bases. In 2021, the PLARF launched 135 ballistic missiles for testing and training, more than the rest of the world combined.
- **The Strategic Support Force (SSF)** is a theater command-level organization established to centralize the PLA's strategic space, cyberspace, electronic information, communications and psychological warfare missions and capabilities.
- **The Joint Logistic Support Force (JLSF)** seeks to improve strategic and campaign-level logistic efficiencies through training and integrating civilian products and services. The JLSF also provides support for the nation's COVID-19 response.

THE NATIONAL STRATEGY

The CCP's modernization objectives align with the PRC's national development aspirations, according to the DOD. "China's economic targets abroad focus intensely on advancing what the party calls the country's productive forces (industry, technology, infrastructure and human capital) which it views as the means to achieve the country's political and social modernity — including building a world-class military," the DOD reported. "The party-state's relentless efforts to grow China's national industry and technology base has significant implications for China's military modernization as well as for China's global economic partners."

Modernization of the armed forces is indispensable to the PRC's strategy to become a rich country with a powerful military, according to the DOD.

Experts say the PLA faces significant challenges on its path to catching up with the U.S. military.

"Specifically, the PLA's ongoing struggles to embrace jointness among the service branches, as well as the challenge of updating doctrine to reflect the implications of their belief in a military revolution through artificial intelligence, reveal nuances that are crucial for a broader understanding of the Chinese military," Ben Noon, a research assistant at the American Enterprise Institute, and Chris Bassler, director of the Naval Science & Technology Cooperation Program at the Office of Naval Research, wrote in an October 2021 commentary for the website War on the Rocks. "Despite its continued growth, the extent to which the PLA can handle the less tangible side of military modernization will be vital for the Chinese military's future warfighting capabilities."

Though rapidly expanding, the PLA remains untested on the modern battlefield, leaving internal and external observers uncertain about its "true warfighting capabilities," Noon and Bassler noted. This means analysts should closely watch PLA advancements and scrutinize what the PLA says about its trajectory.

The DOD's report offered a similar assessment: "Understanding the tenets of the People's Republic of China's national strategy is essential to understanding the drivers of China's security and military strategy. This in turn offers insight on the current and future course of the People's Liberation Army's reform and modernization in terms of its strength, technological advances, organization and operational concepts — all of which could offer PRC leaders expanded military options to support its national goals." □

High-Risk PROPOSITION

WHY THE CCP'S MILITARY-CIVIL FUSION STRATEGY COULD BACKFIRE AND POSSIBLY PROVE TRAGIC

A People's Liberation Army officer guards the Yuan Wang 5, a dual-use Chinese research ship equipped with surveillance technology, at Sri Lanka's Hambantota Port in August 2022.
THE ASSOCIATED PRESS

FORUM STAFF

The Chinese Communist Party's (CCP) People's Liberation Army Navy (PLAN) demonstrated the use of civilian ferries to launch a mock invasion of Taiwan during an August 2022 exercise. Using a custom-made ramp, the PLAN employed civilian roll-on/roll-off (RoRo) ferries to load amphibious assault craft on a Chinese beach near the Taiwan Strait, according to USNI News, the daily news service of the U.S. Naval Institute.

The CCP's military has practiced using dual-use amphibious ferries for years. This exercise, however, was larger and entailed launching the craft from RoRos at sea, which would enhance a would-be attack, retired U.S. Navy Capt. Tom Shugart, a defense analyst, told USNI News.

The drill could have delivered more than 80% of the PLAN's heavy brigade equipment and over 10,000 personnel, Shugart wrote in an October 2022 article for War on the Rocks, a website for analysis and debate on strategy, defense and foreign affairs. In 2022, the PLAN also escalated the aggressiveness with which it conducts such exercises by sending warships beyond the median line in the Taiwan Strait and flying drones over islands governed by Taiwan, explained Shugart, a former submarine warfare officer and an adjunct senior fellow at the Center for a New American Security.

In the event of a Chinese invasion of Taiwan, "civilian augmentation will be essential, if not providing the majority of the required sealift capacity," Shugart, who has monitored Chinese military exercises for years, told USNI News.

"All this means that China could have the ability to conduct a successful invasion sooner than many would like to think. In response, Taiwan and its partners should take urgent action to deploy, at scale and in a survivable manner, the numbers of advanced anti-ship

Taiwan Soldiers conduct an amphibious drill in Kaohsiung City in January 2023. The CCP continues to threaten the self-governed island. THE ASSOCIATED PRESS

missiles and mines that will be required to stop dozens of landing ships — of all flavors — even if those ships are surrounded and screened by hundreds of escort ships and decoy vessels," Shugart wrote in his War on the Rocks essay.

"Planners in Taipei and Washington should also decide in advance at what point they would be willing to start shooting at these ostensibly civilian targets. The Chinese military has an explicit goal of disrupting command and control well before an invasion commences, making that time a poor one for nuanced discussions of rules of engagement. China's civilian roll-on/roll-off vessel fleet enhances the immediacy and the complexity of the invasion threat facing Taiwan. Washington should start preparing now to counter it," Shugart wrote.

Using civilian ferries in an invasion is a manifestation of the CCP's military-civilian fusion (MCF) strategy designed to propel the PLA's modernization. MCF is part of a plan promoted by CCP General Secretary Xi Jinping to enable the military to become the most technologically advanced in the world by 2049. As chair of the CCP's Central Military Commission and the Central Commission for Military-Civil Fusion Development, created in 2017, Xi oversees the strategy's implementation, including an array of approaches to bind military components to seemingly innocuous civilian activities. Those range from dual-use "research" expeditions, such as voyages of the Yuan Wang 5, which provide more surveillance and intelligence data than scientific information, to fishing fleets that function as a CCP military branch to prop up unjust territorial claims. Xi's strategy also entails industrial espionage and theft of foreign military technologies, such as reportedly occurred with the CCP's development of its fifth-generation fighter jet. The J-20 stealth fighter closely copied technologies from the United States' F-22 Raptor and Joint Strike Fighter program, experts contend.

Xi and the CCP, however, could be placing the Chinese people at risk by advancing such an aggressive strategy, military analysts said. Under international laws and norms, civilians who should be considered noncombatants could be designated combatants if they are in combat zones or general areas of hostility and/or support the PLA under MCF, legal analysts explain. By engaging in hostilities, civilians may even be considered "unprivileged belligerents," who incur the liability of combatant status but are not entitled to combatant privileges such as prisoner of war status, according to the U.S. Department of Defense's (DOD) Law of War Manual.

By showing intent to use RoRos to deliver troops and equipment during an invasion, the PLA is weakening the principle of distinction under the Law of Armed Conflict (LOAC) by obscuring crucial lines between warship and nonwarship, civilian and combatant, and civilian and military objects, analysts said. The LOAC, the international law regulating the conduct of armed hostilities, is derived from customary laws and treaties.

Indo-Pacific allies and partners want noncombatants to be protected in a conflict, war or other military operation. To mitigate civilian harm, upholding the LOAC's principle of distinction is critical.

The PLA's use of RoRos in training for amphibious invasions also sets a dangerous precedent by eroding legal principles established to protect civilians in conflicts.

LIKELY FAILURES

Such MCF pursuits could be folly given the improbability of public-use ferries and other civilian systems surviving under fire, analysts predict. "Among the numerous critical components necessary for a successful cross-Strait landing, a failure to secure landing areas for follow-on forces in the initial assault would bring the entire endeavor to a screeching halt, likely inflicting severe costs on the part of the aggressor and resulting in a withdrawal," Conor Kennedy, a research associate in the U.S. Naval War College's China Maritime Studies Institute in Rhode Island, wrote in a 2021 analysis in The Jamestown Foundation's China Brief.

Moreover, a PLAN invasion across the Taiwan Strait — even if it mainly uses military assets — will likely fail and produce heavy losses and unfavorable outcomes for the People's Republic of China (PRC), as well as Japan, Taiwan and the U.S., according to a January 2023 analysis by the Center for Strategic and International Studies

The Taiwan Navy's ship Yu Shan, the first domestically built amphibious vessel, carries landing craft during a drill in January 2023 in Kaohsiung. REUTERS

Enhancing Protections for Civilians During Operations

The U.S. DOD's Civilian Harm Mitigation and Response Action Plan, released in August 2022, creates institutions and processes to improve strategic outcomes, optimize military operations and strengthen the military's ability to mitigate civilian harm during operations. The DOD is working to:

- Establish a center of excellence as a hub and facilitator for analysis, learning and training related to civilian harm mitigation and response (CHMR).
- Provide commanders and operators with more information to better understand the civilian environment. Update doctrine and operation plans with guidance for addressing civilian harm across the spectrum of armed conflict so troops are prepared to mitigate and respond.
- Develop standardized operational reporting and data management processes, including an enterprisewide platform, to improve how the DOD collects, shares and learns from data related to civilian harm.
- Improve the assessment of and response to civilian harm resulting from military operations.
- Incorporate CHMR into exercises, training and education across the joint force, and into security cooperation and operations with allies and partners.
- Establish a steering committee co-chaired by senior military leaders to oversee and guide the plan's timely and effective implementation.
- Designate the secretary of the Army as the DOD's joint proponent for CHMR.

(CSIS). The independent Washington, D.C.-based think tank developed a war game simulation of a Chinese invasion of Taiwan, which included an amphibious attack, and ran it 24 times.

"In most scenarios, the United States/Taiwan/Japan defeated a conventional amphibious invasion by China and maintained an autonomous Taiwan," said the CSIS report, titled, "The First Battle of the Next War: Wargaming a Chinese Invasion of Taiwan."

But all parties paid a high price. "The United States and its allies lost dozens of ships, hundreds of aircraft, and tens of thousands of servicemembers. Taiwan saw its economy devastated. Further, the high losses damaged the U.S. global position for many years. China also lost heavily, and failure to occupy Taiwan might destabilize Chinese Communist Party rule," the analysis surmised.

The report estimated that the PLA would lose 10,000 troops, 155 combat aircraft and 138 major ships. Its naval and amphibious forces would be in disarray, and tens of thousands of PLA soldiers would be captured.

Civilians in Taiwan, meanwhile, would be in immediate peril. "Once the war begins, it's impossible to get any troops or supplies onto Taiwan, so it's a very different situation from Ukraine where the United States and its allies have been able to send supplies continuously to Ukraine" since Russia's invasion in February 2022, Mark Cancian, a CSIS senior advisor and simulation project leader, told news broadcaster CNN. Whatever the Taiwan people "are going to fight the war with, they have to have that when the war begins."

CIVILIAN LEGAL PROTECTIONS

Decades ago, nations around the world designated targeting civilians in times of war an illegal activity. The Geneva Conventions, a series of four treaties signed between 1864 and 1949 and three subsequent protocols, establish the international legal standards for humanitarian treatment in war, including rights and protections afforded to noncombatants. One-hundred ninety-six nations signed and ratified the conventions. More countries have agreed to the Geneva Conventions than have agreed to any other international treaty. Most nations have also ratified the first and second protocols, which strengthen the protection of victims of international and non-international armed conflicts, respectively. International laws protecting civilians have changed little since the 1970s. Article 51, Additional Protocol 1, states that "the civilian population as such, as well as individual civilians, shall not be the object of attack. Acts or threats of violence the primary purpose of which is to spread terror among the civilian population are prohibited."

Some nations and organizations have enhanced such protections. The U.S. DOD, for example, recently published a new Civilian Harm Mitigation and Response Action Plan to expand measures that spare civilians from the effects of military operations. (See sidebar, Page 21.) The International Committee of the Red Cross conducted its own study on the notion of civilians taking direct part in hostilities, titled "Interpretive Guidance on the Notion of Direct Participation in Hostilities under International Humanitarian Law," which it published in 2009. The six-year-long study sought to clarify who is considered a civilian for the purposes of conducting hostilities; what conduct amounts to direct participation in hostilities; and the precise modalities according to which civilians directly participating in hostilities lose their protection against direct attack. The report's recommendations have gained little traction, however, because many nations have not accepted the broader definitions and conclusions the Red Cross reached on protecting civilians.

Nations generally agree that civilians engaged in an attack against an adversary are participating directly in hostilities, as the law now stands. Moreover, civilian objects may become military objects under certain circumstances, as defined in Article 52, Additional Protocol 1, as well as the DOD Law of War Manual, legal analysts explain.

States carrying out an attack must distinguish combatants from civilians. But there is no clear obligation to mark or identify civilians. In practice, markings are available for protected buildings such as hospitals, cultural properties and civil defense structures. Often, aggressors ignore such markings. Russia, for example, is accused of indiscriminate attacks against Ukraine. The United Nations Office of the High Commissioner for Human Rights (OHCHR) expressed "deep concern" and issued a reminder to Moscow that targeting noncombatants could be considered a war crime. "Civilians are being killed and maimed in what appear to be indiscriminate attacks, with Russian forces using explosive weapons with wide area effects in or near populated areas," Liz Throssell, OHCHR spokesperson, said in February 2022. "These include missiles, heavy artillery shells and rockets, as well as airstrikes." Russian shelling, some potentially from cluster bombs, hit schools, hospitals and nurseries just 15 days into the war, she said. Civilian deaths and injuries have continued throughout the war, but Russia denies targeting civilians. The International Criminal Court (ICC) launched an investigation in March 2022 into possible war crimes in Ukraine and then announced in March 2023 that it would pursue charges in two cases against Russia, the BBC reported. In mid-March 2023, the ICC issued an arrest warrant for Russian President Vladimir Putin for war crimes because of his alleged involvement in abductions of children from Ukraine, The Associated Press reported.

When it comes to its use of the RoRos, the PLA has not differentiated its ferries from civilian ferries, such as by painting the PLA vessels gray or affixing military markings. In addition, the CCP created a series of domestic laws and regulations beginning in 1995 that govern civil transport and essentially permit the PLA to obfuscate the RoRos' role. Such rules, however, do not legitimize activities that are inconsistent with international law.

The PLA apparently envisions a bevy of military functions for RoRos, from delivering forces to mine placement, reconnaissance and deception, as retired U.S. defense intelligence officer Lonnie D. Henley detailed in a May 2022 edition of the China Maritime Report, published by the U.S. Naval War College. The PLA also intends to hide behind the civilian facade of the RoRos to portray domestic legitimacy and create a pretext for lodging accusations if a RoRo is attacked in conflict. In addition, the RoRos could be used to exploit the hesitancy of opposing forces to attack civilian vessels — even those engaged in belligerent activities, analysts said.

Protecting civilians from military operations should be a state's main concern under the Geneva Conventions Article 57 (1), Additional Protocol 1, as most nations, including the PRC, have tacitly agreed. By advancing MCF, Beijing appears to be putting its citizens in harm's way as a matter of government policy. Its use of RoRos in military exercises pushes international civilian protections down a slippery slope, analysts contend.

HIGH COST OF FUSION, HEGEMONY

Many nations use civilians and civilian objects to augment military operations, either out of convenience or under duress. During World War I, the French placed military communication relay towers atop the Eiffel Tower in Paris to send and intercept critical messages. During World War II, the British used fishing boats and pleasure craft to withdraw troops from Dunkirk as German forces advanced. Australia has used civil contractors to support forces in Central Asia and the Middle East for peacekeeping missions. The U.S. has similarly used civilian contractors and commercial supply chains to support global military operations for decades.

In pursuit of hegemony, however, the CCP has sought to make civilian and military efforts indistinguishable, often obtaining key technologies by using Chinese civilians in nontransparent and illicit activities, including forced technology transfer, intelligence gathering and theft. "MCF threatens the trust, transparency, reciprocity, and shared values that underpin international science and technology collaboration and fair global business practices," the DOD said in a 2020 brief.

The means by which the CCP has acquired technologies and assets — to include dual-use military facilities, bases and infrastructure — may also prompt suspicion of Chinese civilian noncombatants engaged in such enterprises during conflicts, analysts assert.

"The MCF is being interpreted as a war cry by the CCP to be combat-ready in 2022 and beyond — a call that the Party has made since soon after it assumed power in Mainland China in 1949. Developing the PLA into a world-class military by 2049 remains the primary aim," Dr. Monika Chansoria, a senior fellow at The Japan Institute of International Affairs in Tokyo, wrote in a 2021 essay for JAPAN Forward, an English-language news website.

"Toward that end," she predicted, "the developing ground realities of China's activities and aggravations in the Himalayan borderlands, South China Sea and East China Sea are increasingly being determined by a military-civil fusion of military stealth, economics, and politics."

Her insights appear to hold true well into 2023.

Given the level of CCP aggression and ambition, Indo-Pacific allies and partners must affirm the importance of upholding the Law of Armed Conflict in peacetime to ensure civilians enjoy protections to which they are entitled under international law should conflict arise. Otherwise, the PLA will attempt to exploit the law's principles of distinction and honor to gain advantages. Civilians in China, Taiwan and elsewhere may pay the highest price. □

The Chinese-flagged Zhong Yuan Yu 16 sails near Ecuador's Galapagos Islands in July 2021. The CCP uses thousands of distant-water fishing vessels as part of its military-civilian fusion strategy.
THE ASSOCIATED PRESS

THE INDO-PACIFIC STRATEGIC SPACE AND THE GLOBAL ORDER

A New Perspective on Underwater Domain Awareness

DR. ARNAB DAS/CMDR. (RET.) INDIAN NAVY

The center of global power has shifted toward the Indian and Pacific oceans. The Indo-Pacific strategic space is recognized as the main theater of geopolitical and geostrategic interactions in the 21st century. More nations globally are deploying assets in the region to ensure their strategic presence and interests. India, the People's Republic of China (PRC) and Russia are emerging as major forces in the region alongside the United States. We must recognize the importance of the maritime domain in the multipolar global order in the making.

Increasing threats beneath the waves are a prominent aspect of this evolving strategic space as more countries acquire modern submarines. Security partners in the Indo-Pacific need to understand why underwater domain awareness (UDA) is critical and how to improve it to meet defense needs.

For example, sonar technology developed during the Cold War for underwater surveillance does not work in tropical littoral waters such as those of the Indian and Pacific oceans. In the absence of customized acoustic signal processing algorithms, using hardware to map the site-specific characteristics of tropical waters is futile. In Indo-Pacific waters, sonar performance is degraded by around 60%, which presents a serious limitation that much be addressed.

DOMAIN AWARENESS

Such waters present multiple opportunities and challenges. They hold great wealth in terms of biodiversity and natural resources. The developing economies of the region are typically unable to prioritize science and technology (S&T) and site-specific research and development (R&D) for long-term acoustic capacity- and capability-building. In addition, many emerging countries lack the capabilities to explore and derive economic value from their waters. The combination keeps them dependent on outside powers for strategic security and economic well-being and leaves them open to exploitation.

Regional volatility could contribute to powerful nations from outside the region manipulating these countries for their vested interests. Nonstate actors are operating in the region, often with state backing. The disruptive and asymmetric edge that these nonstate actors hold is a major concern for security forces to counter, especially with conventional means, and such advantages only enhance the importance of UDA.

Developing UDA in tropical littoral waters is complicated, as shallow water acoustic measurement (SWAM) efforts reveal. SWAM is the proven way to build acoustic capacity and capability in those waters. The first step is modeling and simulation to develop an understanding of the underwater ambient noise and the channel behavior.

The U.S. has led the way for decades in submarine, SWAM and UDA research. On August 3, 1958, the USS Nautilus, the world's first operational nuclear-powered submarine, became the first vessel to complete a submerged transit of the North Pole.

Prior to that, the Scripps Institution of Oceanography conducted a pioneering UDA effort, launched in 1946 and authorized by the U.S. Navy, to map snapping shrimp. The creature's sounds have been measured at 200 decibels, louder than those of Earth's largest mammal

Sounds from large groups of snapping shrimp can interfere with underwater communications.

The Indian Navy submarine INS Vagir is commissioned in Mumbai in January 2023. Indo-Pacific militaries are boosting submarine capabilities. REUTERS

the blue whale under similar conditions. Large clusters of snapping shrimp in certain parts of the seabed can interfere with underwater communications and research. The Scripps study revealed the snapping shrimp exist predominantly in tropical littoral waters and have a unique vocalization pattern that can acoustically swamp a nuclear submarine by overlapping frequencies used for sonar navigation and surveillance.

In 1988, there was evidence of such an incident during a nuclear-powered submarine's maiden exercise off Visakhapatnam, India. When the submarine sat down, the entire sonar screen blanked out, although the crew made a blast transmission to resolve the situation. There are sufficient reasons to attribute the problem to snapping shrimp. The proliferation of submarines in the Indo-Pacific calls for serious consideration of this aspect of UDA.

A WAY FORWARD

More research is needed to plan submarine deployments appropriately. Habitat mapping, followed by soundscape mapping, is the way forward. There are 14 subspecies of snapping shrimp in waters surrounding the Indian subcontinent alone, each with unique vocalizations and variations in their ecosystem and life cycle. This will require significant site-specific R&D with conclusions repeatedly field-tested.

In 2000, a three-year SWAM exercise known as the Asian Seas International Acoustics Experiment (ASIAEX) launched in the South China and East China seas. The maritime strategic community realized the PRC had developed significant maritime capabilities and that UDA was critical to prepare forces for a potential deployment. The U.S. Office of Naval Research funded ASIAEX, with six U.S. universities, led by the University of Washington, developing models and identifying experiment validation sites during the first phase. In the second phase, nearly 20 institutions from the PRC, Singapore, South Korea, Taiwan, the U.S. and elsewhere collected field data. The PRC was aware of U.S. concerns but participated to further its own UDA initiative.

BUILDING A UDA FRAMEWORK

The contemporary global order needs to be contextualized based on recent incidents before allies and parties can fully understand the relevance of the UDA framework and attempt to move ahead.

The Quad Summit in Tokyo on May 24, 2022, brought leaders of Australia, India, Japan and the U.S. together as the international community was experiencing massive churn on multiple fronts. The cascading impact of the pandemic, followed by Russia's invasion of Ukraine, contributed to unprecedented crises for global economic engines. The Quad Summit overlapped with the World Economic Forum meeting in Switzerland, where another set of global leaders met to discuss the theme "History at a Turning Point: Government Policies and Business Strategies."

The Quad Summit produced two major announcements in support of a Free and Open Indo-Pacific. First, the maritime domain awareness (MDA) partnership would provide a new stream of data from commercial satellites to countries across the region. Second, the Quad introduced the Indo-Pacific Economic Framework (IPEF) for prosperity, a U.S.-led economic group of 12 countries. These countries account for 40% of the global gross domestic production. The economic framework broadly rests on four pillars: trade, supply chain resilience, clean energy and decarbonization, in addition to taxes and anti-corruption measures. The joint statement said that the framework aims to "advance resilience, sustainability, inclusiveness, economic growth, fairness and competitiveness" in these economies.

Many considered this MDA announcement a substantial addition to the Quad agenda and the most

Continued on page 28

MARITIME DOMAIN AWARENESS

is the understanding of anything related to the maritime domain, such as infrastructure, people, cargo, vessels and other conveyances, that could affect security, safety, economy and the environment.

Satellite Communications: Private and Secure

Virtual Private Network (VPN)

Very Small Aperture Terminal (VSAT)

Long Range Identification and Tracking (LRIT)

Vessel Monitoring System (VMS)

Synthetic Aperture Radar (SAR)

Global Positioning System (GPS)

VMS

FISHING BOUNDARY

MARITIME DOMAIN AWARENESS CENTER

USERS

LRIT

LRIT

Collision Avoidance: Automatic Identification System (AIS)

PORT

Underwater Domain Awareness (UDA)

Shallow Water Acoustic Measurement

CAMERAS

RADAR

AIS

VESSEL TRAFFIC SERVICES

COASTAL AIS STATION

AIS Aids to Navigation

AIS Range: Averages 20 to 40 nautical miles

AIS: Public and Unsecure

The legacy systems for monitoring maritime activities include coastal radars and aerial and surface patrols. State-of-the-art tracking capabilities such as AIS and VMS provide spotty coverage because the legal framework across most ocean areas does not yet mandate their installation.

Automatic Identification System (AIS) tracks vessels and functions as a transponder, broadcasting information in the VHF mobile maritime band.

AIS Aids to Navigation are guides that are broadcast over the AIS radio from onshore or offshore stations or virtually to display at designated locations on AIS-enabled radar or electronic chart systems.

Long Range Identification and Tracking (LRIT) is a satellite-based, real-time reporting mechanism that can locate vessels that would otherwise be invisible and a potential threat.

Synthetic Aperture Radar (SAR) uses the microwave range of the electromagnetic spectrum to detect vessels, including at night or in poor visibility conditions.

Underwater Domain Awareness (UDA) pertains to MDA focused on the underwater sector to include sea lines of communication, coastal waters and varied maritime assets. In terms of security, it entails the proliferation of submarine and mine capabilities intended to limit access to seas and littoral waters as well as hostile actors.

Very Small Aperture Terminal (VSAT) satellite communications rely on Earth-based stations to receive and transmit real-time data.

Vessel Monitoring System (VMS) is a satellite communications system used by regulatory agencies to monitor the movement and location of commercial fishing boats.

Virtual Private Network (VPN) creates safe and encrypted connection over a public or less secure network, such as the internet.

Sources: Pole Star, Absolute Software Corp.

FORUM ILLUSTRATION

OCEAN MONITORING

entails collecting and providing observational data to understand the current state of the ocean environment and what kind of changes oceans have undergone. Researchers, industry experts and military technologists use various instruments and measuring techniques to monitor oceans.

Satellite measures sea surface temperature, sea level and sea ice, and also is used for ocean monitoring

Airborne Lidar measures atmosphere over the oceans and oceanic aerosol

High-Frequency Radar measures currents and waves from the land

Volunteer Observing Ship provides meteorological and oceanographic data

Drifting Ocean Buoy measures water temperature, wave height and wave period

Moored Buoy measures water temperature, salinity and surface meteorology

Bio-logging entails attaching sensors to marine animals to observe their behavior

Water Sampler with conductivity, temperature and depth sensors collects samples of seawater and measures the temperature, salinity and pressure of the ocean

Air Gun and Streamer Cable are used for seismic surveys to investigate geologic features beneath the ocean floor

Expendable Bathythermograph measures temperature at differing ocean depths

Remotely Operated Vehicle is used for deep sea surveys, ocean floor sampling and equipment installation

Underwater Glider Autonomous observation system

Autonomous Underwater Vehicles acquire ocean floor topography data and sub-bottom profiler data

Argo Float Drifting system measures temperature and salinity, while ascending and descending in the ocean

Multiple Corers collect sediment samples from the ocean floor

Bottom-Mounted Acoustic Doppler Current Profiler measures ocean and coastal currents

Power Grab collects samples such as seabed minerals

Submarine Cable Systems measure earthquakes and tsunamis on the ocean floor

Sediment Trap collects particles falling toward the ocean floor

Dredge Bucket collects sediment and rocks on the ocean floor

FORUM ILLUSTRATION

Sources: White Paper on the Oceans and Ocean Policy in Japan 2019, Ocean Policy Research Institute, Sasakawa Peace Foundation; Japan Agency for Marine-Earth Science and Technology. https://www.jamstec.go.jp/e/about/equipment/observe/

Continued from page 25

promising initiative to date. In particular, it satisfied the desire of most regional partners for the Quad to provide public goods and address the needs of smaller states in the Indo-Pacific strategic space. If the Quad can implement the MDA partnership properly, it will be a game changer for the entire region and demonstrate real value for all nations.

TRACKING IMPROVEMENTS

The legacy systems for monitoring maritime activities include coastal radars and aerial and surface patrols. The recent advent of the automatic identification system (AIS) to monitor larger shipping traffic in international waters and the mandated use of a vessel monitoring system (VMS) by licensed fishing boats in some states allow for tracking, with identifying data, position, course and speed relayed to nearby vessels and receiving stations, both onshore and in space.

AIS and VMS coverage are patchy, however, as the legal framework across multiple ocean areas has yet to mandate installation of such systems. Moreover, there are serious attempts to undermine their implementation by actors engaged in illegal fishing operations and other illicit activities. Thus, maritime law enforcement agencies rely on coastal radars and aerial and surface patrols, which have limited range. Traditional terrestrial AIS and VMS transponders share that limitation. Coastal radars and terrestrial AIS/VMS are too overworked and outnumbered to counter the scale of illicit activities in the Indo-Pacific.

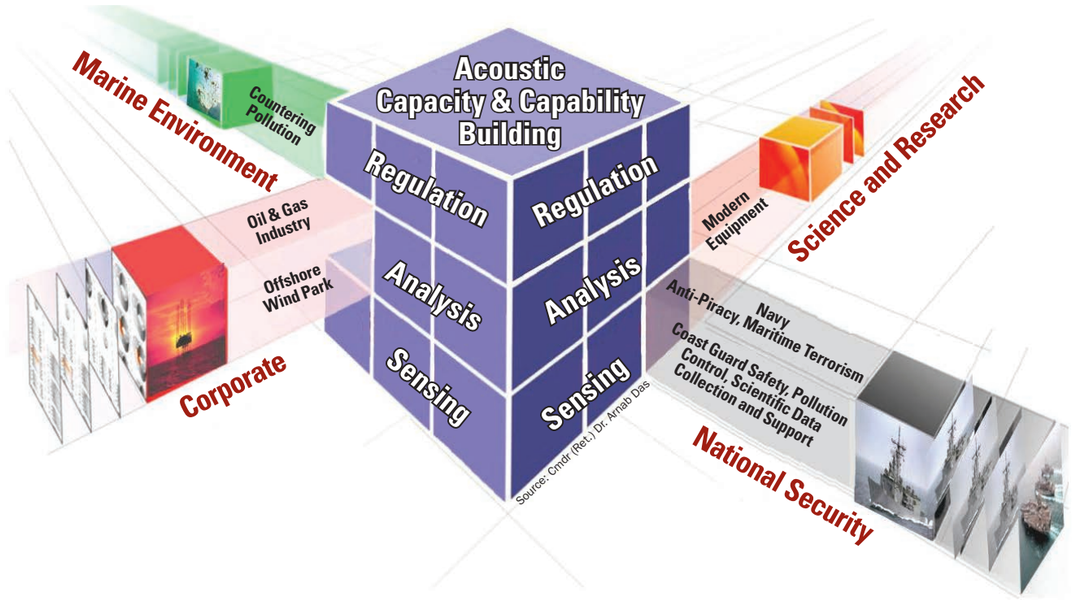
Satellite-based AIS/VMS is a good alternative to cover large ocean areas but isn't widely available. The satellite systems feature electrooptical and synthetic aperture radar sensors for imaging Earth's surface. The shift from large satellites in geosynchronous orbit to constellations of small satellites in low Earth orbit has cut the cost of satellite data. However, the scale of space-based, remote sensing data required to consistently monitor an exclusive economic zone is still prohibitive for developing nations in the Indo-Pacific.

Imaging satellites require a trade-off between resolution and aperture: Lower frequency gives better range but poorer resolution and vice versa. A hybrid system is thus required to ensure larger areas are covered by low-resolution, electrooptical sensors or radars, while smaller areas are mapped using high-resolution imaging cameras.

In terms of analysis, automation and machine learning are critical for real-time identification of suspicious behavior from diverse data sources. The challenges range from uneven regulatory frameworks across nations, capacity and capability limitations, data privacy concerns,

A Ukrainian worker uses an underwater drone to search for unexploded ordnance in a lake near Kyiv. REUTERS

COMPREHENSIVE PERSPECTIVE OF UNDERWATER DOMAIN AWARENESS



lack of seamless cooperation across regions, and lack of site-specific R&D.

The U.S.-based HawkEye360 is the leading commercial operator, and Quad members plan to purchase and share its data with partners across the Indo-Pacific. The Quad will also facilitate data processing and real-time sharing through existing channels.

The data analytics facilities currently in operation in the Indo-Pacific include:

- The U.S. Navy's SeaVision platform
- India's Indian Ocean Information Fusion Centre
- The Singapore-based Information Fusion Centre
- The Australia-sponsored Pacific Fusion Center in Vanuatu
- The Pacific Islands Forum Fisheries Agency's Fisheries Surveillance Centre in the Solomon Islands.

The availability of high-quality data for these centers will significantly enhance the region's MDA initiative.

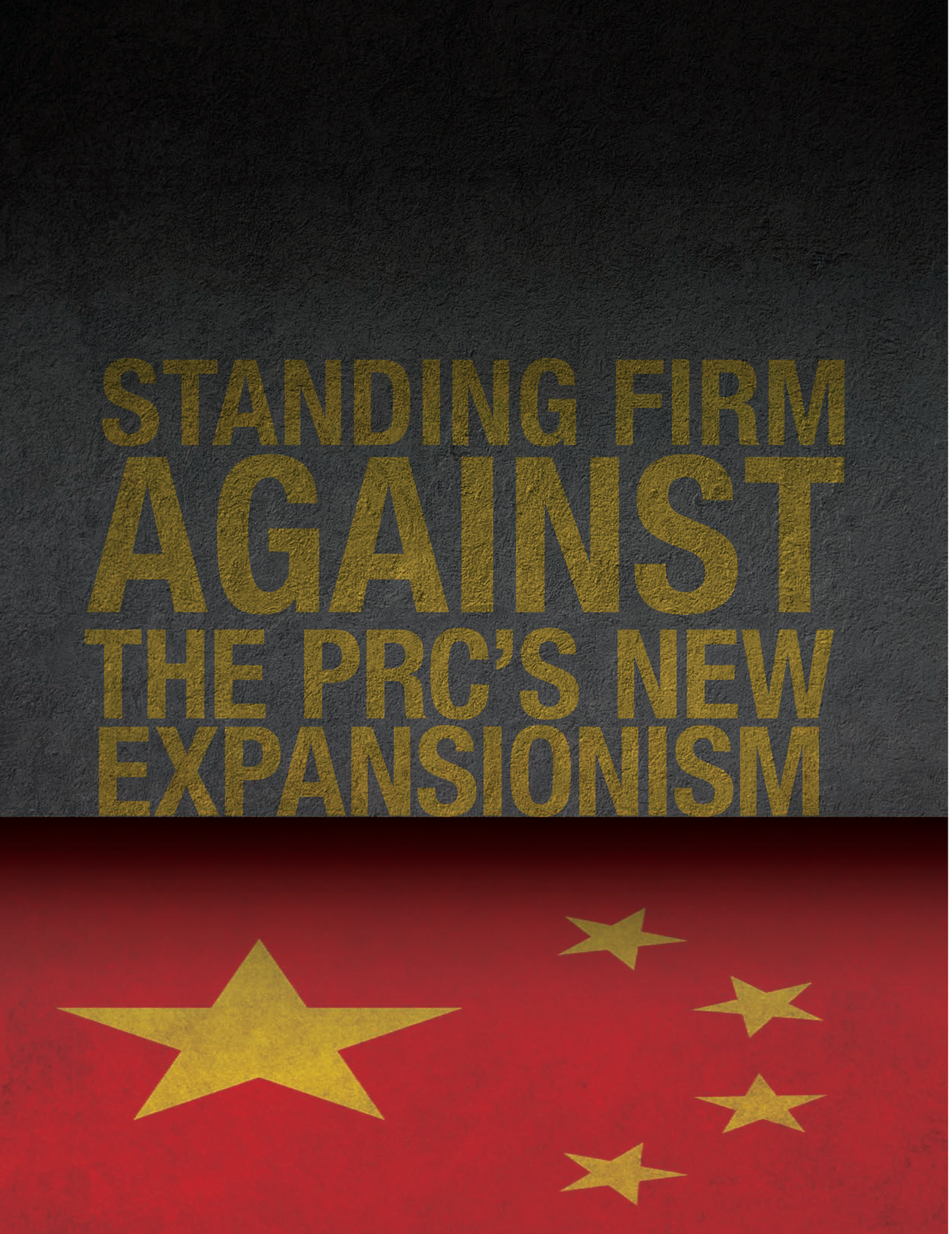
The security pact signed by Australia, the United Kingdom and the U.S. in September 2021 will support Canberra's acquisition of conventionally armed, nuclear-powered submarines, as well as promote collaboration on advanced technologies, including undersea capabilities. A nuclear-powered submarine fleet requires UDA at a tremendous scale, making a major SWAM exercise a necessity for Australia, the U.K. and the U.S.

The PRC has conducted a significant number of research trips in the Indian Ocean region in recent years to enhance UDA, more than France, India and the U.S. combined. Since 2019, Chinese vessels have conducted dozens of missions to survey the deep waters of the Bay of Bengal, the Arabian Sea and the waters west of Indonesia, considered important submarine operation areas for Australia and India.

The Maritime Research Center in Pune, India, in partnership with Nir Dhwani Technology Pvt. Ltd. has proposed a UDA framework that encourages pooling resources and synergizing efforts from stakeholders in maritime security, blue economy, environment and disaster management, and science and technology communities. Even nations with diverse geopolitical leanings can collaborate on environmental and disaster management issues, which will encourage higher deployment of S&T across applications. (See figure above.)

However, in the tropical littoral waters of the Indo-Pacific, the core requirement will remain acoustic capacity- and capability-building. In the absence of effective sonar, there is no viable solution. Given the appropriate impetus, the envisioned UDA framework can address multiple global challenges.

Global order demands that security and growth be navigated seamlessly. The challenges and opportunities presented by the Indo-Pacific's tropical littoral waters can be comprehensively addressed with implementation of the UDA framework. Partnership forums such as the Indian Ocean Rim Association and the Quad, among others, must prioritize and institutionalize the framework in their agendas. □



Nations Respond to Beijing's Prioritization of Security Concerns

FORUM STAFF | PHOTOS BY REUTERS

More signs are emerging that nations — especially in the Indo-Pacific — view the People's Republic of China (PRC) as a security threat. Indicators include Japan's plan to drastically increase its defense spending, the election of a South Korean president critical of Chinese coercion and first-time participation in NATO's annual summit by four Indo-Pacific partners.

These moves and others come as Chinese Communist Party (CCP) General Secretary Xi Jinping has declared that his nation will prioritize security concerns above all others. Xi introduced a concept of security in 2014 that's unique to the PRC and reiterated its provisions during the CCP's 20th National Congress in October 2022, when he secured a third five-year term as party leader. This comprehensive national security policy covers 16 areas of governance, including cultural security, food security, energy security and military security.

"The gradual securitization of everything is what we're seeing in China," Helena Legarda, lead analyst with the Berlin-based Mercator Institute for China Studies, told FORUM. "Any policy area can be seen by Beijing as a matter of national security if it can pose a challenge to the regime and the political system."

The policy goal, driven in part by perceptions of internal and external threats, appears to be self-reliance. "Effectively, it's Beijing preparing for the worst in case they need to disconnect with the West," Legarda said.

A wide range of reactions to the PRC's assertiveness has emerged among countries concerned about coercion, many of which count the PRC as a top trading partner or avoid taking sides between the PRC and the United States. "They're looking to try to settle disputes as best as they can or at least control escalation and try to keep good relations with all powers in the region," Legarda said.

Still, in areas such as commercial fishing, territorial sovereignty and the projection of military power, concerns are being expressed. "When we're looking at the reactions from countries, especially in the Indo-Pacific," she said, "I think we're starting to see somewhat of a pattern."

Australia, India and Japan, in particular — all democracies and partners with the U.S. in the Quadrilateral partnership, or Quad — are growing bolder in their response to a CCP military buildup that has accelerated since Xi came to power in 2012. "Over the last four or five years, we've seen a China where pragmatism is being sidelined in favor of ideology," Legarda said. "It's a China that seems more willing to accept economic or reputational costs in service of its grand strategic and political goals."

Phillip C. Saunders, director of the Center for the Study of Chinese Military Affairs at the U.S. National Defense University, sees irony in this.

"China is concerned about the potential for the Quad nations working together, taking on more of an institutionalized form, doing more in terms of regional security," Saunders told FORUM. "But it's China's actions that are stimulating threat perceptions in all of the Quad members in a way that makes them want to increase security cooperation … and potentially for other states to be interested in joining the Quad, or in some form, a Quad-plus."

Two developments underlie the perceptions of a new PRC threat, Saunders said. First, the People's Liberation Army (PLA) has developed greater capabilities and a greater willingness to project power, as seen in the deployment of two aircraft carriers around Taiwan, the self-governed island that the PRC claims as its territory, and into the South China Sea, as well as in long-range, simulated bombing missions and the development of more advanced fighter aircraft. Second is the PRC's reaction to an August 2022 visit to Taiwan by a U.S. delegation led by then-House Speaker Nancy Pelosi. "They were unhappy about this and chose to express that unhappiness using military means," Saunders said. "That certainly got attention in Taiwan, and it got attention elsewhere in the region, as well." Within days of the visit, the PLA staged major drills around Taiwan and fired ballistic missiles that landed near the island's ports and in waters inside Japan's exclusive economic zone, prompting a diplomatic protest to Beijing.

Nations concerned about the PRC's destabilizing activities look to the U.S. as they shape their responses, said Raymond Kuo, a political scientist with the Rand Corp., a U.S.-based security research and analysis group. "Chinese belligerence is causing countries to want to gravitate toward the United States," Kuo told FORUM. "The United States is starting to take up the mantle of

South Korean President Yoon Suk Yeol says he won't allow his nation's reliance on Chinese trade to dictate the terms of their bilateral relationship.

leadership in corralling a more regional and unified response to China's challenge."

Japan has shown some of the strongest resistance to Chinese aggression, Kuo said, including a statement with the U.S. in 2021 identifying the Taiwan Strait between China and Taiwan — a critical shipping route for Japan and South Korea, among others — as a top security concern. It was the allies' first such joint statement in more than five decades. In addition, Japan established an economic security ministry in May 2022 to defend supply chains, infrastructure and leading technology. The move reflects increasing concerns about PRC trade obstructionism and economic espionage, according to an essay for the East Asia Forum by Toshiya Takahashi of Shoin University in Japan. "The law helps Japanese security cooperation with the United States and Australia — both of which are receptive to economic countermeasures against China," Takahashi wrote.

The PRC criticized Japan when Tokyo published its annual defense white paper in July 2022 highlighting repercussions from Russia's invasion of Ukraine, the PRC's intimidation of Taiwan and vulnerable technology supply chains as growing national security threats. The white paper noted Japan's plans to increase its defense budget and develop counterstrike capabilities. The PRC said the white paper contained "accusations and smears" against Chinese defense policy and was an attempt by Japan at "finding excuses for its own strong military arsenal."

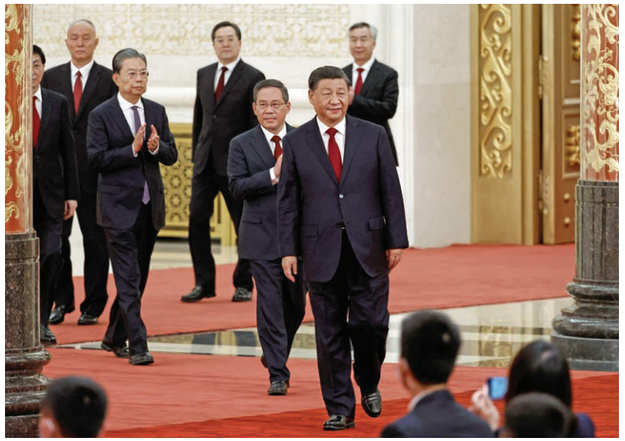
Tokyo and Beijing normalized relations in 1972, and Japan's generally favorable feeling toward the PRC reached its highest point in 1980, when a government poll showed 79% of the population had a positive image of China, according to the online news magazine The Diplomat. Four decades later, in 2021, private polls indicated that more than 90% of the Japanese population had a negative view of China, The Diplomat reported.

Other examples of pushback against PRC assertiveness:

SOUTH KOREA has sought increased cooperation with the U.S. and Japan since the March 2022 election of President Yoon Suk Yeol, Saunders said. During his campaign, Yoon noted that the PRC had imposed economic restrictions that cost South Korea about U.S. $7.5 billion in response to Seoul's deployment in 2017 of the U.S. anti-ballistic missile defense system known as Terminal High Altitude Area Defense (THAAD) to protect against North Korean missile strikes. In a February 2022 essay for Foreign Affairs magazine, then-candidate Yoon called for "high-level strategic dialogues" with the PRC but suggested he would not let South Korea's reliance on Chinese trade dictate the terms of their relationship or his nation's broader foreign policy. The PRC's retaliation over THAAD, which it considered a threat to its own interests, "had a lasting impact on popular views toward China, and on government and military views, as well," Saunders said. "Statements out of South Korea are more candid about Chinese intentions and military capabilities."

VIETNAM may have shown the fiercest resistance to the PRC's maritime coercion, Kuo said, when as many as 30 of Hanoi's naval vessels challenged up to 160 Chinese vessels during a May 2014 confrontation over exploratory oil drilling by the PRC in disputed waters of the South China Sea. Hundreds of vessels were reportedly rammed in the final month of the standoff. This incident and others involving control of the Paracel and Spratly islands and the PLA's dredging and militarization of artificial reefs and other maritime features have left Vietnam "looking to involve outside powers to balance the situation," Saunders said. In a 2019 defense white paper, Vietnam detailed the Chinese aggression it has faced, including "unilateral and power-based coercion, violation of international law, militarization, change in the status-quo and infringement over its sovereignty, sovereignty rights, and jurisdiction." Vietnam is working with the U.S. Air Force to develop its military capabilities and move away from dependence on Russian weapons and PRC influence, the Air University's Journal of Indo-Pacific Affairs reported in December 2021. Despite strong economic ties and a shared ideology, Saunders said, the Vietnamese have shown "nationalism is a strong force, and that begets suspicion of China. They're playing a delicate game that has diplomatic, military and economic elements to it."

INDIA and the PRC fought a border war in 1962, and tensions continue to flare. A June 2020 skirmish left 20 Indian Soldiers and by some accounts up to 40 Chinese troops dead, The Times of India newspaper reported. In November 2021, Indian military officials labeled the PRC the nation's No. 1 security threat and vowed to deal with border incursions. As a nonaligned nation, India refrains from entering into formal military alliances, but it routinely conducts exercises with the U.S. and its allies and partners. Although India and the PRC are members along with Brazil, Russia and South Africa of the BRICS economic group, India, as a Quad member, issued a joint statement rebuking the PRC, including condemning actions in the East and South China seas that involve "the militarization of disputed features, the dangerous use of coast guard vessels and maritime militia, and efforts to disrupt other countries' offshore resource exploitation activities." Saunders described India's policy as "one of hedging against China, but as security concerns have intensified, they've been willing to do more with the United States as part of that hedge."



Chinese Communist Party General Secretary Xi Jinping leads a procession of new politburo members during the party's 20th National Congress in Beijing in October 2022.

AUSTRALIA joined the United Kingdom and the U.S. in unveiling a security partnership in September 2021 that will provide Australia with advanced military capabilities, including conventionally armed, nuclear-powered submarines. Following a May 2023 meeting with his Australian counterpart, Singapore Foreign Minister Vivian Balakrishnan articulated his support for the security partnership and said he trusted Australia to play a bigger role in regional security. "On AUKUS, insofar as it contributes constructively to regional security, we're in support of it," Balakrishnan said, according to The Guardian newspaper. "We are comfortable with all the three partners within AUKUS, because with each of them, we've had long-term relationships, and that's why I think we're able to work together."

South Korea's deployment of THAAD missile defense systems to protect against North Korean missile attacks sparked retaliatory and costly trade restrictions from the People's Republic of China.

Defense leaders in 2022 also reiterated plans to rotate more U.S. land, sea and air forces to Australia amid shared concerns about the PRC's increasing power projection. On other fronts, Australia called for an investigation into the origins of COVID-19 in China, imposed a 5G network ban on PRC communications giant Huawei and investigated Chinese nationals under Canberra's new foreign interference laws. The PRC responded by imposing sanctions on Australian products such as coal, seafood and wine. In addition, Australia attended the NATO summit in June 2022 as one of the security alliance's Indo-Pacific partners along with Japan, New Zealand and South Korea. The NATO 2022 Strategy Concept singled out the PRC for the first time as a threat to the alliance's values and principles, condemning the communist nation's "coercive policies," and concluding that the PRC "strives to subvert the rules-based international order, including in the space, cyber and maritime domains." The leaders of Australia and the PRC, meanwhile, spoke in November 2022 for the first time since 2016.

NEW ZEALAND has questioned the PRC's assertiveness. Then-Prime Minister Jacinda Ardern, also during the 2022 NATO summit, urged resistance to PRC expansionism, according to the South China Morning Post newspaper, saying the PRC has "become more assertive and more willing to challenge international rules and norms." In recent years, New Zealand has joined in more than 20 international statements criticizing CCP actions including the repression of the Muslim Uyghur population in northwest China and the eroding of civil rights in Hong Kong, The Economist newspaper reported in October 2022. New Zealand also was among 50 nations, including Australia and the Pacific Island Countries of the Marshall Islands, Nauru and Palau, that issued a joint statement at the United Nations General Assembly in October 2022 declaring that CCP treatment of the Uyghurs "may constitute international crimes, in particular crimes against humanity."

BALTIC NATIONS Estonia, Latvia and Lithuania recently withdrew from the Beijing-led initiative Cooperation between China and Central and Eastern European Countries. The decisions came amid criticism of the PRC's escalating military pressure on Taiwan and Beijing's strengthening of ties with Moscow despite Russia's invasion of Ukraine. Lithuania's withdrawal coincided with the announced opening of a Taiwan trade office in its capital, Vilnius, and as the nation embraced a "values first" foreign policy, pledging it "will actively oppose any violation of human rights and democratic freedoms, and will defend those who are fighting for freedom around the world, from Belarus to Taiwan." The PRC responded by banning exports from the Baltic nation.

THE EUROPEAN UNION reported that 30 Indo-Pacific countries attended its Ministerial Forum for Cooperation in the Indo-Pacific in Paris in February 2022. Among the "shared ambitions" discussed were maritime security and cybersecurity — two areas where the PRC is at odds with other nations. The PRC has territorial disputes with more than a dozen nations, including disagreements on sovereignty over islands and navigation rights in the South China Sea. In addition, PRC-linked hackers have been accused of cyberattacks worldwide, the Center for Strategic and International Studies reported in October 2022, including targeting "multiple Southeast Asian governments … using custom malware linked to Chinese state-sponsored groups."

THE U.S. is countering PRC assertiveness in new ways. The Indo-Pacific Maritime Security Initiative will boost maritime domain awareness among countries along the South China Sea and into South Asia. The separate U.S. $6.1 billion Pacific Deterrence Initiative singles out the PRC and notes that "a great deal of the [U.S. Defense] Department's investments and efforts are focused on this threat and strengthening Indo-Pacific deterrence." The U.S. Indo-Pacific Strategy released in February 2022 notes growing competition from the PRC and commits to initiatives including the five U.S. treaty alliances in the region, as well as strengthening the Quad, supporting India's continued regional leadership and expanding U.S. diplomatic presence. Saunders also pointed to new U.S. restrictions on the sale of microchips to the PRC and, more broadly, on products that use U.S. technology. Previous restrictions focused on technology that could aid the PRC's nuclear capability. "Now, in a more general sense, we don't want China to be a state-of-the-art competitor with integrated circuits. We don't want them to have a world class artificial intelligence industry," Saunders said. The U.S. is urging like-minded nations to abide by the new restrictions and to begin decoupling parts of their economies and supply chains from the PRC. "We're going to lean on Japan and South Korea and the Southeast Asian states to be careful what you trade with China," Saunders said. "And we're doing the same thing with Europe."

Among the many nations concerned about the PRC's growing threat are members of the Association of Southeast Asian Nations (ASEAN), which is negotiating with Beijing over a South China Sea code of conduct for navigation, territorial claims and other issues. The talks have gone on for a decade and seem to offer little hope for progress, said Kuo, the Rand Corp. analyst. Among the sticking points in the South China Sea negotiations: the PRC's insistence on bilateral agreements with individual member nations such as the Philippines and Vietnam rather than with ASEAN as a whole. "If ASEAN could really act together as a bloc," Kuo said, "they would have much more authority and much more ability to shape the region."

U.S.-led restrictions on the export of technology products to the People's Republic of China targeted Chinese companies such as e-commerce giant Alibaba Group.

Still, Saunders said, the long-running talks have revealed the PRC's true intentions: to restrict the freedom and sovereignty of ASEAN nations. The PRC, for example, wants to limit ASEAN members' ability to conduct military exercises with nonmember nations and exploit oil resources with help from foreign companies. "They want it to be only ASEAN companies or Chinese companies," Saunders said. "The course of these negotiations has made explicit what many of these countries fear, which is a China that's trying to dominate the region and dictate what happens there or at least have veto power over what happens there." This strident approach has fostered distrust of the PRC across the region. The 2022 State of Southeast Asia Survey, conducted by Singapore's ISEAS-Yusof Ishak Institute of Southeast Asian Studies, found that 64% of respondents in ASEAN nations welcomed U.S. regional, political and strategic influence and that 53% trusted the U.S. to do the right thing regarding global peace, security, prosperity and governance. The comparable numbers for the PRC: 24% and 27%. □

MULTIDOMAIN INTEGRATION

Project Convergence 22 boosts battlespace situational awareness

U.S. Soldiers use the Integrated Visual Augmentation System during Project Convergence 2022 at Camp Talega, California.
THIEM HUYNH/U.S. ARMY

A landing craft participates in Project Convergence 2022 at Red Beach, U.S. Marine Corps Base Camp Pendleton, California.
JUAN MAGADAN/U.S. MARINE CORPS

CAPT. PATRICK HINTON/BRITISH ARMY

Australia, the United Kingdom and the United States held an experiment in California in late 2022 aimed at improving integration and interoperability among military forces, an effort that began in July 2020 when the British and U.S. armies signed a memorandum of agreement on joint modernization.

Known as Project Convergence 22 (PC22), the campaign of learning allowed the allies to merge capabilities, experimenting with new equipment, tactics, techniques and procedures through challenging scenarios against a peer "enemy" around the world, including the Indo-Pacific. The engagement allows joint forces to integrate artificial intelligence, robotics and autonomy to improve battlespace situational awareness, connect sensors and accelerate decision-making.

Troops achieved several firsts during the deployment. A U.S. Marine Corps F-35B Lightning II aircraft autonomously cued fires from a U.K. Multiple Launch Rocket System. A U.K. Giraffe Agile Multi Beam radar connected to the U.S. Integrated Air and Missile Defense Battle Command System (IBCS) to contribute to an integrated fires network — a significant achievement as IBCS had been a U.S.-only system.

Much focus was placed on logistics and sustainment. Predictive software generated resupply recommendations within 90 seconds, a process that might have taken brigade planners several hours. An L3Harris FVR-90 remotely piloted aircraft delivered blood to a simulated mass casualty scenario while the Battlefield Assisted Trauma Distributed Observation Kit, a smartphone application, allowed networked management and effective transfer of casualties and their data.

HoloLens virtual reality goggles aided engineers in receiving expert advice on repairs. U.K. and U.S. forces also 3D-printed parts for each other's equipment. The cooperation enhanced resilience and reduced the burden of sending equipment back and spares forward.

Data and Electromagnetic Spectrum Management

With multiple air and ground sensors deployed, it was clear that data collection does not limit multidomain integration. Rather, data management is critical. "The network is really going to be foundational," U.S. Army Secretary Christine Wormuth said at the conclusion of the 2021 project, stressing the importance of an "assured, reliable, resilient network underlying all of the systems that we're using."

PC22 participants explored how best to manage the flow of data, recognizing that information must be delivered to warfighters in a way that enhances battlefield situational awareness while also driving decisions.

Bandwidth was also highlighted. As Wormuth noted, a resilient network is crucial to multidomain integration.

Soldiers with the U.S. Army Special Operations Command use networked devices to prepare for Project Convergence 2022.
ALEX WERDEN/U.S. ARMY

As such, networks must not be overstressed, which could prevent critical information from reaching intended recipients. The wars in Iraq and Afghanistan saw coalition forces project from well-established bases with strong network architecture developed over years. Commanders became used to high-definition video feeds of operations. PC22 taught planners that protecting the network requires a move toward static images and even text to describe targets, and commanders have identified distributed decision-making as one solution. This concept involves analyzing data nearer its source rather than at a central hub, which can reduce bandwidth demands as well as processing delays.

Battlespace Management

Battlespace management and airspace safety become more difficult with increasing numbers of piloted and remotely operated aircraft. Better use of data and sensors is crucial to unlocking this issue, U.S. Army Chief of Staff Gen. James McConville said during PC22. For example, targeting software that disseminates information from sensors must be fully integrated between land and air forces.

During PC22, robotics and autonomous systems (RAS) were field-tested to explore how to integrate them into force design. Commanders found RAS useful for identifying and initiating contact with enemy troops, thereby reducing their own Soldiers' exposure. Using robotic sensors ahead of troops proved invaluable, compelling opposing forces to reveal their position earlier. While RAS are proliferating, robots remain the most common facet. Remotely operated equipment exposes fewer Soldiers to danger and widens the areas of observation and operation.

Has Full Integration Occurred?

Integrating forces across national boundaries remains in its early stages, and PC22 participants emphasized that the third iteration of Project Convergence was an experiment rather than an exercise. It is important that collaboration and integration endeavors continue until the next iteration, expected to be in 2024. PC22 was a landmark event amid a regular drumbeat of smaller integration initiatives, underpinned by endeavors such as the British Army's Future Soldier program. These efforts must be resourced and prioritized moving forward.

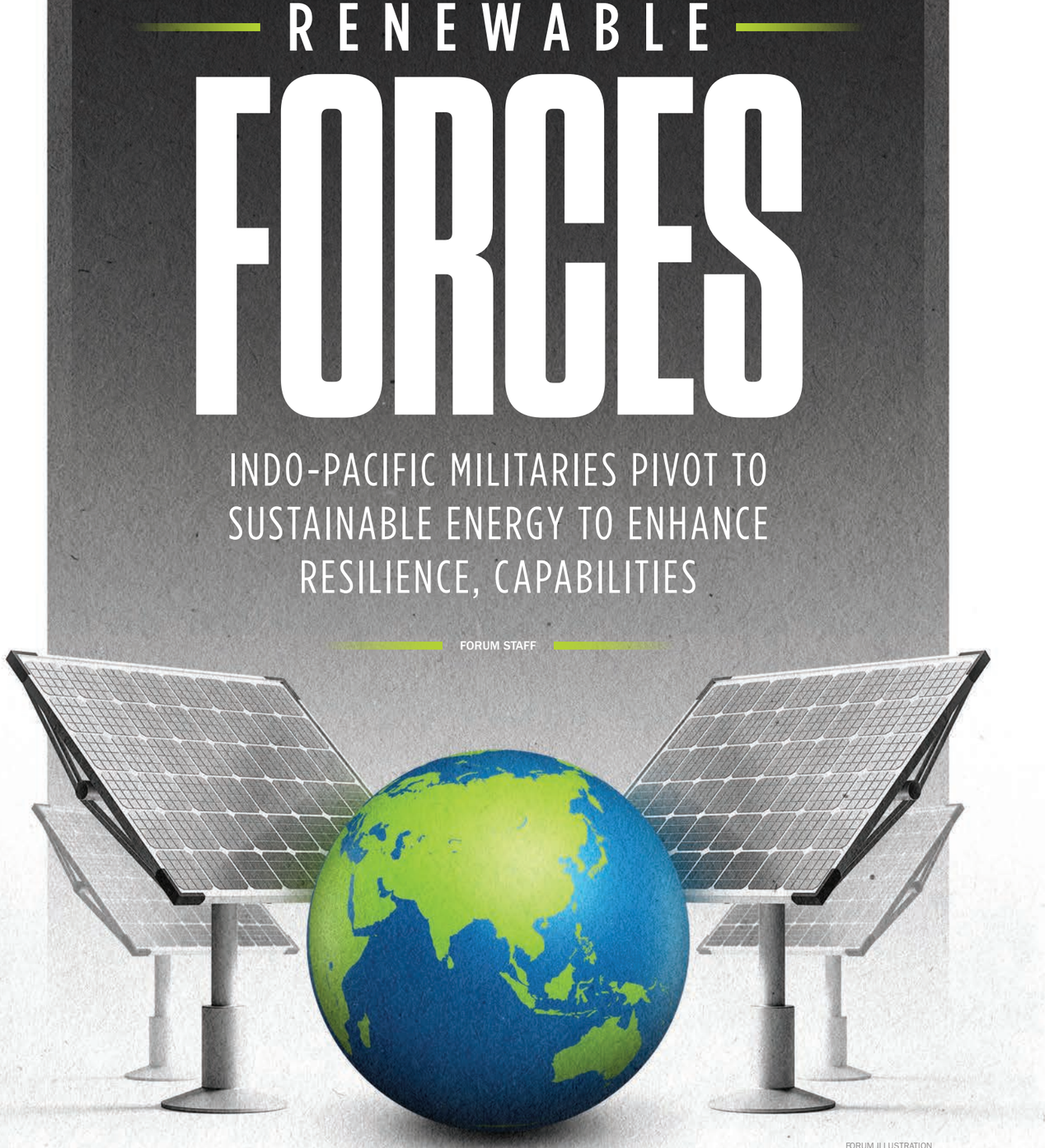
While barriers remain, such as differing policies and regulations, PC22 was an important step toward multidomain integration across national boundaries. The biggest gains come from deploying forces together with the freedom to troubleshoot and experiment. This will reveal the true nature of a challenge and place its resolution in the hands of those who may eventually use the concepts on the battlefield. □

This article was originally published in December 2022 by the Royal United Services Institute (RUSI), as part of RUSI Defence Systems. RUSI is a U.K.-based think tank focusing on defense, security and international affairs.

RENEWABLE FORCES

INDO-PACIFIC MILITARIES PIVOT TO SUSTAINABLE ENERGY TO ENHANCE RESILIENCE, CAPABILITIES

FORUM STAFF



FORUM ILLUSTRATION

ON the evening of November 21, 1918 — 10 days after the signing of the armistice that ended World War I — British War Cabinet member George Curzon presided at a dinner honoring the Inter-Allied Petroleum Conference. Toasting the delegates gathered in London, Curzon declared that the Allies had "floated to victory on a wave of oil" due to their immense fleets of trucks. French delegate Henry Berenger noted that Germany expected to win because of its significant coal deposits, but the Allies prevailed with oil. It was, he said, a victory of automobiles over railroads.

More than a century after that global conflict ushered in an age of oil-thirsty geopolitics, militaries and defense agencies across the Indo-Pacific are at the leading edge of a surge in scientific and engineering advances that promise to herald a new era. From geothermal-powered bases and zero-emission electric vehicles to jet fuel produced from biomass such as algae, crops and household waste, armed forces are accelerating their transition to renewable energy. The evolution aims to enhance operations in peacetime and war, while reducing harmful greenhouse gases. A blend of factors is driving innovation: civilian and military mandates to mitigate climate impacts and build resilience; diminishing fossil fuel reserves; strains on oil and gas supplies caused by crises such as the war in Ukraine; and evolving clean technology to better prepare and protect troops.

A French Army convoy carries troops and cargo at Nixeville, France, during the Battle of Verdun in 1916. THE ASSOCIATED PRESS

"The global energy system is undergoing a rapid and enduring shift with inescapable implications for militaries," Royal Australian Air Force (RAAF) Wing Cmdr. Ulas Yildirim, then a visiting fellow at the Australian Strategic Policy Institute (ASPI), wrote in a June 2022 report for the think tank. "Australia's dependence on imports for liquid-fuel security places the ADF [Australian Defence Force] at risk. The risk isn't whether the ADF can get to an area of operations and perform poorly but whether it can get there at all. … In this context, the ADF's transition to renewable sources isn't a zero-sum choice that results in operational capability being undermined or degraded. A rapid transition to renewables will make the ADF more effective in doing what the Australian Government directs and demands in the more divided and dangerous world and region we're already experiencing."

Enhanced operational performance also is at the heart of the United States Department of the Air Force's Climate Action Plan, released in October 2022. "Our overall goal," the agency stated, "is to deliver more combat power to the warfighter using less fuel."

GENERATING SUCCESS

At its tanker-transport hangar at Changi Air Base, the Singapore Armed Forces (SAF) is doing more than reducing fuel consumption — it's also generating enough renewable energy to power other parts of the base. The facility's solar panels, natural ventilation, grass-covered roof and eco-friendly building materials conserve electricity, while rainwater is collected for irrigation and other nonpotable use. "Solar energy remains the most promising renewable energy source for Singapore, and we have commenced the installation of solar panels on suitable rooftops in military camps and bases, generating approximately 20 MWp [megawatt-peak] of electricity," Brig. Gen. Frederick Choo, chief sustainability officer of the SAF and Singapore's Ministry of Defence (MINDEF), told FORUM.

"By 2025, all remaining military camps will have solar panels installed on suitable rooftops, capable of generating about 50 MWp of electricity in total," Choo said, which is enough to power more than 12,500 households annually. "To maximize solar adoption, we are also working with national agencies to explore floating solar photovoltaics over reservoirs sited within MINDEF land."

Singapore generates about 96% of its electricity from natural gas imports, which arrive via pipelines from Indonesia and Malaysia and in liquefied form from as far away as Africa, Australia and North America. With a land mass of 720 square kilometers, the

city-state of 5.6 million people is constrained in how much renewable energy it can produce from sources such as solar, according to the government's Energy Market Authority. In late 2021, officials announced plans to import about one-third of Singapore's electricity from renewable, low-carbon sources such as wind and hydropower plants by 2035.

The SAF and MINDEF renewable energy initiatives align with the Singapore Green Plan 2030, "a whole-of-nation movement launched in February 2021 to chart concrete targets over the next 10 years to advance Singapore's national agenda on sustainable development," Choo said. The military seeks to be at the forefront of those efforts, with plans to replace its administrative vehicle fleet with electric vehicles (EVs) by 2030. It also is collaborating with the Defence Science and Technology Agency and the National Environment Agency to generate energy with biogas produced from food waste, while the Royal Singapore Air Force is set to start trials using green aviation fuel in some of its F-16 fighter jets.

"Adapting to use green technologies could also reap operational advantages," Singaporean Defence Minister Dr. Ng Eng Hen told Parliament in March 2020 at the Changi hangar's unveiling, citing the Royal Singapore Navy's research into energy-efficient hybrid propulsion systems to boost endurance.

POWER PIVOT

Singapore's sustainability strides are evidence of a quickening trend across the region. "Some Asian countries' militaries are gearing up for a new energy paradigm amid a perfect storm of security concerns, climate change and the emergence of renewable resource options that are driving operational changes," Defense News magazine reported in August 2021. For industrial heavyweights such as Japan and South Korea, which depend on fossil fuel imports, the "need for energy security is more pressing for their militaries, given the complex national security tasks that include deterring Chinese aggression, preparing for the unpredictable nature of a nuclear-armed North Korea and overcoming humanitarian disasters. As alternative energy sources become increasingly viable, these countries and their militaries are renewing efforts to pivot to these."

A month earlier, Japan's defense white paper cited climate effects such as more frequent deployments to natural disasters, and growing burdens on military bases and equipment. It marked the first reference to climate change in the yearly report on the nation's security preparedness and challenges, which Japan released shortly after establishing a Defense Ministry task force to support Tokyo's goal of a decarbonized society by 2050.

A solar project at Misawa Air Base in Japan, funded by the U.S. Defense Logistics Agency Energy, is expected to cut energy consumption by 20% across nearly 700 buildings and reduce the base's annual electrical load by up to 60%. MISAWA AIR BASE

At a climate summit convened by U.S. President Joe Biden in April 2021, then-Japanese Defense Minister Nobuo Kishi said at least 50% of his ministry's facilities would begin generating electricity with renewable sources such as solar that fiscal year. The ministry also developed a prototype ground vehicle with a hybrid electric-diesel engine and collaborated with the U.S. to boost the electrical capacity of Japan Self-Defense Forces vehicles. "In my view, activities for national defense and environmental considerations can go hand in hand," Kishi said.

The Indian Army wants to shrink its carbon footprint by replacing 25% of light vehicles, 38% of buses and 48% of motorcycles with EVs in some peacetime units, the Hindustan Times newspaper reported in October 2022. The Army is setting up EV charging sites in commercial and residential parking lots and developing solar-powered charge points. India ranks as the world's third-largest energy consumer, with coal accounting for more than 70% of its power sector, and New Delhi has set "ambitious renewable energy targets," according to the U.S. International Trade Administration.

BATTLEFIELD RESILIENCE

Green technology also offers tactical benefits. "The ADF is already leveraging this advantage in modest ways," Yildirim, who has a doctorate in engineering, reported for ASPI. "Electric motorcycles have been trialed as an adjunct to armored reconnaissance capabilities. Quiet vehicles offer huge advantages on the battlefield."

Similarly, EVs and hybrids limit logistical vulnerability, particularly in austere terrains, according to Paul Farnan, principal deputy assistant secretary of the U.S. Army for installations, energy and environment. "If we can reduce the amount of fuel our vehicles use by 30%, 40%, 50%, that's half of the fuel convoys we now have to protect," Farnan said at the October 2022 launch of the Army's climate implementation plan, which calls for a zero-emission fleet of light-duty, nontactical vehicles and for development of hybrid-drive tactical wheeled and combat vehicles, both by 2027. "That's half the casualties we're going to risk. That's half the amount of combat forces we're pulling away from the fight."

Those vehicles can also run electrical systems such as communications and radar without the engine running, "reducing your acoustic signature and your thermal signature, two things that weapons can hone in on," Farnan said during the event at the Center for Strategic and International Studies, a U.S.-based think tank. "So, just by doing this, we're not only reducing the amount of fuel these vehicles need and the amount of fuel we have to move to the battlefield; we are providing better protection for our Soldiers."

"IF WE CAN REDUCE THE AMOUNT OF FUEL OUR VEHICLES USE BY 30%, 40%, 50%, THAT'S HALF OF THE FUEL CONVOYS WE NOW HAVE TO PROTECT. THAT'S HALF THE CASUALTIES WE'RE GOING TO RISK. THAT'S HALF THE AMOUNT OF COMBAT FORCES WE'RE PULLING AWAY FROM THE FIGHT."

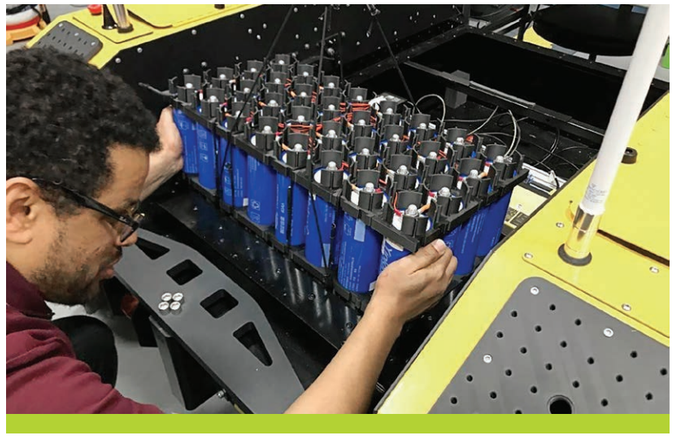
~ Paul Farnan
Principal deputy assistant secretary of the U.S. Army for installations, energy and environment

A Royal Australian Air Force (RAAF) KC-30A tanker refuels a Japan Air Self-Defense Force F-2A fighter jet over Japan in April 2022. The RAAF is developing portable kits to produce aviation fuel from biomass and other sustainable sources.
AUSTRALIAN DEFENCE DEPARTMENT

Air forces in Australia, the United Kingdom and the U.S. also are developing portable equipment to produce aviation fuel from biomass and other sustainable sources, noted Yildirim, who authorized the ADF's first biomass-fueled flight in 2012 while serving as chief engineer of the RAAF's Joint Fuels and Lubricant Agency. Such kits, he wrote, "hold the promise of production at the point of use instead of reliance on complicated distribution systems in often difficult locations."

FUTUREPROOFING FORCES

Global annual investment in clean energy is set to surpass U.S. $2 trillion by 2030, a more than 50% jump over 2022, according to the International Energy Agency (IEA). Russia's unprovoked invasion of Ukraine in February 2022 and the ensuing war sparked the "first global energy crisis — a shock of unprecedented breadth and complexity," likely hastening the move from oil and coal to wind, solar and other renewables, the IEA reported in late 2022.



An engineer installs a lithium battery system in an autonomous ground vehicle at the U.S. Army Combat Capabilities Development Command's research lab in Maryland. T'JAE ELLIS/U.S. ARMY

As major energy consumers, the world's armed forces will be shaped by — and can help shape — this transformation. The Australian military, for example, spent more on fuel than on any other commodity in 2016-17, about U.S. $300 million, Yildirim noted. The fuel that runs the ADF largely comes from "globally sourced crude oil flowing through a handful of East and Southeast Asian refineries," he wrote. "Supply arrangements for these critical commodities are likely to become more fraught, however."

The prospect of a crisis or conflict limiting fuel supplies is an acute security concern, particularly for a country such as Australia, which is a net importer of crude and refined oil and relies on petroleum for about one-third of its energy consumption. Yildirim's recommendations to alleviate such a scenario include transitioning the ADF's noncombat vehicles to EVs, adopting solar and other renewables in upgrading military installations, and widening the use of simulation technology for training and exercises to cut energy consumption.

He also called for tapping into the expertise of commercial sector entities such as airlines and shipping companies, as well as civilian research institutes and partner militaries to avoid duplication and boost interoperability. "Futureproofing the ADF requires the growth of an alternative fuels sector in Australia to meet broader needs that include but aren't defined by the ADF alone," he wrote. "That can only be achieved through partnerships because no individual operator or enterprise has a monopoly on the energy sector."

MISSION CERTAINTY

As such public-private partnerships take root across the Indo-Pacific, a whole-of-society approach to renewable energy already is yielding results for the U.S. Defense Department, the government's largest energy user and one of the world's biggest electricity purchasers. The U.S. military almost doubled its renewable energy production from 2011-15, far outpacing the nation as a whole, according to James Grant, manager of the U.S.-based International Tax and Investment Center's Energy, Growth and Security program. "In a new era in which renewable energy sources could be the difference between an agile, secure fighting force and a sluggish one at risk of market shocks and aged infrastructure, there is little room for the United States to be complacent," Grant wrote in an April 2021 article for The National Interest magazine, noting the People's Republic of China's (PRC) increased targets for renewable technology. "Just like when the U.S. military focused on the nuclear triad to deter adversaries during the Cold War, its aim in the 21st century should be to increase its edge as an energy-independent fighting force."

The U.S. military is pursuing this goal on multiple fronts, with added impetus from President Biden's December 2021 executive order that federal agencies achieve 100% carbon pollution-free electricity by 2030, at least half of which must be locally supplied clean energy, among other targets. The Defense Department and its branches followed the directive by implementing comprehensive climate mitigation and resilience plans. Among the initiatives:

- The U.S. Army, working with manufacturer General Dynamics Land Systems, unveiled a prototype of its next-generation Abrams battle tank in late 2022. The AbramsX incorporates hybrid-electric propulsion

The U.S. Air Force Research Laboratory, NASA and Boeing developed the X-48B, a prototype ultra-efficient, blended-wing aircraft. NASA

that will cut fuel consumption and allow its crew to operate sensors and other systems without telltale engine noise and heat. "This improves the vehicle's lethality and survivability and massively expands its operational envelope," The National Interest reported. Similarly, all five industry participants in the Army's Optionally Manned Fighting Vehicle program to replace the M2 Bradley infantry fighting vehicle have proposed a hybrid-electric design.

- In addition to expanding its use of sustainable aviation fuels and exploring the electrification of small mobility aircraft and rotorcraft, the U.S. Air Force is collaborating with NASA, defense firms and other partners to develop blended-wing aircraft with less drag and greater fuel efficiency. With aviation fuel accounting for about 80% of the branch's energy consumption, such advances remain imperative to the U.S. maintaining its technological dominance over the PRC and others, according to John Sneden, head of the Air Force's Propulsion Directorate. "I will tell you that anytime you have an advantage, it's important to check your six," Sneden said during the Air and Space Forces Association's Air, Space and Cyber Conference in Maryland in September 2022. "How fast is your adversary coming up behind you? What's going on? We can't keep living off the advantage. We have to always be innovating, always be moving forward."

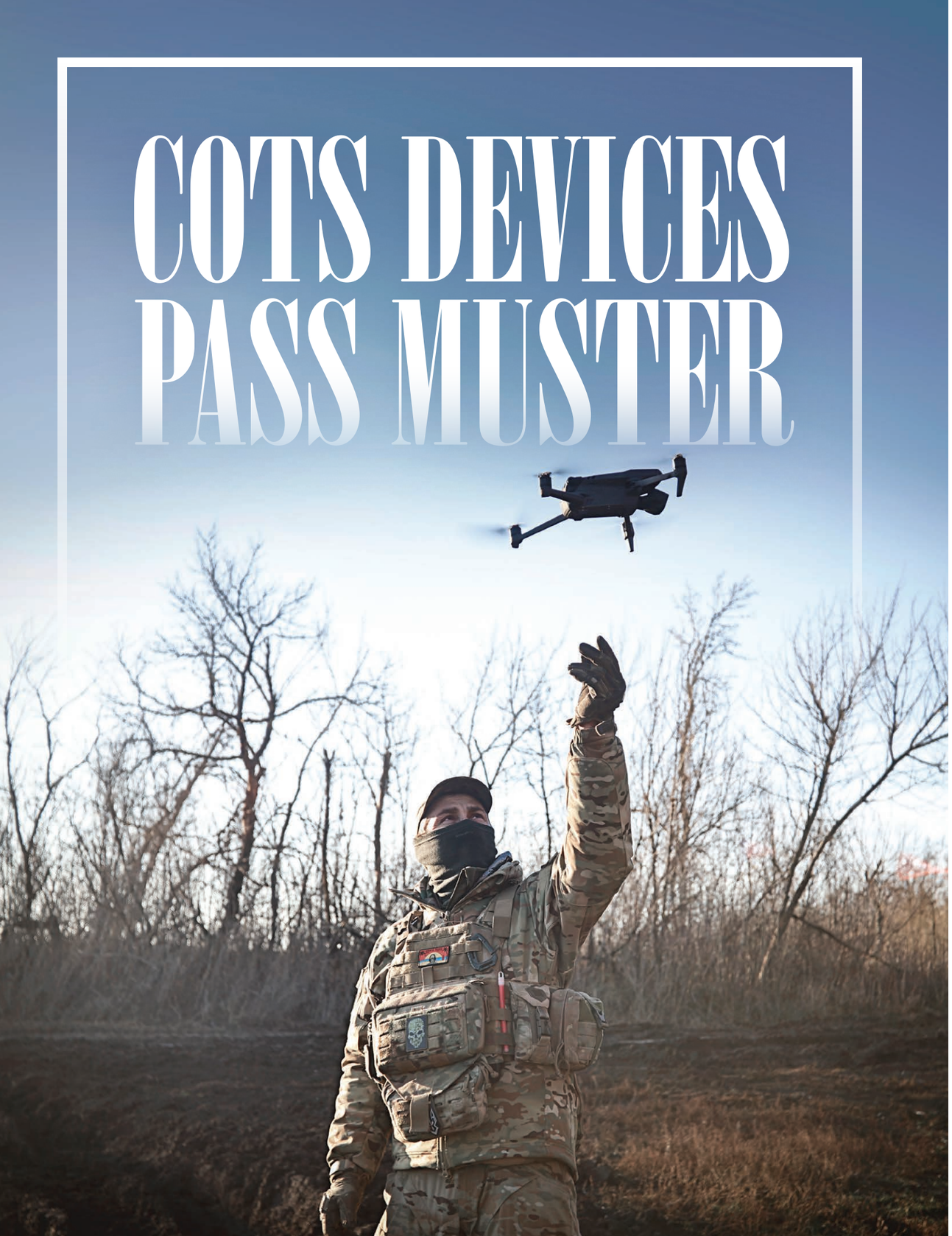
- The U.S. Marine Corps and U.S. Navy also are building on a foundation of progress in sustainable energy, from the commissioning of the world's first nuclear-powered submarines and ships almost 70 years ago to the on-base production of geothermal power in the mid-1980s and the deployment of the Great Green Fleet of aircraft and ships powered, in part, by biofuels in the past decade. In 2022, Marine Corps Logistics Base Albany in Georgia became the first Defense Department installation to achieve net-zero energy, meaning it generates more electricity from renewable sources such as a biomass steam turbine and landfill gas generators than it consumes annually from its utility provider.

The initiatives will pay dividends in the civilian arena, too. "The U.S. military has been one of the greatest tech innovators on the planet. It won't be different in the energy field," Grant wrote in The National Interest. "In addition to improved security through increased renewables, the public stands to gain from the many downstream applications of advanced energy technology."

For Indo-Pacific militaries and defense organizations, the core duty remains constant amid this transformative wave of renewable energy gains. "Make no mistake — the department's mission remains to fly, fight, and win, anytime and anywhere," U.S. Secretary of the Air Force Frank Kendall said in a statement unveiling the agency's climate plan. "We are focused on modernization and improving our operational posture relative to our pacing challenge: China. We remain ready to respond and achieve air and space dominance when and where the nation needs us.

"Our mission remains unchanged, but we recognize that the world is facing ongoing and accelerating climate change and we must be prepared to respond, fight, and win in this constantly changing world." □

COTS DEVICES PASS MUSTER



Commercial off-the-shelf products enhance military operations

FORUM STAFF

Once dismissed as inferior technology, commercial off-the-shelf (COTS) devices such as aerial and maritime drones, secure mobile phones and GPS instruments are helping Ukraine counter Russia's assault and drawing increased interest from militaries worldwide, including in the Indo-Pacific.

A relatively small percentage of the equipment that Ukraine has used against Russian invaders is inexpensive, publicly available and quickly accessible. Aerial drones, for instance, were sold in hobby stores and online before Ukrainians began using them to spot advancing enemy tanks and troops. Some COTS products are combined with manufactured or fabricated parts to fashion weapons and other warfare paraphernalia.

Russia has taken note of Ukraine's use of COTS devices. Both nations have deployed small remote-controlled drones for intelligence, surveillance and reconnaissance, and to drop ordnance on key targets. Meanwhile, commercial GPS equipment can find and track enemy troops, including confirming the presence of opposing forces at the scene of potential war crimes. Cyber equipment monitors and even disables an adversary's equipment.

Commercial technology also is improving the efficiency of traditional military equipment. Intelligence gleaned about an enemy's location, for example, can be used to target missile strikes. "The war in Ukraine lends itself to COTS solutions," Mark Cancian, a retired United States Marine Corps colonel and a senior advisor with the Center for Strategic and International Studies (CSIS), told FORUM. "You have front lines that are relatively stable. People have the time to get these things set up and learn how to use them."

It's critical to connect a civilian COTS device user — an aerial drone operator, for example — with a military unit that can exploit the information. "A guy flying a quadcopter around and seeing a bunch of tanks, that's very nice and interesting, but it doesn't really do anything militarily," Cancian said.

Use of COTS equipment is not new, especially when it comes to drones. The Islamic State group began using unmanned aerial vehicles (UAVs) in 2016 to drop munitions as part of its terrorist attacks, according to a January 2022 report by Bellingcat, a Netherlands-based group of international researchers, investigators and journalists. The tactic has been deployed elsewhere. Terrorists in June 2021 dropped two small explosive devices from UAVs onto an Indian air base building near the Pakistani border. Though injuries and damages were minimal, the incident showed the asymmetric clout of readily available commercial products. It also led militaries worldwide to see the necessity of devising ways to counter COTS applications.

A Ukrainian serviceman flies a drone during an operation against Russian positions in the Donetsk region in December 2022.
THE ASSOCIATED PRESS

A Republic of Korea Soldier pilots a drone during a drill with the United States in Paju, South Korea, in mid-January 2023.
THE ASSOCIATED PRESS

The U.S. decades ago recognized the military potential of commonly used civilian devices. In 1994, then-U.S. Defense Secretary William Perry called for deploying COTS products "wherever and whenever possible," largely to address procurement delays and cost. Defense companies worldwide since then have incorporated attributes of COTS devices and technology into myriad products including military-grade drones. The war in Ukraine offers insight on how these technologies perform on the battlefield alongside traditional military equipment. In the Indo-Pacific, for instance, allies and partners are looking for parallels to deter the Chinese Communist Party (CCP) from attempting to seize self-governed Taiwan by force.

COTS devices can effectively support advanced military technologies, author and defense policy expert Peter Singer told the Vox news website in September 2022.

COTS USE AND POTENTIAL

In Myanmar, also called Burma, a resistance group has adapted COTS drones to counter the military junta, which seized power in a February 2021 coup. "We started with a simple F11 drone, which does not reach far," a resistance fighter told The Diplomat magazine in February 2022. "But by practicing and modifying other models from the amateur toy store, we got more and more proficient in handling them."

The junta, meanwhile, has used military UAVs for surveillance, to break up protests and to target opponents with laser-guided missiles, The Diplomat reported.

The New Zealand Defence Force is strengthening its communications systems with COTS technology and equipment, Breaking Defense magazine reported in December 2022. "Buying COTS solutions means that New Zealand will operate as a quick follower instead of leading with expensive systems development," the magazine reported.

Japan has sent camera-equipped COTS drones, along with military-issued protective masks and clothing, to Ukraine, Kyodo News reported in April 2022. Japan's Defense Ministry does not classify the drones as military equipment, the news agency said.

Commercial drones used by Ukraine's armed forces for reconnaissance undergo test flights in Kyiv in August 2022. GETTY IMAGES

Australian Army Lt. Gen. Simon Stuart touted innovation in his opening remarks at the Chief of Army Symposium in Adelaide in August 2022. He said the Army is the largest user of uncrewed aerial systems in Australia, with more than 400 COTS multirotor aircraft in its arsenal. Armed forces in Indonesia, the Philippines, Singapore, South Korea, Thailand and Vietnam also use COTS products and technology.

COTS devices are not effective for all military operations. Few commercially available UAVs, for instance, have the range to cover vast open-water distances prevalent in the Indo-Pacific. The devices would be more useful in comparatively short-range scenarios, CSIS's Cancian said. Taiwan could potentially use COTS drones and other equipment to deter an invasion, and the Philippines could deploy commercially produced equipment to defend its South China Sea islands.

COTS ADVANTAGES

Mike Monnik, CEO of DroneSec, a cybersecurity company based in Melbourne, Australia, defines COTS gear this way: "I should be able to walk into a store and purchase it." DroneSec has a network of global maps and other software designed to protect friendly UAVs and defend against malicious drones. Monnik said the technology used in many military and security drones was devised for recreational and commercial purposes.

The University of Maryland's Center for Public Policy and Private Enterprise (CPPPE) defines COTS devices as "software or hardware that is commercially made and available for sale, lease or license to the general public and that requires little or no unique government modifications to meet the needs of the procuring agency. Because of their rapid availability, lower costs and low risk, COTS products must be considered as alternatives to in-house, government-funded developments."

Technology changes rapidly, and militaries must understand they no longer hold a monopoly on advancements in warfare devices, CPPPE stated in a September 2008 paper — an assertion that remains true years later. "In many cases, implementing a COTS solution fundamentally changes the work of a system's development teams (both government and contractor), and how they do it — resulting in a natural resistance to the acceptance and use of COTS," the University of Maryland researchers wrote.

A drone ambulance manufactured by the Indian company Raphe mPhibr is designed to evacuate injured military personnel where helicopters cannot reach. AFP/GETTY IMAGES

The throwaway nature of many COTS devices does not square with traditional military preferences for rugged, time-tested equipment that can operate in an array of battle conditions, Cancian said. "You can buy lots of them and think of them as disposable items that you use once or twice, and then they're gone," he said. "So, they're very attractive for groups that don't have a lot of money."

Adapting commercially available devices for the battlefield can help militaries avoid cumbersome procurement procedures, which can take years, and enable them to quickly address threats. Conversely, COTS skeptics say the intense review of products intended for military use ensures applicable requirements and performance expectations are met. Additionally, devices built to military specifications are more likely to remain operational beyond initial deployment. There also is concern that commercial software poses security risks when adapted for military use.

Despite such reservations, COTS devices such as UAVs and secure mobile phones can serve military purposes with minor modifications. Other technologies, such as satellite imagery and cyber devices, can enhance military equipment.

In Ukraine, drone enthusiasts who once photographed weddings, fertilized crops or raced each other for sport now risk their lives to help their country repel Russian invaders, The Associated Press reported weeks after fighting began in late February 2022. Civilians track enemy convoys and relay the information to Ukrainian forces.

The potential advantages of COTS devices are strategic and psychological, Monnik told FORUM, with the mere sound of a UAV overhead capable of putting enemy troops on edge.

TYPES OF COTS DEVICES

COTS products also can be used to provide humanitarian aid, conduct rescue missions and monitor illicit activities such as illegal, unreported and unregulated fishing. In addition to UAVs, commonly used COTS devices include:

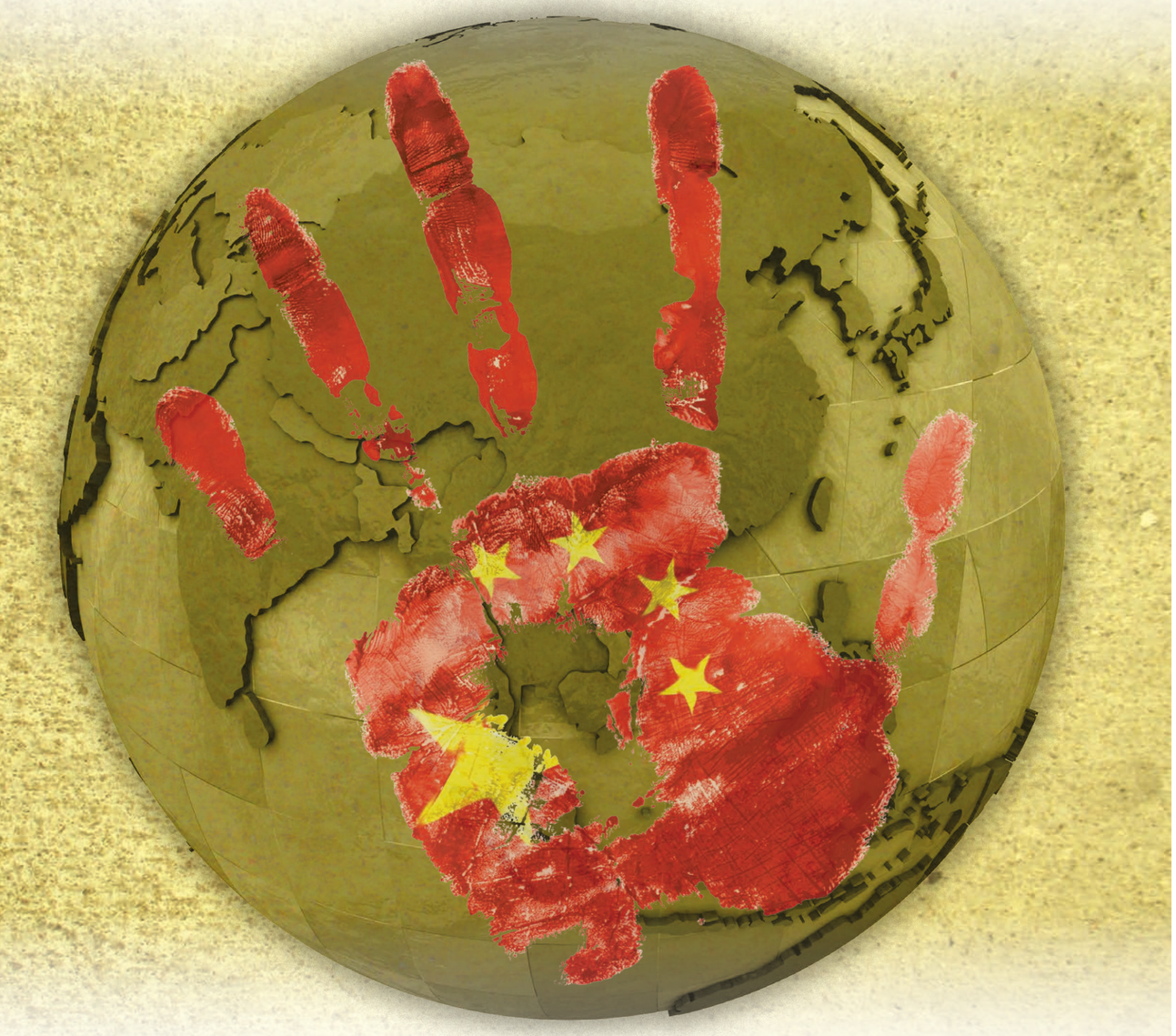
- Naval drones, also known as multipurpose unmanned surface vessels: Ukraine has launched uncrewed boats to defend ports, cities and commercial shipping lanes. The 5.5-meter-long vessels, which resemble armored kayaks, are used for surveillance and can be equipped with explosives. Many of the vessel's components, including the Sea-Doo engine, are produced commercially. Ukraine started a crowdfunding effort to build a fleet of the boats. Each vessel costs about U.S. $250,000, a fraction of the cost of an anti-ship missile, The Economist newspaper reported in December 2022.
- Cyber equipment: Commercially sold computers, simulators and other information technology that can enhance training, enable monitoring and disable enemy communications equipment.
- GPS technology and radar: These technologies allow militaries to monitor adversarial positions, movements and capabilities.

MOVING FORWARD

While COTS devices will not completely replace traditional military hardware, they have proven useful as supplemental equipment in multiple theaters. Mounting evidence of their effectiveness — in Ukraine, Myanmar and elsewhere — has prompted militaries to address their use.

Such devices are particularly well-suited to asymmetric warfare, where a less-equipped force can supplement traditional warfighting concepts with COTS equipment to exploit a larger force's weaknesses.

"The biggest benefits that have emerged from using COTS components are overall lower costs, greater availability, and faster delivery," Military Embedded Systems magazine reported in April 2022. "Non-military-grade technologies are always going to be less expensive, with more vendor choice. But the assumption that the lower cost associated with COTS components is synonymous with lower quality is simply not true anymore, with the reliability of commercial-grade components and systems increasing greatly." □



FORUM ILLUSTRATION

THE CCP'S POLITICAL WARFARE

An existential fight for allies, partners and like-minded nations

PROFESSOR KERRY K. GERSHANECK

The Chinese Communist Party (CCP) is waging existential warfare against the rest of the world. It is a war for global control, and the CCP aspires to win it without fighting — or at least without having to engage in major kinetic combat.

The key to the CCP's strategy is to ensure that target countries cannot — or will not — fight back.

To this end, the CCP engages in political warfare globally to shape narratives, perceptions and policies to protect the party's power and to achieve its geopolitical and hegemonic ambitions. It employs political warfare against every nation in the Indo-Pacific as well as across Europe, Africa and the Americas. It fights this war overtly and covertly and in highly deceptive ways that are difficult to detect.

Central to achieving its goals, the CCP undermines the sovereignty and political integrity of other countries. It seeks to fulfill the aspirations of thought and behavior control dreamed by China's earliest despots and the 20th century's most repressive dictators. Violence and intimidation are key to this political war, as reflected in the brutal repression of peaceful protests across China over the CCP's "zero-COVID" policy and of Hong Kong's pro-democracy protests, as well as in the combative confrontations by the CCP's maritime militia and other armed forces with various nations and territories to assert control of international waters and airspace.

At the CCP's 20th National Congress in October 2022, CCP General Secretary Xi Jinping fully consolidated his power. In his closing speech, Xi made clear that the CCP intends to accelerate this already intense war to attain his expansionist "China dream" to rejuvenate the nation under his autocratic terms.

The danger posed by the CCP is unprecedented. Targeted nations, especially the United States and its allies and partners, must understand the nature and scope of the CCP's political warfare in order to detect, deter, counter and defeat it. Failure to do so will be catastrophic, resulting in loss of sovereignty, resources and freedoms.

Political Warfare as Internal Repression

Brutal internal repression is one form of the CCP's political warfare, including religious persecution and genocide. In the Xinjiang region in northwestern China, the CCP is trying to destroy Uyghur culture, in part by imprisoning as many as 3 million Muslim minority Uyghurs in so-called reeducation camps.

The CCP also imprisons tens of thousands of religious practitioners in its pursuit of Sinicization of society. Many are tortured and many have died from maltreatment, organ harvesting or other cruelties. Millions more not imprisoned still face relentless persecution such as torture by electric shock and beatings in their homes, loss of assets and forced indoctrination as punishment for their faith. "The gravest threat to the future of religious freedom is the Chinese Communist Party's war against people of all faiths: Muslims, Buddhists, Christians, and Falun Gong practitioners alike," U.S. Secretary of State Antony Blinken said during an October 2021 speech in Indonesia.

The release of the People's Republic of China's (PRC)

Protesters hold blank sheets of paper, which represent government censorship, during a demonstration in Beijing in November 2022. THE ASSOCIATED PRESS

secret "China Cables" in 2019 and of the "Xinjiang Police Files" in 2020 proved the atrocities against Uyghurs, including rape, forced sterilization and abortions, physical and psychological torture, and execution. The leaked documents describing the internal workings of detention camps also highlighted the role Xi and other top CCP officials had in crafting the genocidal policies.

None of this is new. The CCP has brutally repressed the Chinese people for a century. It is responsible for large-scale reigns of terror beginning with the CCP conquest of China in 1949, through the Great Leap Famine (1958-62), the Cultural Revolution (1966-76) and other atrocities such as the 1989 Tiananmen Square tragedy when the CCP's People's Liberation Army (PLA) massacred civilians after students called for freedom. Historians estimate that up to 100 million Chinese people have died as a result of CCP actions.

The CCP has also conducted assimilation efforts in Tibet for more than a century. Under Xi, the CCP has renewed its campaign by implementing laws, rules and regulations intended to gradually Han-icize the Tibetan population and undermine Tibetan culture and history. The CCP's recent activities to undercut Mongolian traditional education, culture and language in Inner Mongolia represent another example of the CCP's attempts at forced assimilation.

Within China, however, it is nearly impossible to learn of the CCP's history of terror. References are heavily censored, and people risk imprisonment for even discussing the topic.

Outside China, meanwhile, the CCP's global propaganda operation claims that accusations of genocide and persecution are the "biggest lies of the century," and a reflection of the West's "deep-rooted egotism and prejudice towards China."

The CCP's internet censorship, massive propaganda apparatus and relentless indoctrination create an insidious echo chamber for the Chinese people, many of whom embrace patriotic education programs that instill hatred and xenophobia. One outcome is that the CCP weaponizes large numbers of hypernationalized students by sending them to foreign universities, where many propagate CCP narratives and attempt to stifle criticism of the PRC.

Lawfare as a Weapon

Legal warfare, or lawfare, is another key weapon in the CCP's arsenal. In 2015, the CCP arrested and imprisoned lawyers, legal assistants and human rights defenders who were taking Chinese statutes at face value and trying to use the legal system to protect nominally guaranteed rights. The charges included nebulous offenses such as "provoking quarrels." Many remain imprisoned.

Beginning in 2020, the CCP used a new national security law to crush Hong Kong's freedoms and any potential opposition to the party. Journalists, former lawmakers and pro-democracy activists were among those arrested and imprisoned. The CCP also attempted to use lawfare to undermine Hong Kong's election systems. The CCP touted its repression-by-lawfare internally and globally, with a resultant powerful psychological impact on people in the PRC, the Chinese diaspora and the people of Taiwan, among others.

The CCP has also established more than 100 so-called police stations in other countries, despite not having authorization from the host nations. Under the direction of China's public security ministry, CCP officials at the stations monitor, harass and, in some cases, forcibly repatriate Chinese dissidents and other exiles. Such actions include Operation Fox Hunt and Operation Skynet, in which Chinese security agents penetrated foreign countries to apprehend Chinese officials accused of corruption. However, those operations were less about battling corruption and more about the CCP clamping down on rivals and dissidents. Notably, some Fox Hunt targets living in Canada had close connections with the CCP's politburo, the party's chief decision-making body, and knew secrets the party wanted to shield.

Chinese journalists work at a media center during the CCP's tightly controlled 20th National Congress in Beijing in October 2022. THE ASSOCIATED PRESS

The CCP claims the stations, which also spread party propaganda, are administrative centers to help Chinese citizens with tasks such as renewing a driver's license. Further, the CCP dismissed concerns about its extraterritorial police forces operating on sovereign soil, and a PRC spokesman demanded "that U.S. side should stop the groundless hyping of this issue."

Political Warfare for Global Hegemony

As the CCP wages global political warfare, it employs a wide range of weapons to seduce, subjugate, infiltrate and coerce. The CCP cloaks its insidious nature behind innocuous names. The CCP rebranded its One Belt, One Road (OBOR) infrastructure scheme, for example, as the Belt and Road Initiative. OBOR spinoffs that sound enticing but promote coercive policies include the Digital Silk Road and the Polar Silk Road.

Other CCP political weapons include attempting to bribe officials in Pacific Island Countries, Africa and the Indo-Pacific; trying to silence critics in Australia, Canada and New Zealand; and seeking to interfere in elections in the Maldives, South Korea and Taiwan.

The CCP has attempted to demoralize and destabilize many Pacific Island Countries through efforts to corrupt officials and socially divide populaces. Palau and Samoa have repelled such CCP neocolonial advances in the South Pacific. Through its United Front Work Department (UFWD) and intelligence operatives, the CCP uses bribes and other financial inducements against these countries — and many others — to target elected officials in hopes of undermining their democracy and national sovereignty. Some of those ensnared have signed security pacts and other agreements that open the door to CCP exploitation of their nation's fisheries and other natural resources, as well as to PLA access to port and aviation facilities.

In Canada, according to the nation's Security Intelligence Service, the CCP's political warfare includes payments through intermediaries to party-affiliated candidates, potentially placing agents in positions to influence national policy, as well as seeking to co-opt and corrupt former Canadian officials, and mounting aggressive campaigns to punish Canadian politicians viewed as threats to the CCP. The party has employed similar tactics in Australia, India, New Zealand, the Philippines and South Korea, as well as in countries participating in OBOR.

In Japan, as in Canada and many other nations, the UFWD is responsible for most elite capture operations. The UFWD runs organizations such as the Japanese branch of its China Council for the Promotion of Peaceful National Reunification to conduct influence operations. One such organization, the Chinese Association of International Friendly Contact (CAIFC), targets Self-Defense Force officials in Japan as it does in other countries. However, in Japan CAIFC also engages with many sectors in society, including Buddhist organizations, architects, calligraphy associations and even Japanese players of the board game Go. Further, UFWD runs at least 15 Confucius Institutes, or supposed Chinese "cultural centers," as well as friendship associations in Japan to influence Japanese elites and elections. Fortunately, Japan is increasingly taking steps to better defend its security and sovereignty.

According to Federal Bureau of Investigation Director Christopher Wray, other forms of CCP political warfare in the U.S. include blackmail, threats of violence, stalking and kidnappings of those of Chinese ancestry. In England, PRC embassy officials have been videoed beating peaceful

Weaponized activities include religious practices; tourism in targeted countries; flows of students; the establishment of friendship societies and sister city organizations; and the purchase of strategically important land, infrastructure and companies.

protesters on public streets, and in Taiwan CCP-aligned gangs have publicly beaten students protesting pro-PRC legislation. To advance its political warfare, the CCP supports proxy wars. For example, Indian officials have accused the CCP of backing terrorist separatists in the nations' disputed border region. The CCP's support and training of warlord armies to coerce Myanmar's government is also well documented.

Leveraging Multiple Pressure Points

Indonesia is among the CCP's media warfare targets, and its experience is indicative of that of other countries such as the Philippines and Thailand. The CCP has dramatically expanded its media influence in Indonesia through content sharing, media partnerships and journalist training. Further, CCP state-run media such as the Xinhua News Agency and the China International Television Corp.'s Hi Indo! channel for young people have established branch offices in recent years, recruiting Indonesian journalists and other staff. The CCP's return on investment is an amplification of its propaganda and the ability to censor critics and content. In one case, the Chinese tech firm ByteDance manipulated the popular Indonesian news aggregator app Baca Berita to censor articles critical of the CCP regime and all references to Indonesia-China tensions over the South China Sea.

Then-staff members of the Apple Daily pose at the pro-democracy newspaper's headquarters in Hong Kong on June 23, 2021, the day before the paper's last edition was printed. Six former executives of the now-defunct newspaper pled guilty to collusion charges under the CCP's National Security Law that silenced and jailed opposition voices in the territory. THE ASSOCIATED PRESS

So-called wolf warrior diplomacy is another coercive political warfare strategy of the CCP. Relentlessly belligerent, it entails CCP diplomats engaging in verbal and, on occasion, physical attacks. In October 2022, for example, Chinese diplomats were accused of grabbing and beating a protester outside their consulate in Manchester, England, according to news stories. In 2018, during the Asia Pacific Economic Cooperation (APEC) meeting in Papua New Guinea (PNG), PRC diplomats forced their way into the PNG foreign minister's office to demand the rewording of the APEC final communique, and in 2020 PRC diplomats beat a Taiwan trade office librarian in Fiji, leaving the victim hospitalized, according to media reports.

The CCP has also succeeded in weaponizing many benign activities for political warfare. Weaponized activities include religious practices; tourism in targeted countries; flows of students; the establishment of friendship societies and sister city organizations; and the purchase of strategically important land, infrastructure and companies.

One example of weaponized religion is the CCP's effort to exploit Buddhism as a channel for special influence. Co-opting and managing religion is a core function of the UFWD. Under its direction, the State Administration for Religious Affairs (SARA) and the Buddhist Association of China (BAC) seek to work with Buddhists globally to support the CCP's goals. Operatives from SARA, BAC and the PLA conduct a wide range of operations to influence Buddhists. For example, in Mongolia they attempt to cultivate Buddhist leaders to influence that country's political elite to comply with the CCP and to undermine the CCP's perceived enemies. In Japan, these operatives seek to influence Buddhist groups to shape Tokyo's foreign policy and defense planning in the CCP's favor. In Australia, CCP operatives have sought to partner with a Buddhist council to influence political leaders, while in Thailand they attempt to influence Buddhist leaders to support OBOR projects and other CCP objectives in the kingdom. In Taiwan, the CCP funnels political interference funds via Taiwan-based Buddhist organizations.

The CCP's external lawfare campaigns often entail conjuring laws to support illegitimate claims to territory and resources. They also employ bogus maps, most notably with the contrived nine-dash line that encompasses about 2.5 million square kilometers of the South China Sea, to which the PRC lays claim.

Protesters in Istanbul, Turkey, hold posters and pictures of victims of the CCP's brutal crackdown on Uyghurs and other ethnic minority groups. THE ASSOCIATED PRESS

The CCP fundamentally rejects the 2016 international tribunal ruling invalidating much of its claim. It also distorts the law to extend Beijing's administrative writ into the South China Sea, including by designating Sansha, a village in the disputed Paracel Islands, as a Chinese prefecture.

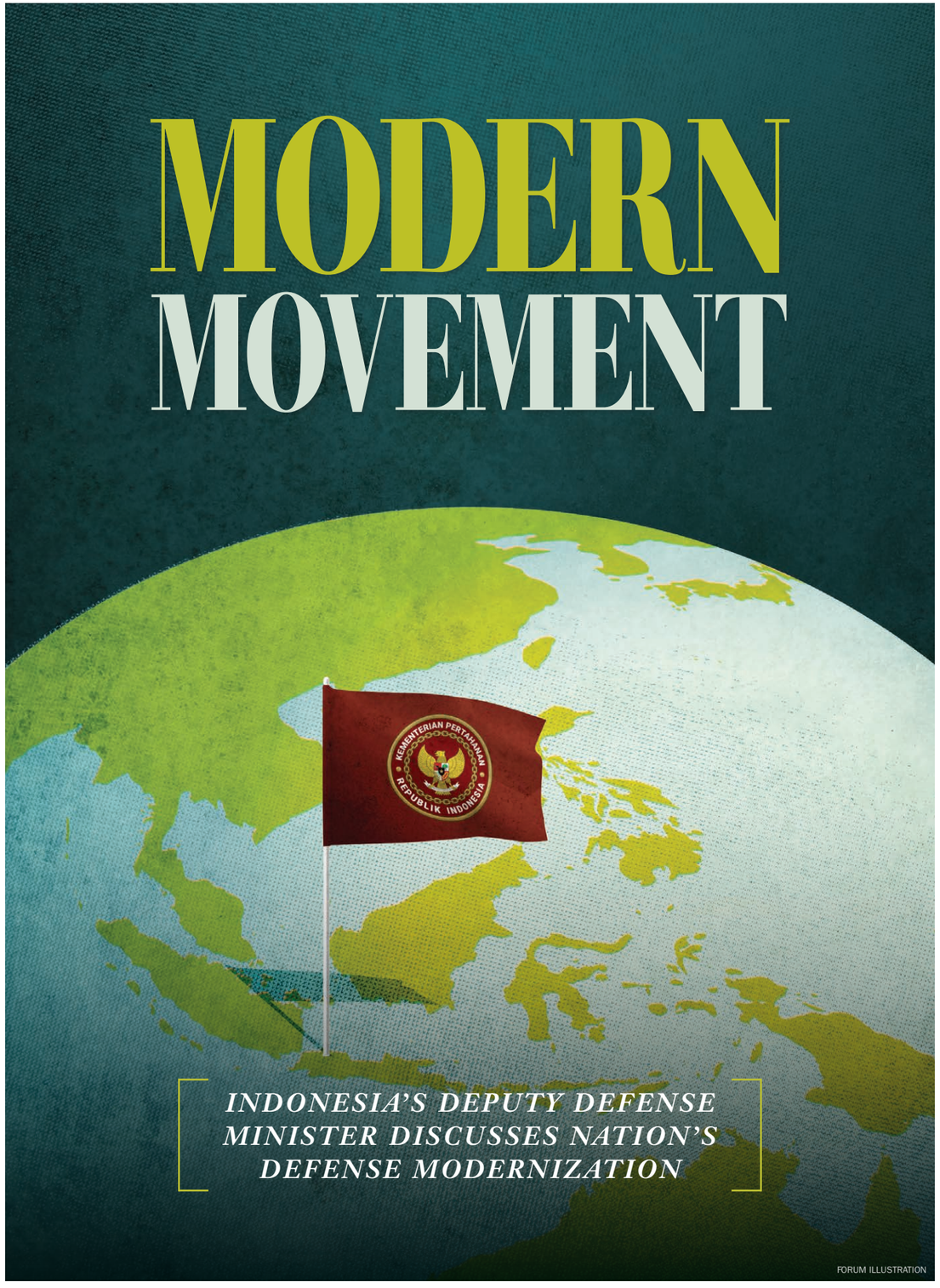
Lawfare is almost always employed with media warfare. For example, Beijing either finds or contrives so-called historical documents to establish a legal basis for its territorial claims, such as in the case of the Japanese-controlled Senkaku Islands in the East China Sea. The CCP then publicly promotes the documents via its state-run media as purported proof of its claim.

Countering the CCP's 'China Dream'

The CCP is aggressively waging political warfare globally to achieve its expansionist and totalitarian goals. Accordingly, allies and partners must build a common capacity to detect, deter, counter and defeat the threat. In the Indo-Pacific, an important step would be establishing a center of excellence to provide an intellectual foundation for combatting the CCP's political warfare. Such a center would help like-minded nations to develop an understanding of the threat and devise effective responses.

Key steps nations can take individually to build that capacity include:

- Rapidly generate national strategies to assess and combat the CCP's political warfare, including establishing policies and operations to defeat it.
- Establish education programs on political warfare for government officials, business leaders, law enforcement personnel, academics and journalists.
- Enhance capabilities for the legal community, law enforcement and counterintelligence officials to investigate, disrupt and prosecute CCP political warfare activities. Review laws and policies to ensure adequate and effective mission statements, requirements, resources, training and assessments.
- Routinely expose CCP political warfare operations. Mandate an annual public report that includes practical advice for leaders and citizens regarding those threats.
- Raise the costs to the CCP of its political warfare. While many countries are increasingly focused on CCP espionage, the party's political warfare operatives face few, if any, consequences. To counter CCP interference and intimidation, for example, Chinese diplomats who threaten media organizations should have their diplomatic status revoked and be expelled from the host nation. □



FORUM ILLUSTRATION

GUSTY DA COSTA

Lt. Gen. (Ret.) Muhammad Herindra has served as Indonesian deputy defense minister under President Joko Widodo since December 2020. As a senior Army officer, he served as chief of the General Staff of the Indonesian National Armed Forces, as well as commander of the Army Special Forces Kopassus in 2015 and commander of the Regional Military Command III/ Siliwangi in 2016. He graduated top of his class from the Indonesian Military Academy in 1987.

What are the main goals of Indonesia's defense modernization plans?

President Joko Widodo has directed Defense Minister Prabowo Subianto to draft a long-term master plan of state defense, including a plan for the modernization of primary weapons systems/defense and security equipment. The drafting of the modernization plan considers several priorities. First, the geopolitical and geostrategic situation. Second, prediction of threats. Third, the development of ready-for-combat defense capacity. And, fourth, consideration of budget allocation.

We study the constellation of current global politics and security, and we need to take a position by strengthening internal defense to prevent the impact of security instability that could happen at any time.

A component of the Indonesian military posture development policy is the modernization of the main weapons systems, as well as the defense and security apparatus. The structure of the Indonesian military is based on the evolution of the circumstances and surroundings of our country's defense. Threat dynamics have an impact on development, thus efforts to improve the professionalism, welfare and combat readiness of Indonesian military personnel should be coordinated with modernization of defense and security technology.

In developing Indonesian military postures, the policy is implemented by procuring primary weapons systems/defense and security equipment for ready-for-combat, long-distance precision and the achievement of interoperability. Moreover, the policy seeks to increase the number of reserve components for the Army, Navy and Air Force deployed across Indonesia.

Indonesian Deputy Defense Minister Muhammad Herindra
INDONESIAN MINISTRY OF DEFENSE

The policy for the modernization of the primary weapons systems is also in line with the prioritized program in the development of defense, mainly for the absorption of defense technology, the development of human resources and the growth of defense facilities.

For the absorption of technology, Indonesia's strategic state-owned enterprises in defense sectors have developed several new variants of the weapons systems. One such enterprise is Penataran Angkatan Laut (PT PAL), which is an Indonesian state-owned enterprise that manufactures ships for military and civilian use and conduct repairs and maintenance on ships and engineering. PT PAL Indonesia has succeeded in developing the U-209 submarine as well as guided-missile frigates. Another, PT Dirgantara Indonesia, has succeeded in developing missiles and uncrewed vehicles, such as the UAV Male [unmanned aerial

"IN ADDITION TO PROCURING DEFENSE ASSETS FROM DOMESTIC PROVIDERS, THE DEFENSE MINISTRY IS ALSO CONDUCTING PROCUREMENT FROM FOREIGN MARKETS."

Indonesian forces mark the military's 77th anniversary in Semarang in October 2022.
REUTERS

vehicle, medium-altitude, long endurance]. PT Len Industri, meanwhile, has developed ground-control intercept radar. Then there is PT Dahana, which is producing explosives material and has developed propellant composite and ball grain powder propellant.

Can you provide specifics about the timeline and budget for these modernization efforts?

The development of the main power of the Indonesian military is aligned with the national long-term development plan … implemented over 15 years, from 2010 to 2024. The five-year or midterm development plan outlines the national plan. The plan emphasizes four main elements: rematerialization, revitalization, relocation and procurement. To implement this plan, the government has gradually increased its defense budget. In 2023, it allocated 134.32 trillion Indonesian rupiah [U.S. $8.8 billion].

We are aware that the current geopolitical and geostrategic situation has led to an increase in global military firepower. This is evident from the rising defense spending of the major military spending nations.

Let's compare Indonesia with other countries in ASEAN [Association of Southeast Asian Nations]. Indonesia's defense budget consists of a smaller percentage of its gross domestic product (GDP) at 0.64%, compared to the defense budget of Brunei Darussalam, which is 4.12% of its own GDP, or Singapore at 3.23%. Even East Timor [Timor-Leste], a newly independent nation, allocates 1% of its GDP for defense.

Aware of the issue, our government initiated a policy to transform defense spending into defense investment. The approach is in line with the instruction of President Widodo. The policy is meant to optimize the defense budget allocation and change the mindset or thinking in procuring the imported primary weapons systems. This policy will help the development of Indonesia's defense industry.

In addition to procuring defense assets from domestic providers, the Defense Ministry is also conducting procurement from foreign markets. One recent procurement is the purchase of one squadron of twin-engine, lightweight Rafale fighter jets. The fighters are produced by the French company Dassault Aviation. The procurement of these fighters strengthens Indonesia's Air Force weapons systems.

The purchase of the Rafale aircraft is the biggest purchase conducted by the Indonesian government. We cannot deny that the increasing power of a weapons system can be a barometer for the defense power display of a country. For Indonesia, this issue has a specific policy reach, the modernization of the primary weapons systems.

The first of five C-130J-30 Super Hercules aircraft acquired by the Indonesian Air Force arrives in Indonesia in March 2023
REUTERS

How will the modernization plans affect the character of the military, and how will the changes impact it?

The efforts to increase the human resources quality of the Indonesian military are aimed at making them more professional and reliable in operating modern and advanced primary defense systems. The mechanism to improve human resources will be conducted by sending the personnel of the Indonesian military to study in foreign countries or to the producers of the primary weapons systems. While at home, the mechanism to increase the quality is conducted by education and training programs, particularly related to the transfer of technology and the transfer of knowledge.

Related to the efforts to increase human resources, we emphasize that the Indonesian military has a doctrine of "Sishankamrata" — the total people's defense and security systems. It means that we develop strong synergy with other elements of the nation. This doctrine should be understood as a total defense system that involves all citizens, areas of the country and other national resources.

How is Indonesia's position on the global supply chain for military hardware affected by current conflicts and tensions around the region and world?

The dynamic of global defense and security is evolving rapidly. Nobody can foresee when the current, more than a year-old war between Russia and Ukraine will come to a conclusion. Together with the issue of North Korea's nuclear weapons and missiles, there is also an increase in tension in the South China Sea and with Taiwan. Indonesia now occupies a key spot on the supply map for military equipment used throughout the world as a result of all these conflicts and tensions.

The modernization of Indonesia's defense and security equipment is necessary to protect the state's sovereignty and not to attack other countries. Indonesia had no power projection in procuring military weapons and equipment. We need to be strong; thus, prosperity and security must be in line.

If the local consumers — in this case, the Indonesian military and police — do not become the buyers or users of the weapons goods produced by our national industry, then the modernization of our major weapons systems and the attempts to establish the national defense industry will not be successful. In this manner, we create chances for our domestic products on the international market by acting as buyers of goods from the national defense sector.

Moreover, our defense procurement department also purchases primary weaponry equipment from other nations. If there is no domestic supply of defense equipment, foreign procurement is used. To ensure proper usage and maintenance, it should be followed by the transfer of technology and expertise.

Adm. Yudo Margono, right, commander of the Indonesian National Armed Forces, greets outgoing commander Gen. Andika Perkasa at the Presidential Palace in Jakarta in December 2022. REUTERS

A member of Indonesia's elite Navy unit, known as Kopaska, participates in an anti-terrorism drill at an airport in Surabaya in December 2022. THE ASSOCIATED PRESS

What measures are in place to ensure that the procurement process for armaments is transparent and fair?

We have the primary weapons systems procurement and purchase mechanism, E-Proc, or electronic procurement. This mechanism serves the entire process from requisitioning, ordering, and purchasing goods and other related services that we conduct online.

What steps are being taken to address territorial disputes and illegal activities in Indonesia's sea, air and land spaces?

For all problems related to territorial issues, we always take diplomatic channels and a persuasive approach without compromising the values of our sovereignty. We must pay more attention to sea territory because we constantly face border violation issues in our exclusive economic zone [EEZ]. The violations of the borders are incited by illegal fishing activities and control over our sea territory, which is rich with natural resources like oil and gas in the island of Natuna areas, for example.

Regarding widespread violations of our exclusive economic zone, we have adopted the 1982 United Nations Convention on the Law of the Sea [UNCLOS] and ratified it into law in December 1985. UNCLOS is internationally accepted and is not a one-sided claim by Indonesia.

The threat of terrorism is one of the transnational crimes that warrants our particular attention, along with threats to our EEZ. As a result, we conduct joint patrols of the Malacca Strait with Malaysia and Singapore to maintain security.

For land territory, we have intensified joint patrols with Malaysia, especially on the land border with Kalimantan [the Indonesian portion of the island of Borneo]. We have a collaborative forum like the General Border Committee Malaysia-Indonesia, or GBC Malindo, that addresses various illegal activities, including illegal migration, drugs, terrorist group movements, radical groups, among others.

How will the government ensure that the defense modernization plans benefit the Indonesian people and contribute to the country's overall development?

The government is continuously working to boost the economy of the Indonesian people. Our government's Peningkatan Penggunaan Produksi Dalam Negeri (P3DN) program is one such attempt. P3DN intends to increase production to generate the growth and empowerment of industries in Indonesia. The ministries and government organizations in Indonesia have been instructed by President Widodo to forgo acquiring imported goods if the necessary requirements can be satisfied domestically or if the goods can be produced domestically. The government's goal is to transform defense spending into defense investment, thus this is in line with that goal.

For instance, the plans to satisfy the demands of the state defense system for 2023 were established with the composition that the component and proportion of the national industry is 29.5% and the local content is 33.5%. Hence, we estimated that Indonesia's defense spending will contribute 20.914 trillion Indonesian rupiah [U.S. $1.37 billion] to the country's GDP. The policy has been put into practice.

In the latest policy, our Defense Ministry, for example, has signed several procurement contracts for tactical vehicles produced by PT Pindad, including the Jeep Maung and an electric motorcycle. The tactical vehicle is meant for combat units and territorial units. The Defense Ministry has also signed a contract to purchase thousands of units of ammunition from PT Pindad in East Java. □

Gusty Da Costa is a FORUM contributor reporting from Jakarta, Indonesia.

JAPAN ACQUISITION, TECHNOLOGY AND LOGISTICS AGENCY

Japan launching defense tech research agency,

ADVANCING RAILGUN PROJECT

FORUM STAFF

Japan plans to create a research agency by 2024 to accelerate defense technology development.

The agency will be modeled after the United States' Defense Advanced Research Projects Agency (DARPA) and its Defense Innovation Unit (DIU), according to Shigenori Mishima, vice commissioner and chief technology officer at Japan's Acquisition, Technology and Logistics Agency. DARPA is the U.S. Defense Department's central research and development arm; DIU focuses on rapidly fielding and scaling commercial technology across the U.S. military.

The new Japanese agency "will identify technology that can quickly be integrated into future warfare," Mishima said during the March 2023 Pacific Operational Science & Technology Conference organized by the National Defense Industrial Association (NDIA) in Honolulu, Hawaii.

Japan also plans to partner with like-minded nations to develop cutting-edge technologies, according to National Defense, NDIA's magazine. "The security environment around Japan is growing increasingly severe and at an unprecedented pace, with neighboring countries strengthening their military capabilities," Mishima said.

By 2027, Japan plans to spend the equivalent of 2% of its gross domestic product on defense, which includes boosting annual spending on defense research and development to U.S. $26 billion, a fourfold increase over 2022, Mishima said.

Research priorities include anti-ship missiles for island defense, updated surface-to-ship missiles and hypervelocity gliding projectile and hypersonic missiles, National Defense reported.

Japan, for example, is developing electromagnetic railgun technology, pictured, that uses magnetic fields to launch nonexplosive projectiles capable of targeting ships and more, Mishima confirmed.

"The Japanese Defense Ministry will develop a means to intercept hostile missiles using magnetically powered projectiles," the Japanese newspaper Nikkei Asia reported in January 2022, "as the nation scurries to respond to the hypersonic weapons being developed by China, North Korea and Russia."

Japan has allocated more than U.S. $56 billion to complete the railgun within the next decade, Nikkei Asia reported.

Japan has been developing railgun technology for at least eight years, working in part with the U.S. Navy. In 2016, Japan tested a prototype railgun that launched a projectile at 7,193 kilometers per hour, Popular Science magazine reported.

INDIA DEVELOPING

UNMANNED COMBAT AIR VEHICLES

FORUM STAFF

India is developing an autonomous, jet-powered stealth unmanned combat air vehicle (UCAV) that could be ready to field by 2025.

Researchers at India's Aeronautical Development Establishment, part of the defense ministry's Defence Research and Development Organisation (DRDO), demonstrated a scaled-down prototype, pictured, in July 2022 for the Indian Air Force at a test range in southern India, according to Aviation Week magazine.

Called the Ghatak, the craft is powered by a turbofan engine and eventually will be capable of carrying missiles, bombs and precision-guided munitions, according to news reports.

Numerous Indo-Pacific militaries are developing drones and other unmanned craft to complement multidomain operations and evolving security strategies across air, land, sea and space.

India has demonstrated such drone technology, including a drone swarm in which 75 UCAVs identified and destroyed targets, The EurAsian Times news site reported.

"India has unrestricted access to engines supplied by foreign partners and can choose locally made heavy or multifuel engines too. There's certainly no dearth of engineers and funding to accelerate unmanned aircraft development in India," Philippines-based defense analyst Miguel Miranda told The EurAsian Times in 2021 after details of the Ghatak's progress were revealed.

"It's refreshing to see renewed progress in unmanned aircraft with no less than the DRDO leading the way."

INDIAN DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION

AFP/GETTY IMAGES

South Korea's

'KILL WEB' CONCEPT

to neutralize North Korean threats

FORUM STAFF

Republic of Korea and U.S. Soldiers take part in Freedom Shield 2023.

To counter threats from North Korea's emerging nuclear and missile capabilities, the Republic of Korea (ROK) military introduced the "Kill Web" concept in March 2023 to prevent missile strikes, according to news reports.

Kill Web entails a layered, integrated structure that uses cyber operations, electronic warfare and other cutting-edge capabilities across all defense domains to disrupt and preempt the North Korean regime's activities before it can launch a missile or other attack, South Korea's Yonhap News Agency reported.

The South Korean Defense Ministry announced the initiative under President Yoon Suk Yeol's Defense Innovation 4.0 plan to leverage artificial intelligence and other technologies to create a smarter, stronger and more resilient force, Yonhap reported.

The Kill Web concept will augment South Korea's existing preemptive strike system, known as the Kill Chain, which is part of the nation's three-pronged deterrence strategy. The strategy also includes the Korea Air and Missile Defense system and an operational plan to incapacitate the North Korean leadership in the event of a conflict, The Defense Post website reported.

"The Kill Chain concept is to proceed in a single direction," a South Korean official told reporters, speaking on the condition of anonymity. "But the Kill Web, like a spider's web, entails frequent mission adjustments to ensure the operational effectiveness." It also is a flexible approach that empowers officers in the field to adjust to optimize operations, The Defense Post reported.

LAOS TRUMPETS *return of* ELEPHANT FESTIVAL

RADIO FREE ASIA

Laos' annual Elephant Festival returned in February 2023 after a three-year hiatus, with about 75 of the majestic animals taking part in a grand procession in an event that stressed the cultural ties between the mammals and communities and highlighted the elephants' endangered status.

The three-day festival in Xayaburi province, in northwestern Laos near the Thai border, focused on Asian elephant habitat and preservation and also featured concerts, performances and other activities, including elephant rides.

For Laotians, elephants are a symbol of power, especially in rural areas, where residents use them for transportation, tourism, and as pack animals in logging, clearing land and farming. Lan Xang, the Laotian kingdom that thrived from the 14th century to the 18th century, translates as "land of one million elephants."

There are 500 to 1,000 wild Asian elephants in Laos, one-third of the population 20 years ago, according to the World Wildlife Fund. The mammals, which live 60 years on average, can grow up to 4 meters tall and weigh more than 5,000 kilograms. They roam up to 80 kilometers a day foraging for the 150 kilograms of vegetation they need to survive.

The festival, which was suspended in 2020 because of the COVID-19 pandemic, seeks to preserve and raise awareness about the animals, especially given a drastic decrease in the elephant population in the past three years caused by habitat loss and hunting. Poachers kill the elephants for their ivory tusks and other parts to sell for use primarily in traditional medicine.

Laos' annual Elephant Festival raises awareness to protect the nation's dwindling population of Asian elephants. AFP/GETTY IMAGES

Great Barrier Reef Coral
Frozen in World-First Trial

STORY AND PHOTOS BY REUTERS

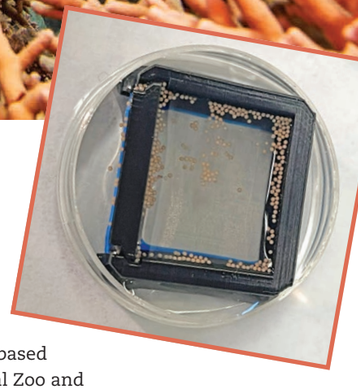
Scientists researching Australia's Great Barrier Reef have successfully tested a new method for freezing and storing coral larvae that could help restore reefs damaged by climate change.

Researchers are scrambling to protect coral reefs as rising ocean temperatures destabilize delicate ecosystems. The Great Barrier Reef, which encompasses 3,000 individual reefs and is the biggest living structure on Earth, has sustained four bleaching events in the past seven years, including the first bleach during a La Nina phenomenon, which typically brings cooler temperatures. When water is too warm, corals expel the algae living in their tissues, turning the coral white.

Bleaching threatens marine species that depend on coral reefs for survival and can affect human livelihoods and food security. Cryogenically frozen coral can be stored and reintroduced to the wild, but the current process requires sophisticated equipment including lasers. Scientists say a new lightweight "cryomesh" can be manufactured cheaply and better preserves coral.

In a December 2022 lab trial, the world's first with Great Barrier Reef coral, scientists used the cryomesh to freeze coral larvae at the Australian Institute of Marine Science (AIMS). The coral was collected from the reef for the trial, which coincided with the brief annual spawning window.

"If we can secure the biodiversity of coral … then we'll have tools for the future to really help restore the reefs, and this technology for coral reefs in the future is a real game-changer," Mary Hagedorn, a senior research scientist at the United States-based Smithsonian National Zoo and Conservation Biology Institute, said while working at the AIMS lab.



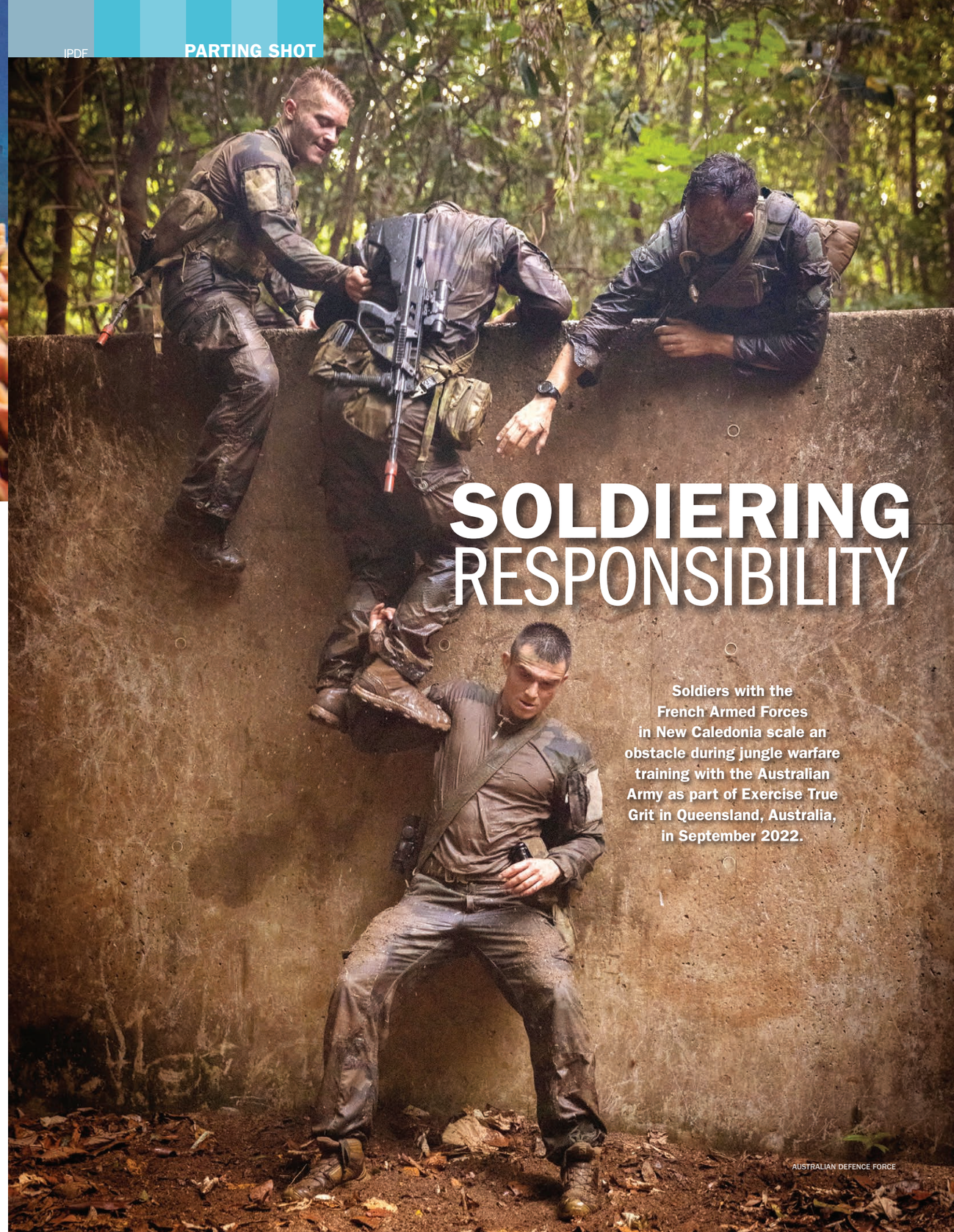
The cryomesh was previously used on smaller and larger varieties of Hawaiian corals, although the trial on the larger variety failed.

Trials with larger varieties of Great Barrier Reef coral involve scientists from AIMS, the Smithsonian, the Great Barrier Reef Foundation and the Taronga Conservation Society Australia as part of the Reef Restoration and Adaptation Program.

The mesh technology, which will help store coral larvae at minus 196 Celsius (minus 320.8 Fahrenheit), was devised by a team from the University of Minnesota's College of Science and Engineering. It will allow for the freezing and storing of larvae "at a scale that can actually help to support some of the aquaculture and restoration interventions," said Jonathan Daly of the Taronga Conservation Society Australia.

Australia's Great Barrier Reef is a World Heritage site and provides habitat for thousands of species, including fish, whales, dolphins and turtles.

INSET: Researchers at the University of Minnesota developed a lightweight cryomesh to help store coral larvae at subzero temperatures.



SOLDIERING RESPONSIBILITY

Soldiers with the French Armed Forces in New Caledonia scale an obstacle during jungle warfare training with the Australian Army as part of Exercise True Grit in Queensland, Australia, in September 2022.

AUSTRALIAN DEFENCE FORCE


JOIN US ON SOCIAL MEDIA