

FORUM

VISION FOR PEACE

Emerging Networks to
Secure Land, Sea, Air,
Cyber and Space



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Mangudai Warrior Challenge

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ABOUT THE COVER:

This photo illustration conveys the importance of creating a clear vision for future security across all domains.

FORUM ILLUSTRATION



Dear Readers,

Welcome to *Indo-Asia-Pacific Defense FORUM's* first-quarter edition for 2017, highlighting nontraditional threats, multilateral engagement and future trends affecting the region. This issue explores outcomes of future forecasts in the security realm and how these forthcoming developments may impact military strategies and government policies.

Analyses of the region's recent past indicate that mounting tensions and growing

security risks could lead to serious incidents or armed confrontations unless measures are taken to dissect flashpoints and work together toward peace.

Avoiding conflict in the near- and long-term requires militaries and security organizations to engage in discussions that promote understanding while mitigating tensions. The need for these conversations is amplified by the potential for traditional and nontraditional threats to evolve in the coming decades in the face of rapid technological advancement, population growth, shifting demographics, economic development, and climate change.

Nations across the Indo-Asia-Pacific more effectively protect their interests and those of their allies and partners against potential threats through cooperative agreements and multilateral approaches. Consider, for example, concerns about population growth coupled with dwindling water and energy supplies. Arable lands become stressed as rapid urbanization and industrialization continue, creating a security challenge as food availability diminishes. Despite these food security risks, regional cooperation and emerging technologies will help reduce resource competition and threats to stability.

The more countries share data on nonsensitive topics, the better safeguarded are borders, national assets and mutually shared resources. For example, the Republic of Singapore Navy operates the Information Fusion Centre, located in the Changi C2 Centre, with the intentions to do just that. This regional maritime security information-sharing hub aims to enhance collective understanding of the maritime domain to ensure the safety of shipping in the region and beyond. More efforts like these — in other areas where cooperation yields mutually beneficial gains — will go a long way toward shaping a more secure Indo-Asia-Pacific in the months, years and decades to come.

I hope that you find this edition insightful and thought-provoking, and I welcome your comments. Please contact the *FORUM* staff at iapdf@iapdforum.com with your perspectives.

All the best,

HARRY B. HARRIS, JR.
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Featured on Page 28



DEBALINA GHOSHAL is a research fellow with the Center for Human Security Studies, a nonprofit think tank based in Hyderabad, India. Her work has been published across the Indo-Asia-Pacific and internationally. She completed a master's degree in international studies from Stella Maris College in Chennai, India, and lives in Delhi. For this issue of *FORUM*, she writes about provocations on the Korean Peninsula. Featured on Page 36



HERMAN FINLEY, an associate professor at the Daniel K. Inouye Asia-Pacific Center for Security Studies (APCSS), focuses on strategy and complexity, influence communication, Chinese military modernization, and the impact of the Information Age on comprehensive security. He retired from the U.S. Army in 1995 after serving almost 25 years. The final decade of his military career was spent as a China foreign area officer.

He joined APCSS in 1996 and is now the lead for the center's Information Integration Learning Laboratory. Featured on Page 46



SENIOR LT. COL. RAYMOND ONG became head of the Information Fusion Centre in Singapore in September 2015. It is part of the Republic of Singapore Navy's Comprehensive Maritime Awareness Group, Maritime Security Task Force. He joined the Navy in 1990. He is a recipient of the Singapore Armed Forces (SAF) Good Service Medal, SAF Long Service and Good Conduct Medals (10, 12, 15 and 20 Years),

Commendation Medal and Command Appointment Award. He was also the top Navy graduate of the Singapore Command and Staff College (now known as the GKS Command and Staff College) in 2005. Featured on Page 50



COMMODORE MIR ERSHAD ALI was commissioned into the Bangladesh Navy in July 1989 and has held a variety of command and staff appointments. He commanded five types of combat ships, including the flagship of the Bangladesh Navy, BNS Bangabandhu. Ershad is a United Nations peacekeeper who served in Côte d'Ivoire as a military observer. He received Bangladesh's Navy Efficiency Medal and served as secretary of the Bangladesh Navy's Indian

Ocean Naval Symposium Secretariat. Featured on Page 54

Join the Discussion

We want to hear from YOU!

Indo-Asia-Pacific Defense FORUM caters to military and security personnel in the Indo-Asia-Pacific region. A product of U.S. Pacific Command, the quarterly magazine provides high-quality, in-depth content on topics that impact security efforts across the region — from counterterrorism to international cooperation and natural disasters.

FORUM provokes thoughtful discussions and encourages a healthy exchange of ideas. Submit articles, pictures, topics for discussion or other comments to us ONLINE or at:

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FORUM

Exploring the issues that impact so many lives

INDIA

FEMALE FIGHTER PILOTS

The Indian Air Force graduated its first group of women who will become fighter pilots, paving the way for more women to be given combat roles.

Flying Officers Mohana Singh (from left), Avani Chaturvedi and Bhawana Kanth received their wings at a June 2016 ceremony in the southern city of Hyderabad.

"It is a golden day as for the first time these women are going to join the fighter pilots," Indian Defense Minister Manohar Parrikar said at the ceremony.

"This will inspire more women to take up the most challenging task in the Armed Forces. Our long-term objective is to work toward gender parity in the Armed Forces."

Select countries, including Britain, China, Israel, Pakistan and the United States, have allowed women into the cockpits of fighter jets.

India had kept women out of that role and away from front-line warships and ground combat, citing concerns over their vulnerability if captured and their ability to handle the stress of such deployments.

Reuters

THE ASSOCIATED PRESS

CAMBODIA



800-YEAR-OLD BOAT UNEARTHED

Tests have confirmed that a wooden boat found buried in a dry riverbed is from the early 13th century, according to an official at the agency overseeing Cambodia's famous Angkor Wat temple complex (pictured).

Apsara Authority spokesman Long Kosal said that tests by a research institute in New Zealand confirmed the age of the 12.8-meter-long boat, which was carved from a single tree trunk. He said it is the oldest boat ever found in Cambodia.

A farmer discovered the boat in April 2016 while digging mud from the riverbed, several kilometers from the temple complex. Officials sank the boat in a pond in front of the temple to keep it preserved pending restoration.

The Associated Press

— Shanghai — DISNEYLAND

Walt Disney Co. opened Shanghai Disneyland, its first theme park in mainland China, in June 2016 with a lavish celebration featuring Communist Party leaders, a children's choir, Sleeping Beauty and other Disney characters.

A vice premier joined Disney CEO Bob Iger in cutting the grand opening's red ribbon, showing the ruling party's support for the U.S. \$5.5 billion investment in promoting tourism at a time of slowing economic growth.

"This is one of the proudest and most exciting moments in the history of the Walt Disney Co.," Iger said after the choir sang. Later, actors dressed as Sleeping Beauty, Donald Duck and other Disney characters danced on stage.

The company hopes Shanghai Disneyland will burnish the brand behind *Frozen* in the world's most populous film market and help revive Disney's struggling international theme park business.

Analysts expect Shanghai Disneyland to become the world's most-visited theme park, attracting at least 15 million and as many as 50 million guests a year.

The Associated Press



COMBATING *Drunken Driving*

Several convicted drunken drivers were brought to a Bangkok morgue in June 2016 to see a corpse and reflect on the gory consequences of their actions as part of a program aimed at combating the carnage on Thailand's roads.

Thailand has the world's second-worst record for traffic fatalities, according to the World Health Organization, just behind Libya. Most of the road accidents are caused by drunken driving.

Thailand's Department of Probation introduced the morgue campaign in April 2016 during the nation's traditional seven-day New Year's holiday, known as Songkran. Thousands of Thais spend time on the road, returning to their home villages for reunions and celebrations. The government has dubbed the holiday "The Seven Days of Danger" because an estimated 2.3 people die and 160 are injured in road accidents every hour.

THAILAND



Since April 2016 officials have brought more than 1,700 drunken drivers to dozens of morgues nationwide, according to Prasarn Mahaleetrakul, deputy director of the Department of Probation. "In the past, we have tried campaigns, but the statistics were not going down. So why not try other activities? What kind of activity would create more shock and worry?" The Associated Press



INDONESIA TRIES TO STEER MILITANTS *to new lives*

STORY AND PHOTOS BY THE ASSOCIATED PRESS

In the heart of Solo city, not far from the Islamic boarding school founded by the radical cleric who inspired the 2002 Bali bombings, the staff of an unremarkable-looking restaurant prepare for another day serving the humble staples of the Indonesian diet.

The manager, a slightly built man with quick lively gestures, darts about the narrow kitchen, dropping ingredients into sizzling hot pans to make the bistik and other fare that customers, including the local police, crave. With a wife and two children to support, he also runs a car-for-hire business and a laundry service.

One of the millions of small-time business owners who keep the world's most populous Muslim nation ticking, 40-year-old Mahmudi Haryono is a poster boy for the transformation of a bomb-maker and jihadist into a productive member of society.

His extensive jihadist history doesn't inspire easy trust. It includes being a combatant with the Moro Islamic Liberation Front in the Philippines for three years, where he honed bomb-making skills, and fighting in sectarian conflicts between Muslims and Christians in Indonesia. He was arrested less than a year after the 2002 Bali bombings that killed 202 people and convicted of hiding materials used to make the bombs.

A private foundation has worked intensively with Haryono since his release from prison in 2009, and holds him up as an example of how hardened militants can be reformed. The need for success stories is great in Indonesia, where several hundred men imprisoned for terrorism offenses have been paroled in the past several years, including 97 in 2015.

Since 2002, Indonesian authorities, with U.S. and

Australian help, have vastly improved their intelligence gathering and counterterrorism operations. The imprisonment of nearly 800 militants and the killing of more than 100 in raids have weakened the groups under the al-Qaida-linked Jemaah Islamiyah network responsible for the Bali tragedy and dozens of other plots and attacks.

However, efforts to deradicalize militants in prison have been less successful, partly because the Islamic State of Iraq and the Levant (ISIL) inspires them to hold to extremism. Two perpetrators of the ISIL-inspired January 14, 2016, suicide bombing in the Indonesian capital had been released from prison shortly before the attack.

"We have to admit the deradicalization programs by the nonstate groups and the government are not enough," said Taufik Andrie, executive director of Yayasan Prasasti Perdamaian, an institute that helps paroled militants and established the restaurant where Haryono works and now owns a stake.

Andrie estimates that 40 percent of the more than 400 militants released by December 2015 returned to their radical networks.

He said some may want a normal life, but few Indonesians want to employ them or even have them

Mahmudi Haryono tries on a prayer cap as he arrives at a mosque for an evening prayer in Solo, Central Java, Indonesia.



Former jihadist Mahmudi Haryono cooks in the kitchen of his Indonesian restaurant. He also runs a car-for-hire business and a laundry.



Haryono carries a tray of food for customers at his restaurant in Solo, Central Java, Indonesia.

living in their neighborhoods. “When they are released, they are on their own. For them, society is a second prison because of the stigmatization,” Andrie said.

In the Solo neighborhood of Ngruki, former militant Joko Purwanto, who uses the alias Handzollah, said he has slowly gained acceptance from the devout Muslim community that shunned him when he was released from prison two years ago.

The village of narrow lanes and tightly packed houses is dotted with shops selling hijabs and is home to the fundamentalist Al Mukmin Islamic boarding school founded by Abu Bakar Bashir, the aging spiritual leader of the Bali bombers, who is now languishing in prison for his role in funding a jihadist training camp in Aceh.

Handzollah, a former student at the school, fought alongside Haryono and was arrested in a 2010 raid on Bashir’s training camp. After his release, he said, neighbors ignored his greetings, and at the mosque a worshipper called him a terrorist who should be ostracized.

“I responded by doing good,” the 41-year-old said. “I didn’t avoid them. Instead I tried to approach mainstream society. Gradually, they realized that I’ve changed.”

Nowadays, Handzollah is popular as a preacher and often travels. Numerous children from two wives are supported by one wife’s business making snack foods for restaurants and shops.

He now says violent jihad is not justifiable within Indonesia because Muslims aren’t under attack. In common with other parolees, he denounces ISIL for killing Muslims who reject its extreme interpretation of Islam.

“What I did in the past was a mistake. Many tenets of Islam were violated to do jihad, by doing bombing attacks in peaceful places like hotels, markets or other public areas that killed innocent people,” he said.

Prized for his skill in repairing weapons, Handzollah said ISIL supporters have attempted to recruit him since

he left prison. He said he has persuaded at least 10 young men not to travel to Syria to join ISIL.

Like Haryono and other former Jemaah Islamiyah militants interviewed, he still believes Indonesia should be governed by Islamic Shariah law, not a secular government, but says that goal should be achieved through peaceful methods.

For those who support deradicalization efforts, Handzollah represents a form of success but also underlines a dilemma for the government: Will doing more to support released militants join mainstream society help prevent attacks or provide cover for militants to rebuild and plot?

Brig. Gen. Hamidin, director of prevention at Indonesia’s counterterrorism agency, said there are limits to what the government can do. It can’t provide former radicals small-business loans, for example, since that could create a perception there’s a financial incentive for terrorism, he said. Instead, it plans to mentor released militants and help them get national identification cards, which are needed to apply for jobs, open bank accounts and conduct other essential tasks.

Hamidin, who uses one name, says the government already has had some success. Government figures show that less than 10 percent of released militants have been re-arrested or killed in anti-terrorism operations. He concedes, however, the number who returned to radicalism is much higher.

The recidivism figure doesn’t include those who joined ISIL in Syria, for instance. It’s not illegal for Indonesians to join conflicts abroad, though the nation’s Parliament is considering a revamped law.

Andrie said the institute has been successful with most of the 30 men it has been involved with in the past five years. The institute finds ways to draw individuals into their communities and focuses on persuading them to repudiate violence, rather than trying to change core beliefs such as support for a caliphate.

A photograph of a zodiac boat with three people in red and orange gear navigating through a field of icebergs in the Antarctic. In the background, snow-capped mountains rise under a pale sky. The title text is overlaid on the upper half of the image.

Changing Climates and **POLAR** **PURSUIT**

Tourists cruise the western Antarctic peninsula in March 2016. AFP/GETTY IMAGES



Indo-Asia-Pacific states take an increased interest in the Arctic and Antarctica as their governments create plans to manage climate change

FORUM STAFF

Today's global population of roughly 7.1 billion is expected to grow to 8.3 billion people by 2030, placing increased demand on dwindling resources for energy, food and water. Such international strains have the potential to send countries scrambling for assets and ultimately deadlock in conflict.

"Climate change can worsen tensions and increase the risk of conflict between states as sea-level rises, coastlines retreat and the eventual submergence of small low-lying islands affect maritime boundaries and exclusive economic zones where natural resources are located," according to "Be Prepared; Climate Change, Security and Australia's Defence Force," a 2015 report produced by the Australia-based Climate Council. "Leading international organizations and defense forces around the world, from the Pentagon to NATO [North Atlantic Treaty Organization] member states and now the G7, have all identified climate change as a significant threat to national security."

Anticipation for such security threats and resource competition already has governments planning for a future wrought with environmental uncertainties. Several have included areas of the Arctic and Antarctica as future resource cache, especially as climate change melts polar ice caps and

creates unprecedented year-round access to previously untapped reserves.

"Whilst some resources are projected to decline, aggravating conflict, the availability of new resources may also have the potential to increase rivalry between nations," according to the Climate Council.

It points out that the Arctic has been warming at twice the normal rate since 1980, which has contributed to melting ice caps. Some projections estimate that the Arctic Ocean could be entirely free of summertime ice by the end of the century, making Arctic waters easier to navigate, opening up new shipping routes, lengthening the shipping season and increasing access to significant oil and gas reserves. According to scientists, Arctic waters haven't been ice-free for at least 100,000 years.

"In the long term, this could increase the risk of potential disputes between nations over access and recovery of these reserves," according to the Climate Council. "The South China Sea and Arctic examples demonstrate how climate change, through rising sea levels and shrinking sea ice, may serve to further complicate sovereignty tensions between nations, although at present, existing political institutions have succeeded in managing these tensions."

China has asserted its interests in the Arctic. Although it has yet to publish an Arctic strategy paper, its interests in the region have slowly grown in recent years.

“Despite the absence of a formal policy, there are three lines of engagement — scientific research, bilateral economic relations and participation in regional governance — which form the basis of Beijing’s Arctic interactions. These help provide insights into China’s underlying aspirations in the region,” according to a March 2016 East Asia Forum report. “China’s Arctic engagements originate from and are still dominated by scientific research projects aimed at building partnerships with many Arctic countries to further climatic and environmental research. Some commentators are quick to dismiss Beijing’s scientific endeavors as camouflaging other political goals. But the massive environmental and climate change challenges China confronts should not be dismissed. These challenges motivate much of their scientific and climate work internationally.”

To clear up any confusion about its position on the Arctic, Chinese officials have acknowledged their interest in the region. China also holds a permanent observer position with the Arctic Council.

“China’s willingness to become an Arctic Council observer supports the view that China does not challenge the sovereignty of the littoral states in the Arctic Ocean and remains committed to respecting the rule of law, including UNCLOS [the U.N. Convention on the Law of the Sea],” according to a December 2015 report by *The Diplomat*, an online news magazine. “China is positioning itself, and gaining a ‘foot in the door,’ in order to access and extract resources and take advantage of strategic, economic, military and scientific opportunities in the Arctic region in the years ahead.”

Russia, meanwhile, hasn’t been as subtle with its desire to claim resources in the Arctic. In August 2015, it submitted a new territorial claim to the U.N. Commission on the Limits of the Continental Shelf, claiming its continental shelf stretched farther into the Arctic Ocean than previously thought. If the claim is validated, Russia would gain control over an expanded area of fishing, oil, gas and other resources, according to an April 2016 report by the *Nikkei Asian Review* magazine.

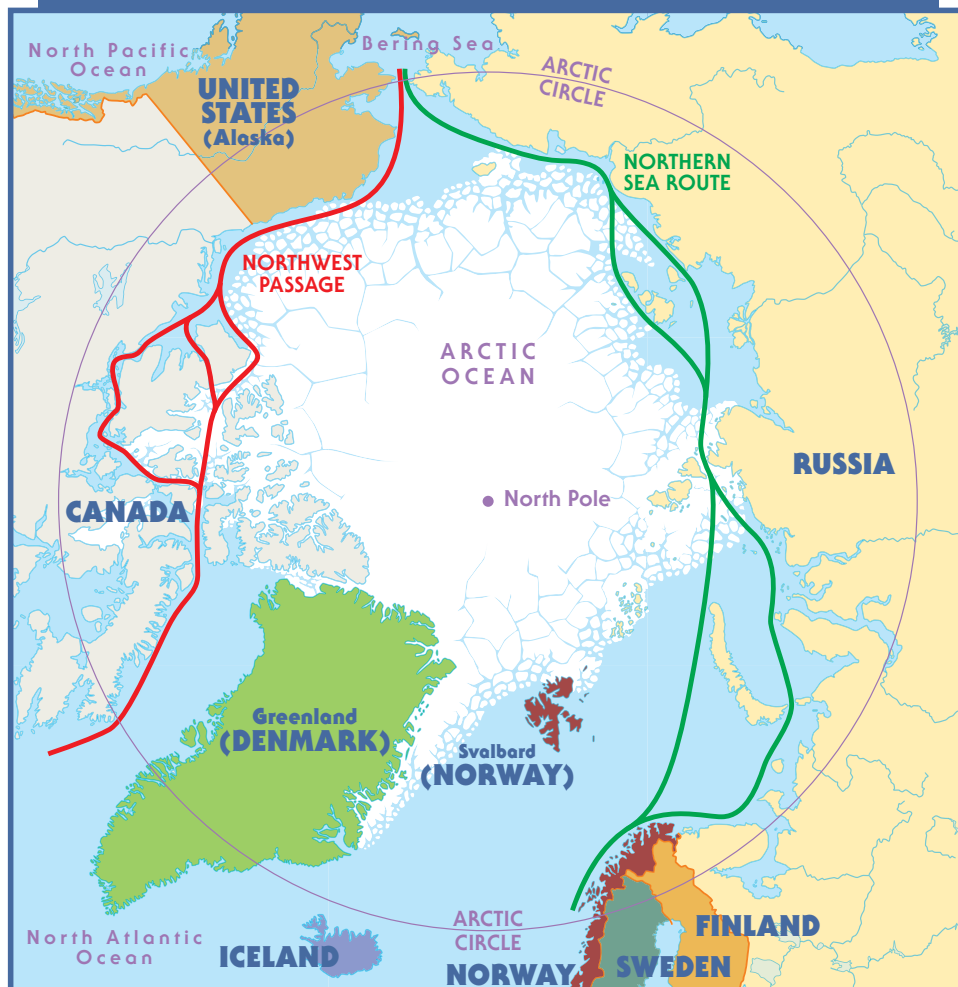
Russia already had 40 icebreakers in the region and began testing a new one in April 2016, *Nikkei* reported. It’s also considering building another military base in the region, according to the magazine.

India, which also has a permanent observer status with the Arctic Council, participated in trilateral talks with China and Russia in 2015 to discuss the potential for cooperating on oil and natural gas production. Those scarce details left some wondering whether that cooperation could extend to a partnership in exploring the Arctic as it thaws.

“While India still maintains that its interests in the Arctic are largely scientific, China has taken a more assertive stance, referring to itself as a ‘near Arctic state,’ ” Politico reported in August 2015.

One New Delhi journalist said that as countries acknowledge the realities of melting ice in the Arctic, many have shifted their focus from environmental to economic. India has focused on Antarctica for years, but its research in the Arctic region has increased more recently, according to DailyO, an online opinion platform for the India

8 ARCTIC COUNCIL MEMBER STATES



FORUM ILLUSTRATION



The icebreaker Ahto stops in the middle of an ice field off the coast of Tornio in northern Finland in February 2016 to test how an oil spill would flow under the Arctic ice. AFP/GETTY IMAGES

Today Group. In 2015, India began pushing for a larger role in the Arctic, touting itself as a leader in scientific research.

Indian researchers also say the polar atmospheric process in the Arctic region is linked to the intensity of India's monsoon season.

"Though such teleconnections are a matter of academic debate, a comprehensive understanding of the Arctic is therefore of special importance for [a] monsoon-dependent agrarian economy like ours," Indian Science and Technology Minister Harsh Vardhan said in May 2015, according to New Delhi Television.

As climate change causes sea levels to rise, it also drives up global temperatures and increases the frequency and intensity of extreme weather events. These impacts will limit the availability of food and water, undermine human health and devastate infrastructure and economies, according to the Climate Council.

"We have been given first-hand information by scientists that if the current trend continues, sea levels may rise by half a meter within the next 50 years, and by a meter within a century," Sam Tan, who represents Singapore on the Arctic Council, told Singaporean newspaper *Today* in June 2016. "If this really happens, many nations around the world, including Singapore, would be at risk from having parts of their country submerged under the water."

These types of events could exacerbate existing tensions, increase societal instability, drive large-scale migration and be a trigger for violent conflict. That's why military forces, and the broader security sector, have labeled climate change a "threat multiplier," according to the Climate Council.

Climate change's effects on the **MILITARY**

Several countries have identified climate change as a threat to national security and begun creating plans to deal with its inevitability. The Australian Climate Council created the following checklist of actions that militaries should consider to combat climate change's potential effects.

MILITARY PLANNING AND OPERATIONS

- Incorporate and mainstream climate change into national strategic military planning.
- Appoint a senior military authority as a climate change planning officer.
- Publish a climate change adaptation strategy.
- Participate in interagency climate change working groups.
- Analyze climate change impacts on military base locations and military base capacity.

MILITARY TRAINING AND TESTING

- Analyze climate change risks to military training.
- Analyze climate change impacts on the readiness of individual Soldiers, Sailors, Airmen and Marines.
- Analyze climate change in military doctrine, specifying how militaries respond with disaster relief.
- Analyze health impacts of climate change on military forces and operational areas.

MILITARY INFRASTRUCTURE

- Mandate renewable energy targets for military bases.
- Conduct risk assessments of sea-level rise and inundation on military bases.
- Conduct risk assessments of climate-affected extreme weather events on military bases.

MILITARY ACQUISITION AND SUPPLY CHAIN

- Mandate fuel and energy efficiency goals in the purchase of major military hardware and platforms, including the use of biofuels and hybrids.
- Analyze climate change risks to critical civilian infrastructure and civilian workforce and resultant impacts on military infrastructure, operations and training.
- Implement sustainable procurement practices to include energy efficient civilian vehicle fleets, energy efficient lighting, heating and waste reduction strategies.

China wants ships to use faster ARCTIC ROUTE

REUTERS

China wants ships flying its flag to take the Northwest Passage via the Arctic Ocean, a route opened up by global warming, to cut travel times between the Atlantic and Pacific oceans, a state-run newspaper announced in April 2016.

China is increasingly active in the polar region, becoming one of the biggest mining investors in Greenland and agreeing to a free trade deal with Iceland. Shorter shipping routes across the Arctic Ocean would save Chinese companies time and money. For example, the journey from Shanghai to Hamburg via the Arctic route is 2,800 nautical miles shorter than going through the Suez Canal.

Also in April 2016, China's Maritime Safety Administration released a guide offering detailed route guidance from the northern coast of North America to the northern Pacific, the *China Daily* newspaper reported.

"Once this route is commonly used, it will directly change global maritime transport and have a profound influence on international trade, the world economy, capital flow and resource exploitation," ministry spokesman Liu Pengfei told the newspaper.

Chinese ships will sail through the Northwest Passage "in the future," Liu added, without giving a time frame. Most of the Northwest Passage lies in waters that Canada claims as its own. Asked if China considered the passage an international waterway or Canadian waters, Chinese Foreign Ministry spokeswoman Hua Chunying said China noted Canada considered that the route crosses its waters, although some countries believed it was open to international navigation.

In Ottawa, a spokesman for Foreign Minister Stephane Dion said no automatic right of transit passage existed in the waterways of the Northwest Passage.

"We welcome navigation that complies with our rules and regulations. Canada has an unfettered right to regulate internal waters," Joseph Pickerill said.

Maritime experts say shipping companies would most likely be deterred by the unpredictable nature of Arctic ice, the total absence of infrastructure in the region, relatively shallow waters, a lack of modern mapping and increased insurance costs. The route would also be strategically important to China, another maritime official, Wu Yuxiao, told the *China Daily*.

Melting sea ice has spurred more commercial traffic, and China wants to become more active in the Arctic, where it says it has important interests.

"Extreme weather events have direct implications for military preparedness and the ability of the military to sustain itself," the Climate Council stated, "whilst greater instability, conflict and climate-induced migration will shape the types of roles and missions that militaries will conduct in the future."

Antarctic Stewardship

Declaring itself a leader in Antarctica for the past 100 years, Australia asserts sovereignty over 42 percent of the Antarctica continent. As new players insert themselves into the landscape in a race for untapped resources, Australia risks a decline in its longtime dominance as an Antarctica powerhouse.

"Australia now has a narrow window of opportunity to underline its Antarctic strategic interests and demonstrate its leadership in Antarctic affairs," according to the Australian government's "20 Year Australian Antarctic Strategic Plan," released in 2014. "Australia must match its Antarctic aspirations with clear demonstration of presence and leadership in the Australian Antarctic Territory," the report said, calling on Australia to become a "partner of choice" in East Antarctic logistics and science.

Australia readily acknowledges that China, India and South Korea have also recently expanded their involvement in Antarctica. (Additionally, Japan and the U.S. each have scientific stations in Antarctica.) China has even gone so far as to build several new stations in the region and added a new icebreaker to aid in marine research.



A crew from the U.S. Coast Guard cutter Healy retrieves supplies in the Arctic Ocean during a research mission. REUTERS

Antarctica is governed internationally through the Antarctic Treaty, signed in 1959 by 12 countries whose scientists were active in and around the region at the time, according to the Australian government's Department of the Environment

As climate change causes sea levels to rise, it also drives up global temperatures and increases the frequency and intensity of extreme weather events. These impacts will limit the availability of food and water, undermine human health and devastate infrastructure and economies. — The Climate Council



A fisherman sails a boat near the Jakobshavn Glacier and the Ilulissat Icefjord in Greenland, north of the Arctic Circle. THE ASSOCIATED PRESS

Australian Antarctic Division.

The total number of Parties to the Treaty is now 53. Among the signatories of the treaty were seven countries — Argentina, Australia, Chile, France, New Zealand, Norway and the United Kingdom — with territorial claims, sometimes overlapping. Other countries do not recognize any claims.

Australia remains keen on protecting Antarctica and doing what it can to broker cooperation in the region to prevent unnecessary competition. In February 2016, Australia hosted China for inaugural talks on Antarctic and Southern Ocean affairs.

“The meeting signals our desire to strengthen cooperation on Antarctic science, operations and enhanced environmental protection,” Australia and China said in a joint statement following the meeting. “We agreed on priorities to guide our future work, both on the ground in Antarctica and through the Antarctic Treaty system.”

The countries agreed to convene a joint committee every two years. In the meantime, the following are initial priorities agreed upon during the inaugural meeting:

- Ensure the joint committee serves as an effective

overarching framework for China-Australia Antarctic cooperation and the platform to complement strong operations and science cooperation.

- Agree to focus on future scientific cooperation.
- Hold a joint East Antarctic workshop on collaborative science in 2017.
- Advance policy discussions on enhanced environmental protection and other key areas.
- Commit to support each other’s national Antarctic programs.
- Establish professional exchanges of scientists, officials and scholars on policy, science and operations.

“China and Australia have a strong tradition of cooperation in Antarctica spanning many decades. Australia helped facilitate China’s first visit to east Antarctica 30 years ago, and we have continued to work closely together, providing support for each other’s Antarctic programs,” their joint statement added. “Australia will continue to work closely with China and other countries to conduct world-class science and protect Antarctica’s unique environment.” □

S · E · E · D · I · N · G

food security



EMERGING TECHNOLOGIES,
FAMILY FARMS AND
REGIONAL COOPERATION
WILL REDUCE RESOURCE
COMPETITION AND
THREATS TO STABILITY



Farmers plant rice saplings on the outskirts of Srinagar in Indian-controlled Kashmir. Agriculture is the main livelihood of about 60 percent of India's 1.2 billion people. THE ASSOCIATED PRESS



ON

TOM ABKE AND JACOB DOYLE

an average day in the Indo-Asia-Pacific region, a staggering amount of food is produced: 1.5 million metric tons of rice, a million tons each of wheat, fruit and corn, a half million tons of potatoes, and hundreds of thousands of tons of fish, beef, poultry and other meats. This bounty is all part of a constant effort to feed the hungry mouths of the region's 4.4 billion people. Growing population, limited land and water, environmental degradation and climate shocks are among the challenges facing the region's food production system, itself increasingly tasked with producing more product with fewer resources — 50 percent more by 2050.

If the region can't meet the burgeoning demand for food, overall security could decline in the coming decades, some experts worry. "Food insecurity is both a consequence and a cause of conflict, making it inexorably linked with political stability at regional, national and international levels," explained Kimberly Flowers, director of the Center for Strategic and International Studies' (CSIS) Global Food Security Project.

"Lack of access to affordable food has proven to trigger revolutions and spark unrest across the world," Flowers wrote in a November 2015 CSIS report titled "Food Insecurity, Conflict, and Stability." Worldwide hunger levels of affected populations will continue to affect regional and international security, she contends.

Many experts remain optimistic, however, that food security can be improved in the Indo-Asia-Pacific region for the decades ahead despite the potential threats to overall stability. Challenges remain, they acknowledge, but a host of solutions ranging from improved government support to advances in "smart" farming to



insect-derived nutrition are being proposed and implemented, typically within the framework of the small family farm.

“Asia is rapidly growing in population and won’t reach its peak for another 50 years,” David Dawe, senior economist at the United Nations’ Food and Agriculture Organization (UNFAO), said from his office in Bangkok in an interview with *FORUM*.

“Much demand for food puts stress on agriculture, as does growing demand for plant-based biofuels. It’s not so much that people are getting richer but that diets are changing. There is a shift from rice to meat and to fish, and more agriculture is required to produce meat than rice.”

Solutions to the region’s food insecurity, Dawe added, must include better access to food. Famine has largely been overcome, but undernutrition remains a threatening problem, one that plagues

families in the agriculture sector. Helping small family farms to become more efficient producers will go a long way to improving the region’s food security, he said, echoing a point raised by others, including Dr. Monika Barthwal-Datta, senior lecturer of social science at Australia’s University of New South Wales.

ROLE OF FAMILY FARMS

“Amongst our most powerful resources when it comes to meeting the challenge of feeding the world sustainably in the face of climate change is the small family farm,” said Barthwal-Datta. She added that 475 million family farms, typically smaller than 2 hectares in size, produce up to 80 percent of all food consumed in the world, according to UNFAO. Moreover, the role of family farms is particularly strong in the Indo-Asia-Pacific.



A farmer dries corn cobs during the harvest season in Indonesia’s Central Java province.

REUTERS

“Research shows us that small family farmers actually produce much higher levels of agricultural output per unit area than larger farms,” she said.

The efficiency advantage of these family farms stems from the central and varied role they play in the families that own them, she explained. While they generate income, they also directly feed each farming family, as well as their livestock, and provide a long-standing cultural identity.

“Government policymakers need to know that agriculture is a multifunctional process for the small family farm — the most important production unit in agriculture and the key to food security,” Barthwal-Datta said.

When family farms are empowered by government policy, food security improves, as indicated by the research of Dr. Wusheng Yu, associate professor at the University of Copenhagen, Denmark, and an expert on

food economics. He presented his findings in December 2015 to the Organization of Economic Cooperation and Development.

Yu examined the policies of farm support in India and China from the early 1990s until 2014 and compared them to the levels of decrease in undernutrition among the countries’ populations. Yu found that in the early 1990s, roughly a quarter of all people in both countries suffered from undernourishment. Twenty years later, however, China saw its level reduced to 10 percent, while India was stuck at 17 percent, according to Yu and his team.

“The two countries are doing similar things in terms of policy, but they are implementing those policy instruments quite differently,” Yu told his audience, explaining that both countries followed a policy of input subsidies, “for things like fertilizers, water, electricity. They both do this, but they do so differently.



A farmer plucks pumpkin flowers from his field in Kolkata, India.

REUTERS

India implemented the subsidies using price-based instruments. The Chinese, especially in more recent years, are providing direct transfers; they have a budget and forecast for the likely development of prices, for example, fertilizer. Then they directly make a transfer to each farmer's bank account."

SUBSIDIES AND COOPERATION

In India, where government subsidies enabled farmers to buy inputs at discount prices, they showed a tendency to overuse the inputs and sometimes overexploit natural resources such as irrigation water, Yu said. This overuse may actually

have pushed up the cost of these resources for the government, thereby causing budget overruns.

India has since begun widespread adoption of the direct benefit transfer system (DBT), which makes payments directly to farmers, a system similar to that of China. DBT has empowered farmers to make their own purchasing decisions, reported Amit Mohan Prasad, principal secretary of agriculture for the Indian province of Uttar Pradesh, broadening their choices and enabling closer relations between farmers and the Department of Agriculture.

According to Barthwal-Datta, however, even the improved government supports fall short. "Fifty to

CHINA ACCELERATES AGRICULTURAL LAND ACQUISITION

JACOB DOYLE

China is a country concerned about food security. With 20 percent of the world's population and less than 10 percent of its arable land, the nation needs solutions. The unfavorable ratio underlies recent moves by Chinese corporations to acquire large swaths of agricultural land outside China's borders. Such moves may be driven by business interest as much as national policy, say experts, and by Chinese consumer preference for foreign food products rather than simple nutrition needs.

Reuters reported.

China's acquisition activity has stirred concerns among foreign governments. "Recent Chinese land acquisitions have not been so much about land, but about food security," said Dr. Andrew Scobell, who writes about China as a senior political scientist at Rand Corp. in Arlington, Virginia. "Ten years ago, the issue was energy acquisitions and acquisitions of resource companies. A Chinese corporation tried, unsuccessfully, to buy Rio Tinto, the British-Australian mining giant. Now, commodities are weak, and the Chinese economy is slowing, so the trend is toward food-related acquisitions."

Chinese consumers tend to trust imported food products more than domestic ones, said Scobell, citing a recent study of Chinese consumer opinion by his colleagues at Rand. This tendency is rooted in tainted food scandals of past years such as one in 2008 involving contaminated milk formula that sickened 294,000 infants and caused six infant deaths.

"Can China clean up its food sector at home and reassure Chinese consumers of its locally grown products? If not, there will continue to be a demand for imported food products," Scobell said. "Just as the organic label has caught on in the West, something similar could happen in China, and this could make buying locally made products more attractive, but this hasn't happened yet. Meanwhile, Chinese firms will continue seeking to buy agricultural lands abroad with the intention of shipping the produce back home."

As of 2014, China ranked as the most active country in the world in land trade, purchasing land from 33 countries but

selling it to only three, according to a study led by Jonathan Seaquist of Lund University in Sweden. The purchase by China's Shuanghui International Holdings of U.S. pork producer Smithfield Foods Inc., which made headlines in 2013, included more than 40,000 hectares of farmland in Missouri, Texas and North Carolina. Chile, Brazil, Russia, Ukraine, Bulgaria and Australia all have seen agricultural properties purchased by Chinese firms. As of May 2016, Shanghai real estate developer Pengxin was bidding to become the world's largest private landowner by seeking to acquire the grazing lands of S. Kidman & Co., Australia's largest cattle empire.

"Such acquisitions are food security driven," said Scobell, "but not driven necessarily decided by the Chinese Politburo." He added that while Chinese companies have been doing the actual buying, "Every corporation in China has some government banking, subsidies, investment. It is very complicated to find ownership, to assess his motives. This all fuels skepticism, on the part of foreign governments in particular."

Indications that a backlash has started can be seen in New Zealand, where authorities have put the brakes on China's acquisition locomotive by vetoing Pengxin's purchase of a 138-square-kilometer sheep farm, Lochinver Station, prompting Pengxin to pull out of 10 other land deals in New Zealand. Australia, meanwhile, has cut the threshold for approval of foreign acquisitions of rural land from U.S. \$186 million to U.S. \$11 million, which could derail planned Chinese land purchases there.



A security guard stands inside a branch of the Agricultural Bank of China in Beijing. REUTERS

Moreover, more than 40 percent of China's arable land is suffering from degradation, its official news agency Xinhua said, further reducing its capacity to produce enough food for its population,

80 percent of farmers' incomes is spent on food alone," she said. "Family farms don't always have enough for the family to eat, and there are many months in the year when they go hungry."

This urgent need is viewed as an opportunity by Unitus Impact, a venture capital fund with offices in Bangalore, Hanoi, Jakarta and San Francisco. "There's a huge opportunity in the low- to middle-income bracket of Asia-Pacific families," said Shuyin Tang, a Unitus Impact principal based in Vietnam. "Every investment that we make seeks to improve incomes of the low- to middle-income bracket. We focus on income improvement rather than yield improvement per se, as ultimately we want to see a clear impact on livelihoods."

Tang described one such investment that highlights the approach of her fund, Vasham of Indonesia. "Vasham raises corn for poultry feed," said Tang. "But what Vasham realized is how inefficient the corn value chain is, so they set forth to improve efficiency in all areas: from access to finance for the smallholder farmers, access to high quality inputs, to access to markets. Vasham offers end-to-end improvements in all these areas, increasing the incomes of farmers by 30 percent on average. Three thousand farmers are involved so far, with 100,000 in sight by 2020. It is a very scalable model."

Tang participated in the recent Asia Regional Agricultural Innovation Summit, held in Bangkok, Thailand, in May 2016. The summit marked the launch of the Feed the Future Asia Innovative Farmers Project, funded by the U.S. Agency for International Development and organized by Winrock International.

Winrock's Rob Turner described Feed the Future as "the U.S. government's global initiative to promote food security — a presidential initiative — with Cambodia, Nepal and Bangladesh as the focal countries in Asia."

"We are calling for solutions — commercial technologies that have been effective in promoting food security," said Turner. "For the first year, our focus will be on solutions that address smallholder access to: improved financial and agricultural services; storage and post-harvest infrastructure; and low-cost technology. Once identified, our aim is to expand them and make them more widely available."

Turner described such new technology as sensors used in "smart farming" that review conditions and feed into an application on a farmer's smartphone. "An example is an application for aquaculture that measures such items as oxygen in water, water temperature and nutrition, thereby enabling aquafarmers to produce fish more efficiently."

As for feeding the farmed fish, insects could replace "trash fish" and poultry entrails as their new, resource-efficient feedstock.

"We've looked at insect-based diets," said UNFAO's

David Dawe. "It's not a panacea, but it has potential to contribute to a longer-term solution for food insecurity in Central and Asia Pacific. There are companies that are producing large quantities of insects for animal feed, which could be a bigger factor than human consumption. This feed could be used in fish farms. Fish farms are growing rapidly in Asia-Pacific as marine fisheries are becoming overfished. Aquaculture is growing by leaps and bounds, so insects could be a big help there."

CLIMATE THREATS

Drought and other climate shocks are a recurring and less predictable threat to food security than lack of access, financing or support, experts say.

"Dealing with climate shocks should not be discounted," Dawe said. "They can set families back for generations. People born in years of drought will have lower paying jobs 35 years later, according to an analysis in Indonesia."

In addition to new communications technologies, international cooperation and crowdsourcing that have greatly enhanced relief efforts, other less-known innovations may help alleviate climate-related suffering.

"Crop insurance is important in ensuring stability and mitigating the losses from climate shocks," said Tang. "Finding the right premium structure, measuring the weather patterns accurately, and adjusting claims all pose challenges, however."

New varieties of rice that withstand extended submersion caused by floods or which flower earlier in the morning as an antidote to higher midday temperatures have also been developed.

"There's been a lot of innovation in developing new varieties of rice," Tang said. "What is needed is to bring these varieties to the market, and we are looking for innovative business models to do this."

By their very nature, small family farms offer the best platform for meeting global food security needs in a sustainable manner, concluded Barthwal-Datta. "When small family farmers have tenure security, they invest and use resources in a sustainable manner. They perceive a long-term future for themselves and their families on the farm."

By working together to employ new technologies, improve management of shared resources of land and water and provide support to the family farm infrastructure, nations in the Indo-Asia-Pacific can bolster food security despite mounting pressures to feed burgeoning populations, experts say.

Moreover, meeting food challenges will require dynamic institutions and actions that can efficiently manage agricultural resources to increase crop and animal productivity and implement favorable trade policies to enhance equitable food distribution, even in the face of environmental uncertainties. □



CHINA'S **CLOINED** **WEAPONS**

Beijing's use of 'techno-cloning' arms its military with other countries' technology

FORUM STAFF

It's well-known that China is stocking its arsenal with an impressive array of new fighter jets, missiles, drones, helicopters, tanks, submarines and warships.

Beijing's arms buildup has been fueled by a surge in defense spending — nearly a two-decade streak of mostly double-digit increases in its armed forces budget.

Today, Chinese military bases, harbors and airfields are bristling with state-of-the-art technology. To Western eyes, however, a lot of these modern airplanes and weapons look quite familiar. In fact, they bear a striking resemblance to designs that originated in the United States or, in some cases, Russia, Europe or Israel.

Military analysts say the evidence is clear that China is copying defense technology from other countries.

Call it “techno-cloning.”

“Some of the technology used in these designs was almost certainly acquired through a vigorous Chinese cyber spying campaign,” the U.S. Naval Institute (USNI) stated in an October 2015 report on its USNI News

website. “U.S. defense officials have stated that Chinese military hackers undertaking ‘technical reconnaissance’ have succeeded in pilfering highly classified technical documents on a number of occasions. The sensitive technical data that is known to have been compromised is now evident in the latest versions of several Chinese weapons.”

The U.S. Defense Science Board, an advisory group for the Pentagon, reported in 2013 that plans for about two-dozen advanced U.S. weapons systems had been breached by Chinese hackers, according to *The Washington Post* newspaper. They included the V-22 Osprey tilt-rotor aircraft, the PAC-3 Patriot missile, and two ballistic missile defense systems: the U.S. Navy's Aegis and the U.S. Army's Terminal High Altitude Area Defense system.

In other cases, such as the U.S. Humvee tactical vehicle or Russia's Sukhoi Su-27 fighter plane, officials reportedly believe that China acquired examples of these vehicles and planes, took them apart and reverse-engineered the designs.

Left: A U.S. Air Force C-17 Globemaster flies over Travis Air Force Base in California.

U.S. AIR FORCE

China's biggest military transport plane, the Y-20, performs at an air show in Zhuhai in south China's Guangdong province.

AFP/GETTY IMAGES



The USNI compiled its own roster of U.S. weapons and vehicles that appear to have been copied and their Chinese counterparts: the F-35 Joint Strike Fighter and China's Shenyang J-31 Gyrfalcon. The Humvee and the Dongfeng EQ2050 Brave Soldier vehicle. The MQ-8 Fire Scout unmanned helicopter and China's SVU-200 Flying Tiger. The X-47B unmanned combat air vehicle (UCAV) and China's Lijian Sharp Sword UCAV. The FGM-148 Javelin anti-tank missile and China's Hongjian-12 Red Arrow.

"These doppelgangers from the Asian mainland tend to come out five to 10 years after their American versions, with Chinese engineers vehemently stating any resemblance was strictly — strictly — coincidental," the U.S.-based magazine *Popular Mechanics* said in an October 2015 report.

Here's a selection of original weapons and their Chinese counterparts:

F-35 Joint Strike Fighter: Produced by Lockheed Martin, the F-35 is the latest generation of stealth aircraft in the U.S. arsenal. It and the F-22 are the U.S. military's most advanced radar-evading stealth fighters. The Chinese version, the Shenyang J-31 Gyrfalcon, was first spotted in 2012 and strongly resembles the F-35, according to a number of media reports. The plane's rapid development aroused suspicions that it was designed with stolen data, according to *Popular Mechanics*.

In March 2016, a Chinese businessman living in Canada pleaded guilty to working with two Chinese hackers to steal data about the F-35 and F-22 stealth fighters and the C-17 military transport plane, according to the Council on Foreign Relations.

C-17 Globemaster III: The U.S. Air Force uses these heavy transport planes to ferry troops and cargo around the world. In 2011, a Chinese-born aerospace engineer in California was sentenced to 24 years in prison for spying for the Chinese and stealing designs for the C-17, according to the U.S. Federal Bureau of Investigation. China's Xian Y-20, which made its maiden flight in 2013, looks remarkably similar.



A Chinese J-31 stealth fighter performs at an air show in Zhuhai, China.

AFP/GETTY IMAGES

“These doppelgangers from the Asian mainland tend to come out five to 10 years after their American versions, with Chinese engineers vehemently stating any resemblance was strictly — strictly — coincidental.”

- *Popular Mechanics*



The U.S. Navy variant of the F-35 Joint Strike Fighter flies over Chesapeake Bay on the U.S. East Coast. AFP/GETTY IMAGES

MQ-1 Predator: China took note of the successful use of U.S. Predator and Reaper drones in Iraq and Afghanistan as aerial reconnaissance platforms capable of firing air-to-surface missiles. That's why China began trying to replicate the drones' designs, military analysts told *The New York Times* newspaper in 2013.

"Some Chinese drones appearing at recent air shows have closely resembled foreign ones," the *Times* reported.

One example is the Wing Loong, with different variants called the Pterodactyl or Pterosaur. It bears a strong resemblance to the Predator. It was first exported in 2011, according to *People's Daily*, the Chinese Communist Party's official newspaper. Several countries in Africa and the Middle East have bought the drones.

Another example is the CH-4, also known as the Cai Hong 4 or Rainbow-4, which the People's Liberation Army Air Force began using in 2014. It strongly resembles the Reaper drone.

Sukhoi Su-27: After the Soviet Union collapsed, a cash-strapped Russia sold two-dozen Su-27 fighter jets, "the pride of the Russian air force," to China, according to *The Wall Street Journal* newspaper. Then Beijing negotiated for a license to build another 200 of the planes in China, using Russian components.

After building about 100 of them, China canceled the contract in 2004. "To the fury of the Russians, the Chinese soon debuted the indigenously built and equipped Shenyang J-11B fighter that looks identical to the Su-27," the USNI reported.

The USNI notes a number of other Russian weapons that have Chinese counterparts: The Sukhoi Su-33 fighter and China's Shenyang J-15 Flying Shark. The Smerch multiple rocket launcher and the Chinese PHL03. The BMP-1 amphibious infantry fighting vehicle and China's WZ-501. The 2S19 Msta-S self-propelled howitzer and China's PLZ-05. The Antonov An-12 Cub transport aircraft

An Su-27 fighter jet of the Russian Knights aerobatic team performs at an air show in Zhuhai, China.

THE ASSOCIATED PRESS



and China's Shaanxi Y-9. The Yakovlev Yak-130 supersonic trainer and China's Hongdu L-15 Falcon.

'UNTESTED IN COMBAT'

Despite China's use of techno-cloning, it remains to be seen just how effective its gleaming new weapons are.

"I think the big issue with all Chinese weapons — including copies of Western equipment — is that they remain untested in combat," naval analyst Eric Wertheim, author of the U.S. Naval Institute's *Combat Fleets of the World*, told the USNI. "We just don't know how they will perform, so while they may be far less expensive than their Western counterparts, many countries are understandably reluctant to take the risk of acquiring products that haven't passed the ultimate test of combat."

Defense analysts say China began copying rivals' military technology because it has been under a Western arms embargo since the 1989 Tiananmen Square crackdown.

Chinese officials deny that they simply clone other nations' designs.

"You cannot say it's just a copy," Zhang Xinguo, deputy president of the Chinese state-owned aviation manufacturer AVIC, told *The Wall Street Journal* of the J-11B fighter jet, which looks nearly identical to Russia's Su-27 fighter. "Mobile phones all look similar. But technology is developing very quickly. Even if it looks the same, everything inside cannot be the same."

Geng Yansheng, spokesman for China's Ministry of National Defense, made similar remarks to *People's Daily* in December 2012.

"The world's military affairs have an objective law of development," he said. "Many weapons have the same design principle, and some command and protection methods are also similar." Therefore, he asserted, it is "nonprofessional" to conclude that China is copying technology simply by comparing the appearances of different weapons.

Western experts, however, disagree. □

A J-11B fighter jet from the People's Liberation Army Air Force performs at an air show at the Dafangshen airport in Changchun in China's Jilin province.

AFP/GETTY IMAGES





India's modified Kiev-class aircraft carrier participated in the International Fleet Review in February 2016 near Visakhapatnam, India.

REBALANCING WITH INDIA

India and U.S. Relations Strengthen
in the Face of Chinese Aggression

ARTICLE BY SAROSH BANA | PHOTOS BY THE ASSOCIATED PRESS



A Chinese surveillance ship tailing the 100,000-ton John C. Stennis U.S. aircraft carrier during the joint Malabar exercise in the Western Pacific with Indian and Japanese war ships, brought to the fore the deep schisms that now characterize the Indo-Asia-Pacific expanse.

The Indo-Asia-Pacific littoral has emerged as a flashpoint with China's forays into the Indian Ocean Region (IOR) and its claims of sovereignty over almost the entire South China and East China seas. Chinese aggression has sparked disputes with its neighbors, including Japan, the Philippines, Vietnam, Taiwan, Malaysia and Brunei. "We're constantly evaluating our relationship with China and China's behavior, including the South China Sea, where I emphasize we have very serious concerns about their aggressive militarization there," U.S. Defense Secretary Ash Carter testified during a U.S. House Armed Services Committee hearing on the 2017 defense budget.

Malabar has been conducted almost yearly since 1992 by the Indian Navy (IN) and the U.S. Navy, alternately off India and in the western Pacific. The Japan Maritime Self-Defense Force (JMSDF) participated in these joint drills in recent years. China objected to Japan's involvement, especially during the sea phase of Malabar 2016 when the IN, JMSDF and the USS John C. Stennis strike group participated in exercises from June 14 to 17 in Pacific waters that Beijing claims as its territory. The militaries conducted the harbor phase of the exercise, designed to enhance cooperation among the participating navies, at the Sasebo naval base in southern Japan from June 10 to June 13.

Perceived to be equipped with high-tech radio signal gathering and processing stations, the surveillance ship of the People's Liberation Army Navy that shadowed the Malabar event was the same Dongdiao-class vessel, Type 815, that had trailed the Rim of the Pacific (RIMPAC) exercise in 2014. RIMPAC is the largest international maritime warfare exercise and is held biennially by the U.S. Pacific Fleet in and around Hawaii and Southern California.

China, on invitation from the U.S., participated for the first time in 2014 in the multinational exercise, which has been conducted since 1971. China sent a missile destroyer, missile frigate, supply ship and hospital ship. Chinese officials had maintained then that their scout vessel was within

its rights to operate in the region.

By conceding and not impeding Beijing's right to conduct electronic surveillance from within Hawaii's exclusive economic zone, the U.S. was seeking reciprocity from China to dissuade it from obstructing vessels in waters off its coast.

China again participated in RIMPAC 2016, the 25th edition of which occurred from June 30 to August 4 and involved 45 ships, five submarines, more than 200 aircraft and 25,000 personnel from more than 25 nations. RIMPAC provides training opportunities to foster collaboration in ensuring security of the maritime commons.

China's military posturing challenges the U.S., which has been a Pacific power for more than two centuries. Beijing views Washington's pursuit of its policy of a "pivot" to Asia as an American attempt to curb Chinese influence across the region and embolden countries to stand their ground against China in maritime disputes. Also termed "rebalance," the strategy enunciates relocating 60 percent of U.S. naval assets, up from 50 percent, to the Indo-Asia-Pacific by 2020.

China is just as intent on raising its profile in the region, as this energy-hungry, export-driven economy that is heavily reliant on raw material and fuel imports seeks to buttress its suzerainty over the regional sea lines of communication that are critical to the survival of the entire Indo-Asia-Pacific community. China has been creating and militarizing reefs from dredged sands to further its access to marine resources in the region. It has also been extending its blue-water presence through the establishment of a major surface fleet and nuclear-submarine base on Hainan Island in the South China Sea and by deploying precision cruise and advanced ballistic missiles that can target all U.S. bases and naval forces in the region.

It is within its "rebalance" initiative that the U.S. looks to Indian support, both diplomatic and military. Both sides have underscored the strategic significance of their defense ties and highlighted the growing strategic convergence between the U.S. "rebalance" and India's "Act East" policy, which seeks to intensify New Delhi's role in an Asia that is at the epicenter of the historic transformation of the world today.

As a demonstration of the operational reach and commitment to the "Act East" policy of this growing Asian economic, military and geopolitical power, a formidable armada of the IN's Eastern Fleet steamed out of its base at

Visakhapatnam on May 18, 2016, for a 2 1/2-month deployment to the South China Sea and its littoral. It was this deployment, comprising two home-built guided missile stealth frigates, a fleet support ship and an indigenous guided missile corvette, that participated in Malabar 2016.

India conducts more military exercises with the U.S. than with any other country and participated in 2016 in two that were held there, including RIMPAC. In April and May, a dozen Indian Air Force aircraft, including two U.S.-bought Boeing C-17 Globemaster III transporters, took part in Red Flag, the U.S. Air Force's premier air-to-air combat training exercise with its allies. India returned after a gap of eight years to this exercise, held at Alaska's Eielson Air Force Base.

The U.S., in turn, participated in February 2015 in the International Fleet Review (IFR) of the Indian Navy on India's east coast, where 50 countries were

represented. Taking part were 24 foreign and 75 Indian warships; 45 Indian maritime aircraft, including the Boeing P-8I; and 22 Navy chiefs, apart from more than 4,000 international naval officers and Sailors.

"United through Oceans" was the motto of the IFR, signifying that while the world was divided by geography, it was unified by the seas. There was repeated emphasis that oceans were the great blue commons that not only linked the global community but also granted it unfettered access. Visiting U.S. Chief of Naval Operations Adm.

John Richardson had reported progress in talks on the joint development of India's next-generation aircraft carrier. This, potentially the biggest military collaboration between the two countries, would involve design and construction of a carrier with combat capabilities superior to its Chinese counterparts.

Speakers at the concurrent International Maritime Conference — whose theme was

U.S. Vice President Joe Biden, left, and U.S. House Speaker Paul Ryan applaud Indian Prime Minister Narendra Modi during his address to the U.S. Congress in Washington, D.C., in June 2016.



“Partnering Together for a Secure Maritime Future” — expressed concerns about security challenges in the East and South China seas.

Chinese Academy of Social Sciences Prof. Ye Hailin predicted this dispute would escalate if competitive issues overrode cooperative solutions. He argued that, given the overlap among the actions and policies of parties, the situation in the South China Sea may deteriorate with the possible risk of serious conflict because of differing interests.

India invited China to participate in the 2016 IFR, where Indian Prime Minister Narendra Modi again emphasized “the importance of freedom of navigation and cooperation over competition in the use of international waters,” according to *The Diplomat*, an online news magazine.

Modi used his address to the joint session of the U.S. Congress on June 8, 2016, to respond to U.S. President Barack Obama’s keenness on leveraging the U.S.’ strategic partnership with India for enlisting it in balancing the rise of China in the Indo-Asia-Pacific. Signaling the start of a new phase in India-U.S. relations, Modi affirmed that strong links between the two democracies could anchor peace, prosperity and stability “from Asia to Africa and from the Indian Ocean to the Pacific. This can also help ensure security of the sea lanes of commerce, and freedom of navigation on seas,” he added, acclaiming the partnership as an extraordinary relationship and the U.S., an indispensable partner.

The prime minister’s allusion was clearly to China, which is also intent on furthering its interests in the IOR under the framework of its Maritime Silk Route that entails development of a string of ports, essentially encircling India, such as Kyaukphyu in Burma, the Hambantota and Colombo Port City projects in Sri Lanka, and Gwadar in Pakistan. China also has a military logistics base in Djibouti, Africa, to apparently service its warships engaged in counterpiracy operations near the Gulf of Aden.

COASTAL PROTECTION AND DETERRING AGGRESSION

India’s vast coastline of 7,615 kilometers abuts the Arabian Sea, Bay of Bengal and the Indian Ocean. One of the nation’s island enclaves, Andaman and Nicobar, is closer to Burma and

Thailand than to the Indian mainland. The Indian Navy is tasked with securing the sea lines for the Indian Ocean region, stretching from the Persian Gulf in the west to the Malacca Strait in the east. Maritime movement in the region includes 66 percent of global oil, 50 percent of global container traffic and 33 percent of global cargo trade.

India finds a dire need to keep pace with developments in its littoral, with the steady buildup in undersea combat capabilities, to the west by Pakistan, and to the east and south by China — neighbors it has been at war with in the past. With one of the largest fleets of attack submarines comprising four ballistic missile submarines (SSBNs), six nuclear-powered attack submarines and 53 diesel-electric submarines, Beijing is close to deploying a powerful sea-based nuclear deterrent through long-range nuclear-armed submarines. Five Type 094 Jin-class SSBNs may eventually be built, each armed with 12 JL-2 missiles that can deliver 1-ton nuclear warheads at a range of 4,320 nautical miles (8,000 kilometers).

Modi’s repeated references in his U.S. address to India’s commitment to freedom and democracy served as a reminder that his country offers Washington a like-minded partner in an increasingly unsettled region, and that it provides Asia with a model for development and progress more compatible with American values. This was his fourth visit to the U.S. in the two years that he has been in power. He has visited the U.S. more than any other country during his tenure. His engagement with Obama at the White House was the seventh between the two leaders, Obama too being the first U.S. president to have visited India twice during his tenure.

Committing to forge deeper cooperation with India that he calls a 21st century center of influence, Obama believes that with India assuming its rightful place in the world, the two countries have a historic opportunity to make their relationship “a defining partnership of the century ahead.” U.S. Secretary of State John Kerry also maintained that the United States may now do more with India on a government-to-government basis than with virtually any other nation. Indeed, Modi was interrupted throughout his address by applause from U.S. lawmakers who increasingly see in India a



democratic counterweight to China in the Indo-Asia-Pacific.

It is largely to its seaborne trade that China owes its spectacular economic transformation, where the 61 percent of its population living in extreme poverty in 1990 shrank to only 4 percent by 2015. One study states that of the 4 billion tons added to global seaborne trade between 2002 and 2014, Chinese imports accounted for 94 percent of the increase in iron ore volumes and 35 percent in coal volumes, while Chinese exports accounted for 60 percent of the expansion in container trade.

Though the U.S. has sought to be neutral, it is conscious of the need for freedom of navigation for all countries. It hence finds it imperative to raise its already formidable profile in the Indo-Asia-Pacific. Its numerous military bases in the region include 17 in Japan and 12 in South Korea.

In furtherance of their “Joint Strategic Vision for the Asia-Pacific and Indian

Ocean Regions,” India and the U.S. recently concluded a Logistics Exchange Memorandum of Agreement that facilitates mutual logistical support between the U.S. and Indian armed forces for authorized port visits, joint training, joint exercises, and humanitarian assistance and disaster relief efforts. They also agreed to conclude a commercial shipping information agreement that would help their navies work together to defend their territories and to promote and protect global commerce. Though India was not involved in the 1990-1991 Gulf War, it permitted U.S. warplanes to use Indian refueling facilities, despite strong reaction from Iraq that deemed the move “unacceptable from a friendly country like India.”

Strident political opposition, however, forced the then minority government to revoke its decision soon after U.S. military aircraft flying from the Philippines to the Gulf began landing in Mumbai, Agra and

Indian Naval commandos demonstrate their capabilities during the International Fleet Review near Visakhapatnam, India, in February 2016.

Chennai as the United Nations deadline neared for Iraq to withdraw from Kuwait. As a co-founder of the nonaligned movement, India had opposed Washington's involvement in regional disputes and had maintained close ties with Baghdad but granted permission to the U.S. on "humanitarian grounds."

New Delhi today does not want to be seen as too partisan, and it certainly does not desire the situation to precipitate into war. Its stance will likely be compelled by realism because it is circumspect about China's vaulting ambitions and also about the crosshairs of conflicting interests in this region of immense geostrategic import.

Moreover, India faces another dimension of threat from China's recent deal with Pakistan that will assist Islamabad in developing a remote sensing satellite for launch by June 2018. The satellite will monitor the progress of the China-Pakistan Economic Corridor that Beijing is investing U.S. \$46 billion in and which will link western China to the Pakistani port city of Gwadar to provide China direct access to the Arabian Sea.

Obama strongly believes that Pakistan, which had al-Qaida leader Osama bin Laden mysteriously living on its territory for five years, should act determinedly against terrorist groups operating from its soil and help spare India the "inexcusable terrorism" that it has endured for too long.

Yet, the U.S. State Department in February 2016 approved the sale to Pakistan of U.S. \$700 million worth of eight dual-capable Lockheed Martin F-16 fighter jets, suitable for conventional and nuclear missions, despite opposition from some congressmen and India. The deal eventually fell through with U.S. reluctance to subsidize the sale, while Islamabad has threatened to procure Chinese or Russian fighter aircraft instead.

However, in April 2016 the U.S. Department of Defense awarded a contract to Bell Helicopter to manufacture and supply to Pakistan nine AH-1Z Viper attack helicopters worth U.S. \$170 million under its foreign military sales funds. Islamabad has requested 15 of these helicopters, 32 T-700 GE 401C engines, and 1,000 AGM-114 R Hellfire II missiles.

Washington has claimed that this equipment will aid Pakistan in its counterterrorism and counterinsurgency operations in South Asia, without upsetting the military balance with India. Following Modi's visit, however, there is a widening view within the U.S. Congress that Pakistan is not committed to the war on terrorism.

While India has of late become the biggest

buyer of U.S. weaponry, Washington had in the past decade shown that it could blockade supplies of crucial spares even in weapons systems not directly sold by it to India, but in which it had some involvement. Almost half the Indian Navy's sole air strike force of British Aerospace Sea Harriers were grounded when the U.S. restrained the United Kingdom from supplying any spares because the U.S. had imposed sanctions on India following its 1998 nuclear tests. The aircraft was designed in the late 1970s as an Anglo-American development of the British Hawker Siddeley Harrier, and it was actually the British variant that India had purchased, yet the U.K. yielded to the American directive.

Washington similarly intervened in the case of the Westland WS-61 Sea King for the Indian Navy. The helicopters were British license-built versions of the American Sikorsky S-61 helicopter of the same name, built by the U.K.'s Westland Helicopters. In 2003, the U.S. offered to directly sell the vital spares for the Harriers and Sea Kings to India. It then dispatched a team of high-level officials and weapons manufacturers for a sales pitch, but top Indian naval officials expressed wariness over newer sanctions.

Around the same time, the U.S., which had previously agreed to India's U.S. \$1.1 billion deal with Israel for three Phalcon airborne early warning and control radar systems, blocked the sale because of rising tensions between India and Pakistan. The U.S. had deemed it wrong to sell such intelligence technology to India, given the tensions along its border with Pakistan. The U.S. later granted sanction, saying tensions had eased. There is also the view that the Boeing F/A-18E/F Super Hornet and Lockheed Martin F-16IN Super Viper lost out on India's U.S. \$12 billion tender in 2011 for 126 medium multirole combat aircraft because of Indian concerns about the U.S.' overly restrictive export policies, and U.S. congressional compulsions vetoing India's deployment of an American front-line fighter in a theater of conflict. The loss of this coveted contract led then-U.S. Ambassador to India Timothy Roemer to step down.

CHINESE POSTURING

Despite all its maneuvering, China at times portrays a more accommodative stance toward India. In July 2015, the Chinese Foreign Ministry announced Beijing's desire for maritime cooperation and dialogue with India and other South Asian



countries to allay their concerns over increased Chinese naval activity in the Indian Ocean, including docking of its submarines in different ports in the region. The ministry expressed Chinese willingness to contribute constructively to peace and stability in the IOR.

While the Indo-Asia-Pacific has historically been driven by commercial interests, the widening unrest in the sea lanes that are the lifeline of this region may eventually compel the validity of a military front like the North Atlantic Treaty Organization (NATO). Much in the manner in which China's growing might is being perceived today, the 28-member grouping was founded in 1949 in response to the threat posed by the then USSR to deter Soviet expansionism. NATO had codified cooperation in military preparedness among the co-signatories by stipulating that "an armed attack against one or more of them ... shall be considered an attack against them all."

Though Indo-Asia-Pacific countries are keen on safeguarding their territorial

interests, they are at the same time anxious not to let the regional conflicts flare into Asia's next war. "There is no multilateral organization like NATO in the region," noted Carter when he was U.S. deputy defense secretary. "And in the absence of an overarching security structure, the U.S. military presence has played a pivotal role over those last 60 years, providing nations with the space and the security necessary to make their own principled choices."

A NATO-like platform may not evolve soon, but it appears inevitable in light of the rising volatility in the region. The similarities between now and at the time of NATO's creation cannot be lost. Yet the U.S. and China have a high-stakes relationship; their two-way trade alone touched U.S. \$598 billion in 2015, unlike the state of Cold War that had riven Washington and Moscow between the end of World War II and the dissolution of the USSR in 1991.

At times, the consideration eludes the various powers that the Indo-Asia-Pacific is big enough for all of us. □

U.S. Defense Secretary Ash Carter, left, and Indian Defence Minister Manohar Parrikar greet during an April 2016 joint news conference in New Delhi on military cooperation on disaster relief and other emergencies.



This undated picture, released by North Korea's official Korean Central News Agency in June 2016, shows a test launch of the surface-to-surface medium long-range strategic ballistic missile Hwasong-10 at an undisclosed location in North Korea. AFP/GETTY IMAGES

PENINSULA PROVOCATIONS

DEBALINA GHOSHAL

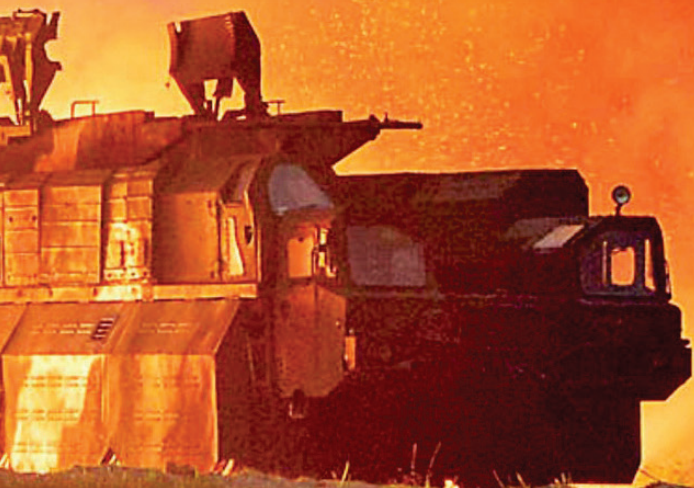
SOUTH KOREA VOWS TO 'STRONGLY RETALIATE' AGAINST THREATS FROM THE NORTH

The North Korean nuclear threat persists as Pyongyang remains relentless in conducting nuclear tests and missile launches. Previous nuclear tests have included the use of highly enriched uranium and plutonium, with a January 2016 nuclear test conducted with a more powerful hydrogen bomb.

A satellite launch followed in February 2016 and a missile test launch commenced from a submarine in April 2016. The unusual pace of North Korean rocket and nuclear testing has analysts taking the threats quite seriously, with some speculating that North Korea has the capability to miniaturize a nuclear weapon and place it on an intercontinental ballistic missile.

"These provocations only serve to increase the international community's resolve to counter the DPRK's [Democratic People's Republic of Korea] prohibited activities, including through implementing existing U.N. Security Council sanctions," U.S. State Department spokesman John Kirby said in June 2016, according to digital news publication International Business Times. "We intend to raise our concerns at the U.N. to bolster the international resolve in holding the DPRK accountable for these provocative actions."

There's no indication of North Korea backing down any time soon.





North Korean leader Kim Jong Un, center, hails the “successful” test of a powerful new medium-range missile during a television news report in June 2016. Kim claimed it poses a direct threat to U.S. military bases in the Pacific.

AFP/GETTY IMAGES

In fact, the North is progressing with its ballistic missile development program concentrated on both solid- and liquid-propelled missiles, which can be ground launched. It’s also working toward strengthening sea-based deterrence by developing submarine-launched ballistic missiles and developing long-range artillery systems

deployed in the Demilitarized Zone to target Seoul.

The incessant threats have only prompted South Korea to bolster its national security program, with President Park Geun-hye directing military leaders in June 2016 to “strongly retaliate” against the North if provoked, according to *The Korea Herald* newspaper.

“We will never condone North Korea’s provocations that threaten the stability and peace of the Korean Peninsula, and in close cooperation with the international community, we will continue to apply strong sanctions and pressure until the North takes a path of change,” Park said.

SOUTH KOREA’S RESPONSE

In the meantime, South Korea has already begun developing an amalgamation of offensive and defensive responses. Seoul is developing ballistic missiles with an 800-kilometer range and 500-kilogram payload. These offensive missiles are a component of Seoul’s “kill chain,” a pre-emptive strike system that would target North

Korean missile systems before they are launched.

Discussions about this plan have captured the attention of local media, with South Korea’s largest news agency, Yonhap, saying the country has reached a turning point in dealing with the North and must reinforce its defense plans.

“The government must reinforce its defense systems to deal with the North’s real threats,” Yonhap News Agency said in a June 2016 editorial. “Our military must elevate the capability of our ‘kill chain’ system aimed at destroying North Korean missiles before they are launched.”

As part of its reinforced plan, South Korea hopes to develop the indigenous Korean Air and Missile Defense (KAMD) system. What has already attracted international and local attention, however, is the planned deployment of the U.S. Terminal High Altitude Area Defense (THAAD) system to Seongju, about 200 kilometers from Seoul. The U.S. wants to deploy THAAD in South Korea to further expand the common missile defense architecture in the Indo-Asia-Pacific region to counter threats from North Korean missiles. Some in Seoul, however, fear that THAAD will not be capable of protecting Seoul against low-flying missiles or against long-range artillery threats. Therefore, it is working diligently on the KAMD to address these issues.

The KAMD system is based on the Israeli C3I Citron Tree system and two Green Pine early warning radars. The KAMD involves early warning radars, ship-to-air and land-based missile defense systems. This would

enable Seoul to track and shoot down the North Korean low-flying, short- and medium-range missiles. South Korea would upgrade its Patriot system while also possessing the SM-2 Block III and the Israeli Green Pine radar system.

The SPY-1D radar system would be part of its Aegis Combat System. There could be a possibility of deploying SM-6 interceptors, advanced versions of the SM-2 Block III on the Aegis destroyers.

TECHNOLOGY UPGRADES AND ADVANCES

In 2015, South Korea awarded U.S. contractor Raytheon U.S. \$770 million to upgrade the country's existing Patriot systems and the PAC-3 variants by 2020. These systems are more advanced than the PAC-2 with capabilities to launch more interceptors and with technical upgrades.

The PAC-3s consist of extended-range interceptors and MPQ-53 phased array radar. Reports reveal the PAC-3 systems would replace the obsolete Nike Hercules SAM systems, which have proven inaccurate on several occasions when test fired.

Seoul is also reported to be developing the long-range surface-to-air missile system (L-SAM), which provides enhanced capacity to develop a multilayered defense system. The L-SAM would enable Seoul to intercept ballistic missiles at higher altitudes.

Seoul also plans to develop the medium-range surface-to-air missile (M-SAM) called Cheolmae-II as an element of KAMD. The missile would replace the obsolete U.S. medium-range MIM-23 Hawk missiles.

A South Korean Defense Acquisition Program Administration official said the indigenously developed M-SAMs would reduce the defense budget. The M-SAM and Patriot Advance Capability (PAC) systems would aim to intercept incoming ballistic missiles from adversaries should the L-SAM fail to intercept them at higher altitudes. Therefore, the KAMD would comprise PAC-2, PAC-3, L-SAM and M-SAM.

Amid these developments, however, and with continued provocations and tests conducted by the North, South Korea began negotiating on the THAAD system and in early July 2016, decided to deploy it.

South Korea also faces a threat from long-range artillery systems, especially from the multilaunch rocket systems (MLRs). Seoul is working on GPS-guided munitions to counter threats from MLRs. South Koreans believe the KAMD and the kill chain would ensure that North Korea realizes that Pyongyang's missile and nuclear capabilities would be rendered useless by Seoul.

The right mix of offense and defense can prove to be the best deterrence against a North Korean threat. Seoul's venture into the kill chain system implies that it wants to destroy the threat before it is unleashed. Destroying offensive systems of the North is the best defense for South Korea. However, the air and missile defense system



South Korean President Park Geun-hye, center front, has called on Republic of Korea military leaders to “strongly retaliate” against North Korea’s provocations. REUTERS

“We will never condone North Korea’s provocations that threaten the stability and peace of the Korean Peninsula, and in close cooperation with the international community, we will continue to apply strong sanctions and pressure until the North takes a path of change.”

— South Korean President Park Geun-hye

would ensure that, should South Korea fail to destroy North Korea's offensive capabilities, the missile defense would counter the residual missiles. This is crucial because North Korean missiles are survivable, and Seoul may find it difficult to wipe out the entire missile arsenal of Pyongyang.


Park has remained steadfast on the matter during her remarks, and she wants North Korea to know the South stands united with international allies to respond to any threat. □

A dramatic space scene featuring the Earth's horizon and a bright sun with lens flares. The sun is positioned in the upper right, casting a brilliant glow and creating a series of colorful lens flares that trail down the right side of the image. The Earth's horizon is visible in the lower half, showing a thin blue line of the atmosphere and a glimpse of the planet's surface with clouds and landmasses. The background is a deep, dark space.

KEEPING
THE PEACE
IN

SPACE

AS THE NUMBER OF NATIONS CAPABLE OF LAUNCHING SATELLITES
GROWS, SO DOES THE NEED FOR COOPERATION AND PARTNERSHIP



The Indian Space Research Organization launched 20 satellites in June 2016, bringing the total of satellites orbiting the Earth to more than 1,400. The successful launch, which carried three Indian satellites and 17 satellites from other countries including Canada, Germany, Indonesia and the U.S., topped India's previous 2008 launch of 10 at a time and advanced international cooperation in space, according to *The Economic Times*, an Indian daily newspaper.

India's launch offers a glimpse into the increasing competition in space and congested traffic in Earth's orbit. As economies advance across the Indo-Asia-Pacific, more nations are seeking better access to space and its opportunities. Space-based systems confer technological and tactical advantages on nations that possess those capabilities in the military and commercial sectors. Satellites enhance navigation, precision targeting, drones, communications, and real-time situational awareness on the battlefield and beyond.

Space will impact virtually every aspect of security, according to Anthony Cordesman, who holds the Arleigh A. Burke Chair in Strategy at the Center for Strategic and International Studies, a Washington, D.C., think tank. "The absolutely critical point is that in a world where geoeconomics are as important as geopolitics and strategy, we need to worry about the spectrum of vulnerability. It is not just military assets that [weaponizing] space is a problem for, but our entire societies," the former Pentagon intelligence chief told the *Financial Times* newspaper in November 2015.

As nations become increasingly dependent on satellites for everything from weather forecasts and instant messaging to driverless cars and air traffic, the need for cooperation will only grow. Many experts say that sharing space resources promotes dialogues and helps deter threats. For these reasons, militaries have an increasing role to play in keeping the peace in outer space. Building consensus on how to operate in and protect this realm will bolster global and regional security, experts say.

MOUNTING THREATS

The biggest threats to space-based capabilities are natural, accidental or deliberate activities that inhibit or deny access to the space environment, experts say. Some of the clear threats to the space-based assets include increased amounts of space debris, space weather induced upsets, the increasingly easy access to space and potential cyber/electronic warfare/kinetic attacks on space and space-support ground assets.

Space debris places satellite-based technology at risk. The U.S. Air Force, for example, tracks more than 23,000 man-made objects in orbit that are roughly the size of a softball or larger and then warns operators worldwide of pending collisions, Lt. Gen. John Raymond, deputy chief of staff, operations, U.S. Air Force, told *Defense News* newspaper in January 2016. On the basis of the information, satellite operators reposition satellites more than twice a week, he said.

There are hundreds of thousands additional pieces of so-called space junk that are too small to track but large enough to damage satellites or even the International Space Station, according to U.S. National Aeronautics and Space Administration (NASA). The fragments can travel at speeds up to 35,900 kilometers per hour.

In 2007, China tested its anti-satellite (ASAT) capabilities by purposely destroying a nonfunctional weather satellite. The test created more than 2,300 pieces of debris that are larger than 10 centimeters and 150,000 debris particles, according to NASA's Orbital Debris Program Office. More than a third of the debris could remain in orbit for 20 more years. Then in 2013, the Chinese launched a rocket that approached the safe haven of strategic geosynchronous satellites.

Potential threats to satellites during a conflict are growing. Countries — including China, Russia, India and the U.S. — are reportedly developing capabilities to deny access to satellites during conflicts. Conflicts could start in space or spill over there from air, sea, land and electromagnetic domains, some officials warn.

“Adversaries are developing kinetic, directed-energy, and cyber tools to deny, degrade and destroy our space capabilities,” Gen. John Hyten, commander of the U.S. Air Force Space Command, told a U.S. House of Representatives Armed Services subcommittee in March 2016. “They understand our reliance on space, and they understand the competitive advantage we derive from space. The need for vigilance has never been greater.”

Another U.S. general who testified before the subcommittee concurred.

“China is developing and has demonstrated a wide range of counter-space technologies to include direct-ascent, kinetic-kill vehicles, co-orbital technologies that can disable or destroy a satellite, terrestrially based communications jammers, and lasers that can blind or disable satellites,” according to Lt. Gen. David

Buck, commander of the Joint Functional Component Command for Space at U.S. Strategic Command. China is modernizing its “space programs to support near-real-time tracking of objects, command and control of deployed forces and long-range precision and strike capabilities,” the three-star general said.

Although the U.S. seeks to deter space warfare, U.S. President Barack Obama's administration budgeted at least U.S. \$5 billion to be spent through 2020 on defensive and offensive military space capabilities.

“The bottom line is the United States does not want conflict in outer space,” Frank Rose, a U.S. Department of State deputy assistant secretary for space and defense policy, told *Scientific American* magazine in a 2015 interview. The U.S. is interested in cooperating with China and Russia to secure space, he said, however, “we will defend our space assets if attacked.”

The combination of increasing space ambitions and increasing space dependence makes nations susceptible to attacks. “Space is going to be a vulnerable domain, so we're going to have to think of ways to mitigate that risk and mitigate those threats,” Elbridge Colby, a senior fellow at the Center for a New American Security, told *The Washington Post* newspaper in January 2016. As ambitions for outer space are surging across the Indo-Asia-Pacific region, “we're going to have to find ways to persuade or coerce our adversaries not to take full advantage of their abilities to hurt us in space,” said Colby, who authored the January 2016 report “From Sanctuary to Battlefield: A Framework for a U.S. Defense and Deterrence Strategy for Space.”

The U.S. created a new center called the Joint Interagency Combined Space Operations Center at Schriever Air Force Base in Colorado Springs, Colorado, to track space threats, including ASAT weapons from spacecraft and missiles to various jamming technologies, Hyten said. The center also has cyber teams that will conduct operations with space systems.

In December 2015, meanwhile, China formally established its Strategic Support Forces as a separate military service. These forces include China's space, electronic and network warfare capabilities. The reorganization signifies the importance the People's Liberation Army places on space and also their recognition of the congruency between space and cyberspace, Buck said in his testimony.

COOPERATION AND PARTNERSHIP

The U.S. space strategy includes partnering with responsible nations, international organizations and commercial firms to pursue cost- and risk-sharing opportunities as well as sharing space-derived information. Although more work remains among Indo-Asia-Pacific nations to cooperate in such areas as science exploration, remote sensing and manned

SPACE FENCE

VERY HIGH FREQUENCY

★ Very high frequency (VHF) radar transmitters and receivers create an energy field in space or “fence.” When satellites pass through, they can be detected.

Note: This graphic depicts the existing Air Force Space Surveillance System, which is being phased out; it will be replaced with S-band radar technology.

Global Information Grid provides information to users.

RECEIVERS

Dispersed VHF radar receivers intercept energy reflected from objects penetrating the fence, increasing timeliness of space situational awareness.

DETECTION FENCE

Resident Space Objects

Micro/Small Satellites

International Space Station

Rocket Body

TRANSMITTERS

The VHF radar transmitters project a fixed, fan-shaped energy beam in space.

In this image made from NASA video, a cargo ship, top, approaches the International Space Station in March 2016. The station is vulnerable to space debris.



Precision Tracking

SPACE FENCE

FORUM ILLUSTRATION

Source: www.globalsecurity.org

missions, experts stress the importance of collaboration in space.

So far, the Outer Space Treaty of 1967, the reigning law governing international space, has successfully maintained the peace in outer space. Current laws, however, do not fully address many new and emerging issues such as space debris and export control. Moreover, no country or authority has the power to regulate space.

Earlier this decade the European Union advanced development of an International Code of Conduct for Outer Space Activities. The code aimed to establish guidelines for the safe and responsible use of space, consistent with international law, in particular to prevent the proliferation of space debris. It also included measures to increase the transparency of the space domain by including notifications of space-related activities such as launches and maneuvers. However, the code was stalled by procedural concerns when advocates tried to push for its adoption by the United Nations in New York in July 2015, and it “appears to be dead,” according to an analysis published in The

Space Review, a weekly online publication. Among its shortcomings, the code failed to clearly define what exactly entails a “space weapon,” observers note.

The challenges of managing an increasingly congested, contested and competitive space environment and its dual-use technologies, in particular, are likely to persist for decades, especially in the absence of a clear space code. Experts hope nations can learn to work together to use outer space for the benefit of all societies and manage space as a global commons.

Michael Krepon, co-founder of the Stimson Center think tank in Washington, D.C., that focuses on transnational security challenges, summed it up this way to *Scientific American*: “We are in the process of messing up space, and most people don’t realize it because we can’t see it the way we can see fish kills, algal blooms or acid rain. To avoid trashing Earth’s orbit, we need a sense of urgency that currently no one has. Maybe we’ll get it when we can’t get our satellite television and our telecommunications, our global weather reports and hurricane prediction.



People watch the Indian Space Research Organization's launch vehicle carry 20 satellites into orbit at the Satish Dhawan Space Centre at Sriharikota, India, in June 2016.

Maybe when we get knocked back to the 1950s, we'll get it. But by then, it will be too late."

There are some bright spots in terms of cooperation in the Indo-Asia-Pacific, however. The U.S. and Australia have joined forces to enhance launch coverage and space object detection and tracking in the Southern Hemisphere. The U.S. upgraded a C-band radar and moved in late 2015 from Antigua Air Station in the Caribbean to Naval Communication Station Harold E. Holt in Exmouth, Western Australia. The radar was slated to become operational in 2016.

The Space Surveillance Telescope (SST), developed by the U.S. Defense Advanced Research Projects Agency to detect faint objects in geosynchronous orbit up to 35,400 kilometers high, will also be relocated to Australia from New Mexico under an agreement signed in November 2012 and housed in a new facility to be built over the next four years, according to Australia's 2016 Defense White Paper. The SST will enhance the space surveillance capabilities of both nations.

"Together with other space surveillance systems such as the nearby C-band radar, the telescope will monitor thousands of objects, including satellites and space debris that can potentially threaten important satellites supporting services such as National Broadband Network," Australian Defence Minister Marise Payne said in April 2016.

The U.S. is constructing the Space Fence System radar, a second-generation space surveillance system designed to track artificial satellites and space debris in low Earth orbit. The initial large S-band radar and facilities will be located at Kwajalein Atoll in the Marshall Islands and will be operational by December 2018, with an option for another radar site in Western Australia. The Space Fence and SST are two of the three parts of a space surveillance network (the Space Based Space Surveillance satellite that orbits at 628 kilometers is the third) that collects information about the orbiting objects and particles in order to provide faster warning on potential space debris collisions.

By 2019, Japan will add a space monitoring division within its Self-Defense Force. "Initially, the force will be tasked with monitoring dangerous debris floating in Earth's orbit and with protecting satellites from collisions with space debris," according to *The Japan Times* newspaper. Japan will share information obtained by the new division with the U.S. military and strive to strengthen bilateral cooperation in space, the newspaper account said.

The U.S. Strategic Command (STRATCOM) introduced its Combined Space Operations initiative in 2011 along with partners Australia, Canada and the United Kingdom. The multinational effort strives to optimize military space operations, improve mission assurance and increase resilience through integration,

collaboration and cooperation. The joint initiative has invited New Zealand to join and is engaging other space-faring nations including France, Germany and Japan to collaborate as well.

To increase safe operation in space, STRATCOM signed a space situational awareness (SSA) agreement with 11 countries and two intergovernmental agencies to share data. They include Australia, Canada, France, Germany, Israel, Italy, Japan, South Korea, Spain, the United Arab Emirates and the United Kingdom, as well as the European Space Agency and the European Organization for the Exploitation of Meteorological Satellites. STRATCOM also shares information with more than 50 commercial satellite companies.

Chiefly, STRATCOM's SSA Sharing Program offers collision warning information. For example, the Joint Space Operations Center can provide prelaunch conjunction assessment to foreign and commercial operators to prevent collision of resident space objects with the launch vehicle and payload on ascent and insertion into early orbit. The program also conducts re-entry assessments for satellites and can help track asteroid threats, as it did when the 45-meter-wide Asteroid 2012 DA14 passed between the Earth and its geostationary satellites in February 2013.

"Our space systems underpin a wide range of services, providing vital nation, military, civil, scientific and economic benefits to the global community," Adm. Cecil Haney, STRATCOM commander, told the defensesystems.com website in February 2016. "Space situational awareness, which requires cooperation in order to be effective, is one of many approaches used to ensure we continue benefiting from this critical domain."

The world's increasing reliance on satellite systems reinforces the need for fostering cooperation and building partnerships in space. "As more countries, companies and organizations field space capabilities and benefit from the use of space systems, it is in our collective interest to act responsibly, promote transparency and enhance the long-term sustainability, stability and security of space," Haney told the defensesystems.com website.

For its part, U.S. Pacific Command is working hard to implement the U.S. National Security Space Strategy in the Indo-Asia-Pacific by advancing international cooperation to increase the resiliency of space capabilities — especially of satellite systems — and deter threats, according to retired Col. Alan F. Rebholz, formerly Pacific Air Forces chief of the Non-Kinetics Operations Division and director of Space Forces.

"Space partnering to build resiliency directly leads into our next objective of deterring threats," he explained to *FORUM*. "In the Indo-Asia-Pacific region, we continue to push for norms of behavior for peaceful space operations." □



SECURING — *THE* — CYBERSPHERE

*Collective action needed
to provide legal protection
for the domain*

“While a peaceful cyberspace provides us with many opportunities, the potential for malicious cyber activities by state and non-state actors to create instability and mistrust in international relations is increasing,” according to a statement released by the chair of the Global Conference on CyberSpace 2015, held in April 2015 at The Hague, Netherlands. Given the almost daily negative activities in cyberspace, few would argue with that quote. The question is: Will nations work together as a community to address this disturbing trend?

The answer is maybe. In the face of limited international agreement on what is unacceptable behavior in cyberspace, some nations have begun to build advanced capabilities to deter or respond to cyber activities. At the same time, to secure the opportunities of a peaceful cyber environment, many nations have begun the long process of codifying restrictions on destructive cyber behaviors.

This article will first look at the current status of international cyber law. Then, it will highlight some of the issues involved in creating international law. Last, it will consider possible future options for the region.

EXISTING LAWS

Globally, few treaties specific to cyber activities exist. Foremost is the 2004 European Union’s Convention on Cybercrime, known as the Budapest Convention. While it focuses on crime, many of the principles embodied in the convention may be applicable to other aspects of cyber activities. Forty-eight nations have ratified the treaty, including Canada, Japan, the United States, Australia and Sri Lanka from the Indo-Asia-Pacific region. It has met with significant opposition from India, China and Russia. Beyond the Budapest Convention, the Shanghai Cooperation Organization (SCO) states have signed an International Information Security Agreement. Additionally, elements of the International Telecommunications Union’s constitution and regulations govern some aspects of cyber activities.

In addition to these few sources of treaty law, there are ongoing efforts focused on building consensus and norms that may eventually develop into customary or treaty law.

The United Nations has established a Group of Government Experts (GGE) to consider international norms related to cyberspace. The current GGE includes Indo-Asia-Pacific experts from China, Japan, Malaysia, Pakistan, Russia and the United States. In its 1995 report, the GGE

reiterated that existing international law fully applies to cyberspace.

The North Atlantic Treaty Organization (NATO) is spearheading its own effort at building consensus. The April 2015 Global Conference on CyberSpace, attended by 80-plus nations, was the third in a series. It created the Global Forum on Cyber Expertise (GFCE) to address a fundamental weakness of many nations — cyber expertise. One of the first fruits of the GFCE was an initiative by the United States, Japan and Australia on preventing and combating cyber crime in Southeast Asia. The initiative consists of four activity areas: capacity building, prevention, framework support and cooperation.

NATO’s Cooperative Cyber Defence Centre of Excellence is pursuing a nonbinding body of understanding about the relationship between law and cyberspace. The center’s *Tallinn Manual on the International Law Applicable to Cyber Warfare* is the most developed scholarly work attempting to codify cyber law principles. The manual focuses primarily on cyber activities in the legal context of armed conflict. The next edition of the manual (known as *Tallinn 2.0*) will look at peacetime activities and is due out in late 2016.

In January 2015, the SCO proposed a voluntary “International Code of Conduct for Information Security” to the U.N. General Assembly. Codes of conduct generally are not considered international law unless the signatories agree to be bound by the code, and/or the code includes sanctions for noncompliance.

EMERGING ISSUES

The Indo-Asia-Pacific region is beginning to shift its regional debate from cyber crime issues to broader issues of state activities in cyberspace.

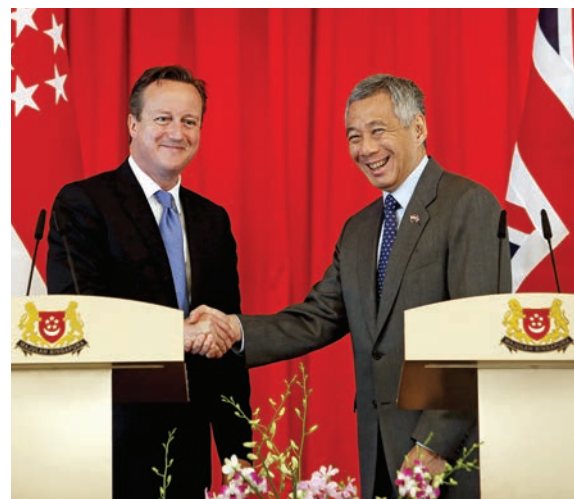
The Association of Southeast Asian Nations (ASEAN) Regional Forum (ARF) has a number of ongoing activities related to cyber legal issues. Malaysia and the European Union hosted the March 2016 ARF Workshop on Operationalizing Confidence Building Measures for Cooperation during Cyber-Incident Response. The workshop focused on transparency, cooperation and behavior to reduce the risk of conflict in the event of disruptive national or international cyber security incidents. More than 120 international experts attended, including representatives from Australia, Burma, Cambodia, China, Indonesia, Japan, New Zealand, Philippines, Singapore, South Korea, Thailand and Timor-Leste.

LEFT: Flanked by lawyers, Kam Sin Wong, left, a Chinese junket operator in the Philippines, presents a document during a March 2016 Philippine Senate hearing on how U.S. \$81 million of Bangladesh's stolen funds were transmitted online to four private bank accounts.

Singaporean Prime Minister Lee Hsien Loong, right, shakes hands with his British counterpart, David Cameron, after signing a memorandum of understanding on cyber security cooperation in Singapore in July 2015.



THE ASSOCIATED PRESS



REUTERS

South Asian nations have not yet achieved the same degree of cooperative approach. According to the former finance minister of Nepal, Dr. Madhukar SJB Rana, the South Asian Association for Regional Cooperation “is totally unprepared to cope with the security threats emanating from the emerging world order. The newest security threat is cyber security.”

The Interpol Global Complex for Innovation opened in Singapore in September 2014 and aims to become a dedicated center of expertise on cyber crime as part of Interpol’s global program.

Bilateral efforts are complementing multinational approaches. Indonesia and China are working on an agreement to cooperate on cyber security with a focus on four areas of human resource development: awareness, capacity building, joint research and joint operations. A U.S.-China forum on cyber crime was held in December 2015, with a second round in June 2016. After the meeting, Guo Shengkun, China’s public security minister said, “China and the U.S. have important shared interests in ensuring cyber security and are fully capable of turning their differences and frictions into bright spots for cooperation,” according to Chinadaily.com. In October 2015, ASEAN and Japan held the eighth in a series of information security policy meetings.

Individual nations are also pursuing cyber laws. There is not space here to recount those activities; rather, the reader is referred to the review of selected Indo-Asia-Pacific national efforts in the BSA report: *Asia-Pacific Cybersecurity Dashboard: A Path to a Secure Global Cyberspace*.

Two issues dominate national efforts to create politically and culturally acceptable cyber laws. One issue is who has responsibility for specific categories of cyber activities within the government: civil agencies, the military or the police? The other involves protecting human rights issues of privacy, association and freedom of expression while appropriately dealing with online crime.

Before turning to future options, consider

how international law is made and some technical characteristics of cyberspace that will shape that process.

UNIQUE CHALLENGES

In general, international law is created through (1) formal treaties (such as the U.N. Charter or the Budapest Convention) that are binding on the states that become parties to them, (2) customary practices and (3) the general principles of law among civilized nations. The formulation of international law is also reflected in secondary sources, such as international judicial decisions and notable scholarly works.

In addition to the treaties mentioned earlier, the primary bodies of law applicable to cyber activities include the U.N. Charter, the law of armed conflict (sometimes referred to as international humanitarian law) and the law of state responsibility. From these, nations derive general legal concepts that would apply equally to emerging technologies such as those in cyberspace. These include: *jus ad bellum* (the law that applies to resorting to the use of force), *jus in bello* (the law that applies to the conduct of armed conflict), sovereignty and territorial integrity, nonintervention, and a state’s responsibility for due diligence in preventing third parties from using their territory or assets to attack their states.

While an international consensus exists that these long-standing sources of international law apply to cyber activities, some characteristics of cyber technologies raise questions about the unique conditions under which such laws apply. One such unique issue is attribution. How can nations know who did what? There are significant technical difficulties in achieving legally actionable clarity on this; states are often left with strong circumstantial evidence that only allows a tentative assertion of guilt. Without clear attribution, it may be difficult for a victim state to determine what response options are legally available in the face of malicious cyber activities or even cyber attacks.

International humanitarian law restrictions on the use of force may apply to cyber actions during armed conflict. For example, law of armed conflict principles such as proportionality and discrimination may limit cyber attacks on critical civilian infrastructure such as power or financial systems, as well as electro-magnetic pulse actions, if employed indiscriminately. An additional question is when a cyber activity can cause such harm that a state may lawfully respond with a use of force. Until such issues are clarified, even if attribution is clear, it will be difficult for states to determine if international humanitarian law applies. It remains to be seen whether the *Tallinn 2.0* manual will consider such questions in its treatment of international law and peaceful cyber issues.

The principles of sovereignty and territorial integrity underlie much of international law, but how these principles apply in cyberspace remains unclear. For example, does a cyber activity through multiple computers in multiple nations impose on each of those nations responsibilities under the due diligence principle? If an individual or nonstate organization uses cyberspace to cause significant harm to a state's interests, does that state have legal rights to counterattack the perpetrator without the consent of the state in which the perpetrator resides?

Finally, the speed at which technology is developing stresses our ability to respond with timely legal solutions that are specific enough for enforcement and sufficiently "socialized" to be acceptable to the broad international community.

FUTURE DIRECTIONS

Actions that would enhance the creation and enforcement of cyber-related law in the future fall into three broad areas: developing a foundation for customary law through national laws, state practices and cooperative international programs; building capacity for nations to enforce their own laws and to cooperate internationally; and continuing to work toward the goal of clarifying legal understandings related to cyber activities.

Given the sovereignty-based international legal system, the passage of national cyber laws could be an indicator of emerging consensus and the eventual development of customary international law. The process of passing national laws necessitates clarification of terms, jurisdictions and enforcement mechanisms. Such laws will provide the justification for enforcement activities aimed at securing national cyber boundaries and for funding capacity building. Additionally, forming laws and enforcing them (in other words, state practice) will support the development of customary international law. It would also be useful for more regional nations to publish national cyber security strategies to further establish norms of state practice.

The need to build capacity for enforcement and international cooperation suggests a number of options



A woman and child walk past a Barbie doll display at a Beijing store in February 2016. Cyber thieves tricked Mattel Inc. into sending U.S. \$3 million to a Chinese bank account, part of the dirty money flow through China. THE ASSOCIATED PRESS

for regional consideration. Many nations lack access to expertise on cyber security and therefore lack capacity to effectively write or enforce national law. It might be feasible and useful to create a regional process to build and share expertise with the GFCE. Regional organizations such as ASEAN and the South Asian Association for Regional Cooperation could support creation of a lexicon of regional commonly agreed definitions of terms associated with cyber activities. Such an agreed set of terms would assist cooperative efforts to respond to cyber incidents.

Increasing the frequency and depth of regional representation in groups such as GGE, GFCE and the Global Conference on CyberSpace will help reduce concerns about international law being created without sufficient input from the region. Increasing public and official awareness of cyber issues will help generate "ripeness" for the body of law to grow. Unless there is a widespread sense of urgency, courts and diplomats will defer meaningful action.

An additional step forward is to highlight that cyberspace should not be viewed primarily as a warfare domain, but rather as a global shared space that requires positive actions by individual states as well as mutual cooperation. More technically capable nations may have to accept limitations on their potential actions to support a larger interest in a robust, protected cyber environment that supports the free flow of information to the benefit of economies and societies.

As the region moves forward on some of these suggestions, it will be good to keep in mind that the road will be long and difficult. Progress will not be fast but, in the greater context, is occurring faster than we might expect. The time is ripe for collective action to legally protect cyberspace for the benefit of the region and the globe. □

Data Sharing

Singapore's Information Fusion
Centre is becoming a regional hub



A helicopter lifts off from the
Singapore Navy's RSS Persistence in
waters near Singapore in June 2016.

REUTERS

Senior Lt. Col. Raymond Ong

HEAD OF THE INFORMATION FUSION CENTRE, REPUBLIC OF SINGAPORE NAVY

The Republic of Singapore Navy's (RSN) Information Fusion Centre (IFC) is a regional maritime security (MARSEC) information-sharing hub. It aims to enhance collective understanding of the maritime domain to ensure the safety of shipping in the region and beyond. Since the IFC's inception in April 2009, it has been at the forefront of cueing responses from regional and extra-regional navies, coast guards and other maritime agencies to deal with MARSEC threats and incidents.

To date, the IFC has seen 107 international liaison officers from

23 countries deployed to Singapore, and currently has 16 such officers serving alongside 12 RSN personnel. It also has links to 71 operations centers from 37 countries and is one of the four technical leading navies (in addition to Brazil, India and Italy) of the Trans-Regional Maritime Network. The network brings together the IFC's OASIS system, Italy's Virtual Regional Maritime Traffic Centre, Brazil's Maritime Traffic Information System and India's Maritime Surveillance Information System to enhance global maritime information-sharing and cooperation.

The IFC recently facilitated strong collaboration among regional stakeholders to arrest the spate of piracy incidents in the straits of Malacca and Singapore, and the approaches to the Singapore Strait. Incidents of piracy and sea robbery spiked in 2014 and the first half of 2015. Through the hard work and strong collaboration of regional stakeholders facilitated by the IFC, incidents of this nature have steadily decreased, with no successful incidents of piracy or sea robbery since October 22, 2015.

Indeed, the effort to improve the state of MARSEC in the region



hinges on a few key thrusts:

- Collaboration between regional and extra-regional navies, law enforcement and other relevant maritime agencies.
- Capacity and confidence building toward MARSEC information sharing.
- Action by the shipping community to adopt best practices and defensive measures.

Collaboration Between Maritime Agencies

Maritime security challenges such as piracy and sea robbery are complex. They span the traditional jurisdictional and enforcement boundaries and functions of different states as well as government agencies. However, this has not stopped navies and maritime law enforcement agencies from working together to reduce incidents of piracy and sea robbery.

As a key MARSEC information-sharing hub, the IFC serves multiple roles through its process of information fusion, sense-making, and precise, accurate and timely information dissemination. It also hosts various multilateral information-sharing portals and platforms, such as the Association of Southeast Asian Nations' Information Sharing Portal, the Western Pacific Naval Symposium's Regional Maritime Information Exchange, and the Malacca Straits Patrol Information System, and is linked up to key networks such as the Trans-Regional Maritime Network and other partners to provide a comprehensive maritime picture.

More recently, the IFC has also developed and will host a submarine safety information portal, which will give partners a platform to proliferate and obtain information pertaining to submarine safety in the South China Sea. Leveraging such frameworks to facilitate regional cooperation, the IFC has been a key provider of actionable information to regional navies and enforcement agencies. An example of this effectiveness can be observed from the response to

the incident involving the Tug Boat Permata 1.

On September 1, 2015, the RSN spotted Tug Boat Permata 1 being boarded by three perpetrators in a sampan, who started stealing scrap metal. This incident occurred off the Horsburgh Lighthouse at the eastern approach to the Singapore Strait. The RSN immediately deployed a patrol vessel to the location, causing the perpetrators to flee southward. This information was shared with the IFC's liaison officers, who sent it to the Indonesian Navy's Western Fleet Sea Security Group, the Malaysian Maritime Enforcement Agency and the Royal Malaysian Navy. With the information provided by the IFC, the Indonesian Navy was able to locate the sampan, recover the scrap metal and arrest the perpetrators within the same day.

This incident sent a strong deterrent signal to criminal syndicates and opportunistic individuals alike. It highlighted the effective collaboration and will of navies and law enforcement agencies to work together through the IFC to respond effectively to such incidents. Such a collaborative approach is critical in enabling maritime agencies to not just combat piracy effectively, but also deal with future threats.

The IFC has an important partner in the Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia Information Sharing Centre, an intergovernmental agency that tracks piracy and sea robbery statistics and promotes capacity-building efforts and cooperative arrangements.

The IFC's mandate, however, is not confined to piracy and sea robbery, but the entire gamut of threats in the maritime domain. These include weapons proliferation, maritime terrorism, contraband and drug smuggling, illegal human migration, and illegal, unreported, unregulated (IUU) fishing, as well as maritime incidents arising from human, equipment and natural factors.

An example of this is the incident involving FV Viking, which was on

Interpol's Purple Notice for IUU fishing offenses globally. The IFC verified information that FV Viking would be transiting the lower reaches of the South China Sea and informed the Indonesian Navy that FV Viking was anchored in Indonesian waters off the island of Bintan. This led to the successful apprehension of the vessel and its 11-member crew.

The IFC also supported the search-and-locate operations for the missing Flight MH370, helping to consolidate a maritime situation picture and reaching out to its network of shipping companies via its voluntary community reporting system to report any debris sightings that could help narrow down the search area. A number of merchant ships acknowledged the message sent by the IFC.

Capacity and Confidence Building Toward MARSEC Information Sharing

As a MARSEC information-sharing hub, the IFC promotes capacity and confidence-building measures to shape the positive habits of MARSEC information sharing in the region. It conducts the annual Regional Maritime Security Practitioner program, which it co-organizes with the Nanyang Technological University's S. Rajaratnam School of International Studies, and recently completed its sixth program in June 2016.

The program was attended by 75 middle-management officers from the militaries and government enforcement agencies of 26 countries, and continues to serve as a valuable MARSEC knowledge enabler and networking opportunity for MARSEC practitioners regionally and extra-regionally.

To promote and strengthen cooperation in MARSEC information-sharing, the IFC also organizes information sharing exercises such as the Maritime Security Information Sharing Exercise (MARISX) on a biannual basis. Of note, in conjunction with the 10th Malacca Straits Patrol (MSP)

Countries with international liaison officers deployed at the IFC include Australia, Brunei, Burma, Cambodia, China, France, India, Indonesia, Malaysia, New Zealand, Peru, the Philippines, Thailand, United Kingdom, United States and Vietnam.



International liaison officers enhance data sharing efforts at the Information Fusion Centre in Singapore. SINGAPORE MINISTRY OF DEFENCE

anniversary events, the fourth MSP exercise was organized and conducted by the IFC at its refurbished watch-floor in April 2016, putting participants from the four MSP member states through the paces of MARSEC information sharing and exchange, against a scenario of maritime crime and terrorism.

Similarly for MARISX, participants from the Western Pacific Naval Symposium and other extra-regional countries are put through the rigor of a fast-paced MARSEC information-sharing exercise at the Changi Command and Control Centre in Singapore. Beyond capacity and confidence building through these exercises, the IFC also helps to shape the necessary collaborative habits needed in dealing with the complexities of today's MARSEC threats.

Shipping Community Actions

The third thrust of IFC's MARSEC enhancement efforts involves galvanizing action by the shipping community. Ships at sea are the last line of defense against maritime crime. Defensive measures and prompt reporting of incidents have contributed greatly to the reduction in frequency of piracy and sea robbery incidents in the region.

The IFC continues to encourage the shipping community to adopt defensive measures against potential perpetrators, especially with the advent and availability of technology. Self-protection measures can vary

from physical hardening of ships to hampering boarding efforts. Deterrence measures include high-pressure water jets and lifelike dummy lookouts. The installation of video cameras for evidence collection enables successful prosecution, and positional trackers help deter vessel hijacking.

These measures and best practices are discussed at the quarterly Shared Awareness Meetings (SAMs) where navies, coast guards, other maritime agencies and members of the shipping community are brought together by the IFC to meet, discuss and share contemporary MARSEC issues and challenges. More important, a SAM is a platform that allows for industry best practices to be shared and proliferated, contributing to the strengthening of the shipping community through its anti-piracy capacity-building efforts across the region.

Emerging Threats to the Maritime Domain

While piracy and sea robbery statistics have been declining over the past months, the scourge of this threat cannot be completely suppressed. At the same time, new threats in the maritime domain are also emerging. In this regard, the growing influence of radical Islamic terrorism is a clear and present danger to all maritime stakeholders in the region. In its propaganda magazine Dabiq, the Islamic State of Iraq and the Levant has identified

the confined and busy waterways of the Malacca and Singapore straits as vulnerable for attack. It is not a matter of if, but when, an attack can occur in the region.

Compounding this challenge is that it is difficult to ascertain if an incident is merely a piracy or sea robbery attempt or a possible terrorist attack until the last minute, given that the intent of the perpetrator will not be obvious at the time of the attack. Moving ahead, the IFC will work with its partners to examine how to strengthen collaboration on this front.

Working Together

The maritime domain is complex, amorphous and porous. Coupled with high volumes of shipping traffic, the growing sophistication of perpetrators — criminals and potential terrorists operating in syndicates — and easy access to shipping information via the internet, the task of ensuring MARSEC has become increasingly difficult for navies and maritime law enforcement agencies.

Today, the imperative to collaborate and share reliable, precise and timely information cannot be higher if we desire to stay ahead of the curve to deter and prevent criminal and terror elements from succeeding. Realizing safe and secure seas is a whole-of industry, whole-of-government and whole-of-region enterprise. Together, we can ensure safe seas for our merchants and navies. □



MARITIME SYNERGY

*LITTORAL NATIONS USE THE INDIAN OCEAN NAVAL
SYMPOSIUM TO COOPERATE ON REGIONAL SEAFARING
CHALLENGES AND TO MAINTAIN SECURE WATERWAYS*

— COMMODORE MIR ERSHAD ALI/BANGLADESH NAVY —



No single country in the world possesses the bandwidth and resources to address maritime security challenges alone. The challenges have simply become too wide in spectrum, complex in nature, and they lack boundary limits. In the globalized world, the threats essentially have also been globalized, more so in the maritime domain.

At sea, there is no physical boundary, and the vast expanse of the salt water — which covers two-thirds of the Earth's surface — is basically a single entity. This continuous body of water is the Earth's greatest defining geographic feature, an immense maritime domain that affects life everywhere. In today's economy, the oceans have increased importance, allowing all countries to participate in the global marketplace.

More than 80 percent of the world's trade travels by water and forges a global maritime link. Unfortunately, the same link also serves the maritime perpetrators around the globe.

Theoretically, a globalized initiative to address these global challenges, such as the “1,000-Ship Navy” — a proposal that called for cooperation between navies focused on securing the global commons — would have been ideal. The reality is, until today, such ideas have floundered. However, regionally, the nations have done better by instituting some kind of regional cooperative arrangements to address the common threats and challenges. Many such cooperative forums are in existence, active or dormant. All these forums are aiming to do the right things right — that is, to be united for a common cause.

The Indian Ocean Naval Symposium (IONS) is one such multilateral maritime security initiative undertaken by the Indian Navy in 2008. In the broader perspective, it was initiated by taking all the littoral countries of the Indian Ocean on board to promote friendly relationships and build professional cooperation among the Indian Ocean region littorals. The symposium strives to promote measures and mechanisms of

consecutive engagement that bear upon issues of regional maritime security and cooperation in the maritime domain. Over a short span of time, IONS [which includes 35 members] has emerged as the largest alliance of navies and maritime security agencies in the world.

However, in recent years, this initiative received

Indian Navy personnel leave after attending the decommissioning of India's first indigenously designed and built warship, the INS Godavari, at a naval base in Mumbai, India, in December 2015. REUTERS



Royal Malaysian Navy personnel participate in a search and rescue mission near the Thai-Malaysia border north of Langkawi Island in May 2015. AFP/GETTY IMAGES

some criticism due to its stagnation. The span of the Indian Ocean includes countries with different ideas and interests, values and cultures, practices and presumptions.

Also, the very breadth of the ocean poses different concerns to countries depending on geography. The security concern on the East African coast may have a global notion, but such a concern does not bother East Asian countries as much as their own problems. This reality always stood in the way of the only existing pan-Indian Ocean maritime initiative, which is IONS.

The following is a cursory analysis of the security elements of the Indian Ocean, highlighting links between regional cooperative engagements, vis-à-vis the global security order. The derivative of such discourse may help determine where to fit IONS in the overall security architecture of the Indian Ocean.

Security Elements of the Indian Ocean

The Indian Ocean is the smallest of the world's mighty oceans and yet has the greatest strategic and economic value. Its waters cover 70 million square kilometers, about 20 percent of the world's water surface. The broad Indian Ocean region has one-third of the world's population, one-fourth of the global landmass and three-fourths of global reserves of oil, iron and tin. Just 10 countries of the Indian Ocean littoral have about 65 percent of the world's oil reserves.

The Indian Ocean contains vital lanes that help feed some of Asia's largest economies and the U.S.,

to some extent. More than 7,000 ships cross the Indian Ocean every year, with their routes constituting the world's most significant sea lines of communication (SLOC). These lines are generally closest to the landmass and are marked by major chokepoints, such as the Strait of Hormuz and the Bab al-Mandab in the west and the Malacca Strait in the east. Through these chokepoints pass the world's major oil tankers carrying hydrocarbon resources to major consumption centers across Asia. About 40 percent of this traffic is accounted for in the Malacca Strait.

The growing economies of China, Japan, India and many other Southeast Asian countries depend on the SLOCs of the Indian Ocean.

By 2020, demand for oil in India is expected to rise to 91.6 percent, whereas for China, the figure is 76.8 percent and for Southeast Asia, 96 percent. Another issue is the war-prone states of the littorals complicating the situation further. Statistical data pertinent to major security concerns in the Indian Ocean region are shown below, which at times may affect the traditional maritime security of the entire region.

- 19 percent of the countries in the region are experiencing varying degrees of involvement in armed conflict.
- 31 percent have varying degrees of terrorist threat to their country, including sea areas.
- 33 percent are threatened by piracy in adjacent international waters or armed robbery at sea inside their own territorial waters/exclusive economic zones.
- 53 percent still have persistent maritime disputes with neighboring states.
- 56 percent are threatened by the endemic problem of illicit trafficking of arms, narcotics and people.

An ocean with such strategic paradigms definitely impairs the willingness of the littorals to engage multilaterally in maritime security management initiatives. Moreover, the width of the Indian Ocean makes a given nation's problems farther from others.

Unconventional Threats in the Indian Ocean

Due to the complex strategic security environment, the Indian Ocean is likely to be a canvas of multifold, nontraditional security concerns. Maritime terrorism and piracy holding the crest of the spectrum left the trough for nonviolent concerns such as environment pollution or illegal, unreported and unregulated fishing. Of course, the intensity spectrum is not corresponding to the consequence of the threat. Lesser intensity threats, such as marine pollution and depleting biodiversity, might have sustained impact on security degradation and come to the top of the agenda. Again, intense issues such as piracy or terrorism are complex and intricate in nature. These asymmetric and nonmilitary threats are predominantly cross-boundary criminal activities with sea extensions and are interlinked.

Some of these threats and challenges include:

Gun running and drug trafficking: The notorious drug-producing and illicit arms-trading areas of the Golden Crescent and the Golden Triangle lie within the geographical propinquity of the Indian Ocean region. This geographical association is further reinforced by the link between narcotics and arms, with the sea routes of the Arabian Sea and the Bay of Bengal providing ideal waterways for the supply of both.

Human trafficking and illegal migration: The recent influx of African and Middle Eastern migrants has drawn the attention of the world. Businesses are set up for human trafficking around the Indian Ocean. A number of evil [actors] traffic humans from Somalia, Ethiopia to Yemen and then to other Middle Eastern countries. The Sub-Saharan and Middle Eastern human trafficking constitute a U.S. \$4.1 billion business per year.

Maritime terrorism: In the past couple of decades, maritime terrorism has been prominent in this region. Since the year 2000, a series of events has opened the eyes of the world to the menace of terror in the maritime domain. Future attacks cannot be ruled out, since with more money and technology being poured in the system, it is becoming a coveted choice of the terrorists.

Piracy and shipjacking: Recently, the most predominant maritime security concerns in the Indian Ocean have been dominated by piracy and armed robbery at sea, specifically the hijacking of merchant vessels by well-armed Somalia-based pirates. However, due to global initiatives of powerful navies forming numerous coalitions and successful anti-piracy operations, the menace has been almost eliminated. With such enormous effort, however, sustenance of outcome is highly questionable. As soon as task forces leave the region, pirates may return because the root cause of piracy has not been addressed.

Maritime pollution: Maritime pollution is a global concern, and the Indian Ocean is the worst affected. Due to lack of monitoring systems and enforcement, coupled with weaker laws, many incidents go unnoticed and unpunished. The transport of radioactive wastes from Europe to Asia is a threat to regional SLOC security. Many coastal states along the routes taken by the shipments have expressed concern, with some states banning the shipments through their exclusive economic zones and territorial waters. Malaysia has condemned the shipments and has demanded that vessels carrying radioactive materials do not enter Malaysia's territorial waters.

Marine pollution is another major problem for safety in this region. The major concern is the possibility of a catastrophic oil spill. In the heavily trafficked straits, such as the Malacca Strait, there are worries that a major oil spill could seriously disrupt, or even close, the straits.

Illegal, unregulated and unreported fishing: Overfishing and illegal fishing is causing damage to the sustainable development of the fishery resources in the Indian Ocean. Overfishing of the tuna fishing grounds of Mauritius, Comoros and Madagascar is a large concern



Indonesian Navy Soldiers escort a Singapore-flagged vessel to Surabaya port in East Java province in May 2016 after detaining nine suspects involved in hijacking the vessel. AFP/GETTY IMAGES

for conservationists. Bangladesh, India and Thailand also suffer from overfishing and illegal fishing at large.

Maritime disasters and accidents: Growing incidents of maritime disaster and accidents require effective and quick search and rescue efforts. The maritime rescue coordination centers in isolation can hardly respond to the search and rescue calls in their regions effectively. The marine accident, especially collision and grounding, possess great threat to maritime trade and SLOC. This accident may be fatal to maritime shipping if it takes places in the chokepoints such as the Strait of Hormuz or Malacca Strait.

Marine accidents in the Indian Ocean region are not uncommon. Many nations in the region import millions of tons of crude oil and refined oil from Middle East countries. A collision could cause major pollution in the area and the closure of an important channel or strait. Moreover, because of nonobservances of maritime regulations and poor governance of the coastal states of the region, collisions often occur in the estuaries of channels and straits. Any unmanageable collision or grounding inside a channel may suspend the port activities of the littorals indefinitely.

Conclusion

Regional cooperation to address maritime challenges is of paramount importance for any maritime nation. Indian Ocean littorals share many things in common, including their worries and woes. The safety and economic security

of the Indian Ocean littorals depend upon the secure use of the Indian Ocean. The littorals may neglect and be oblivious to this important fact, but at the peril of the well-being of the nation and its people.

The Indian Ocean Naval Symposium is no doubt a noble orchestration of regional maritime security construct to address the maritime security challenges collectively. Since 2008, IONS has proven itself as an integral part of the maritime security construction of the Indian Ocean. This forum has now become indispensable to shoulder the responsibility of keeping the Indian Ocean safe and secure for all users.

There are a number of challenges to be encountered, but timely interposition of constructive leadership will definitely turn this forum into a vibrant one. IONS may not solve every problem of every littoral in the maritime domain, but it will definitely create the mechanism to respond faster in case of any need, and there is a willingness to render support. To that note, mariners and sea farers should remember that extending such cooperation in the maritime community is not something new; it is a part of those who go to sea and it is a part of Navy culture. □

Commodore Mir Ershad Ali wrote "Relevance of IONS as a Cooperative Security Construct: A Critical Analysis" for a special edition of the *Navy Journal* published by Naval Headquarters of the Bangladesh Navy and distributed during the Indian Ocean Naval Symposium in Dhaka in January 2016. This excerpt has been edited to fit FORUM's format and published with permission from the Bangladesh Navy. This analysis represents the expressed or implied opinions of the author and does not represent the views of the Bangladesh Navy.



MANGUDAI EVENT TESTS ENDURANCE, TEAMWORK OF REPUBLIC OF KOREA, U.S. FORCES

FORUM STAFF



A Republic of Korea Army Soldier stays alert while securing some rugged terrain near Camp Casey, a U.S. military base near Seoul, South Korea.

For most Soldiers, the Mangudai Warrior Challenge is a recipe for exhaustion — steep mountains, deep ravines and heavy gear mixed with a few parts food deprivation.

It's also the measure of an elite warrior.

Patterned after the selection process for Genghis Khan's Mongol warriors, the challenge measures the stamina, teamwork and problem-solving skills of senior enlisted military leaders from the Republic of Korea (ROK) and the U.S.

Their mettle was fully tested from May 11 to May 13, 2016, at Camp Casey in South Korea.

Senior enlisted members of the two militaries teamed up in a series of challenges. One of the toughest was a resupply mission that required Soldiers to transport heavy equipment and weaponry — about 31 kilograms per Soldier — over a mountain with team members who did not share a common language.

“Even as the first scheduled event of this exercise, it nevertheless proved to be the most challenging as the language barrier overwhelmed the participants, and they were not yet equipped with directions and a sense of unity among themselves,” said Sgt. Maj. Shin Hee Kyu of the ROK's Special Warfare Command.

The training, which is designed to strengthen the military partnership between the ROK and the U.S., put participants in uncomfortable settings to hone their problem-solving skills. “Because most individuals could not effectively communicate with each other using spoken words, they would mostly utilize body language words in order to carry out the mission,” Shin said.

Eventually, Soldiers shared mission details through simple drawings in their notebooks, he added.

While the mountain trek proved the most grueling, a team-based mud wrestling match was the most exhilarating, said U.S. Air Force Command Chief Master Sgt. Eduardo Mireles, former Special Operations Command, Korea Command Master Chief. “This was my third Mangudai exercise, and I still get re-energized mentally and physically when the platoons compete in the mud pit,” Mireles said. “At this point, everyone is extremely tired and hungry, but they dig deep to wrestle as a team and throw other individuals out of the mud pit.”

One of the goals is to strengthen a partnership that overcomes language barriers and cultural differences.

“It is amazing to see both U.S. and ROK Soldiers competing as a unit, working together to outmaneuver the other competitors,” Mireles said. “The atmosphere is electric, and everyone in the exercise gets highly involved in cheering and rooting for their favorite team. In the end, all of the competitors are extremely motivated and have realized the importance of teamwork.”

The exercises are conducted biannually in the Korean Peninsula. The roots of the challenge date back to the elite horsemen of the Mongol Empire in the 13th century. These warriors were put through a gauntlet of tests to prove they were ready for the toughest missions.

While the challenge examines the physical and mental fitness of military leaders from both countries, Shin said one of the most important byproducts is the camaraderie that develops among Soldiers who have struggled together. “Oftentimes, camaraderie brings out leadership even from individuals with absolutely no identifiable leadership traits,” Shin said. “I strongly believe that camaraderie is indispensably incorporated in leadership and that only when a team is complete with camaraderie and leadership can it claim victory in the battlefield.” □



Protesters wave Vietnamese flags and hold a banner as they join a February 2016 protest to denounce China's military buildup in the South China Sea in front of the Chinese Consulate in Makati city. REUTERS

RESOLVING CONFLICT

in an increasingly complicated security environment

SENIOR LT. GEN. NGUYEN CHI VINH, DEPUTY MINISTER OF NATIONAL DEFENSE FOR VIETNAM

The Indo-Asia-Pacific region has an increasingly important role as a driving force for development in the world economy. Southeast Asia, with the birth of the ASEAN [Association of Southeast Asian Nations] community, has become a positive factor, with broadening integration, increasing linkages, binding interests, and as the center of existing and emerging regional security structures.

Nonetheless, the regional security situation continues to have latent complicating factors, such as terrorism, nuclear threats, territorial and border disputes, maritime security and increasingly nontraditional security challenges. Intraregional disputes are the cause of much unease, and though not yet at the point of open conflict, they display potential indicators that need forecasting, prevention and timely resolution.

The situation comes from differences in interest, ambition and strategic competition. It is inconsistency between words and actions — a dispute-settlement style of inequality and double standard. Furthermore, it is an imposing demeanor and an insular, egoistic pursuit of interests, without thought to the interests of other countries, regional interests and the international community. If not settled effectively and with full responsibility for peace and stability, [they] will lead to the threat of conflict.

If a conflict arises — on whatever scale, whether of greater or lesser intensity, local or global, intrastate or interstate, ethnic or religious, political or economic, environmental or cultural — the peak of which is military conflict, the consequences will be great.

No nation wants a conflict to happen, so why do these regional security challenges exist? Why is the subject of preventing and resolving conflict preoccupying the attention of all nations? It is because there are still differences in common perception of interest, lack of confidence in international strategies and failure to abide by international law.

In such a context, we need a more practical outlook in our development cooperation and settlement of disputes. We need both to endeavor and cooperate to settle differences and develop together for the common strategic

interest of each nation and of the region.

Whether cooperating or fighting, all must be done with a spirit of equality and respect for principles of international law.

Every nation bases itself on the national interest of its own people to cooperate and develop as well as to settle disputes. The national interests of a people need to be looked at objectively and appropriately, have a sound basis, and be based on a harmonious relationship vis-à-vis the interests of other states and of the international community.

Strengthening cooperation in multilateral organizations is crucial in settling disputes and checking the threat of conflict. The Shangri-La Dialogue is proof of the spirit of cooperation and the struggle to settle differences, to prevent conflict, and to maintain an environment of peace and stability for the region and the world.

Vietnam is determined to preserve its independence and autonomy — seen as its highest principles — both cooperating and endeavoring to develop as a country and settle disputes. Vietnam relies foremost on its own strength to protect the national interest of its people and does not go with one

country to oppose another.

On the issue of the South China Sea, Vietnam and a number of ASEAN countries have declared their sovereignty in disputes with China. The problem does not just stop there, but brings with it actions of unilateral imposition, changes to the status quo along with the threat of militarization to create a deterrent strength; negative impacts on aerial, maritime and submarine security and safety; environmental destruction; and obstruction of peaceful maritime labor activities.

Vietnam policy [entails] a resolute endeavor to protect the integrity of territorial sovereignty, to protect shipping and airline security by peaceful means on the basis of international law and sincere discussions so that a code of conduct between South China Sea parties can be signed.



Vietnamese Deputy Defense Minister Nguyen Chi Vinh says a failure to embrace conflict resolution could imperil the Indo-Asia-Pacific region.

THE ASSOCIATED PRESS

Senior Lt. Gen. Nguyen Chi Vinh is the deputy minister of national defense for Vietnam. This text has been excerpted from a speech he delivered at the International Institute for Strategic Studies Shangri-La Dialogue in June 2016 and edited to fit FORUM's format.



Traditionalists fight to revive Burma's ANCIENT CHESS

AGENCE FRANCE-PRESSE
PHOTOS BY AFP/GETTY IMAGES

Gripping a monkey-faced chess piece, Thein Zaw swipes his hand across the checkerboard and topples an advancing demon, demonstrating an ancient form of the game that Burmese traditionalists are battling to repopularize.

“Sittuyin” — as Burma’s unique chess is called — is similar to the modern game but has distinctive pieces as well as moves that echo a time when warriors used it to fine-tune real fighting strategies.

Elephants rampage across the squares, a military general marches in place of the queen, and players have creative freedom to arrange many of the pieces as they wish, behind front-line pawns that start almost spear-to-chest.

“The game can feel like you are fighting a

war,” said Thein Zaw, a five-time Burmese chess champion, during a recent sittuyin contest in downtown Yangon.

His match is combative from the outset, with slain pieces quickly piling up on either side of the board.

Soon, both armies become entrenched, and the game reaches long into the sweltering tropical afternoon, punctuated only by exclamations, the strategic rearrangement of the “longyi” (sarong) and pensive twirling of spectacles.

The scene is a rare one in a nation where sittuyin has retreated into the sporting wilderness.

A scarcity of traditional chess sets and dearth of available knowledge about the rules have whittled down interest, so that just fewer than 100 players actively attend tournaments.

“This is an ancient game, and we would like to bring it back to life,” Thein Zaw said.

Thein Zaw’s hand-carved chess set of monkeys and ogres evokes the earliest incarnations of the game in neighboring India, playing out the mythical good-vs.-evil battle of Rama and the god Hanuman against the demon king Ravana.

Experts say this suggests the Burmese version could be over 1,000 years old.

Jean-Louis Cazaux, who has written extensively on the history of chess, said sittuyin has similarities to traditional games in Thailand and Cambodia and is an important addition to a global pantheon of chess varieties.

“Diversity is wealth. If these games can be preserved, they must be preserved,” he said.

Sittuyin retains some of the full-blooded flamboyance from the days when kings used it to plot real battles in which elephants were a fearsome weapon — “sitt” in Burmese means “war.”

“The game can
feel like you are
fighting a war.”

- *Thein Zaw*

“Myanmar [Burma] kings fought in the front lines of every war. Similarly, the result of the game depends on the king being active,” said Win Aung, vice chairman of the Myanmar Chess Federation.

Traditional games were peppered by the combative crack of the pieces against the wooden board.

“When my father and grandfather played, it was like this,” said Win Aung, slamming a pawn down onto the table. “We were scared!”

Those pieces are now a cherished heirloom, their handsome red and black elephants, castles and galloping horses smoothed by more than a century of table-top warfare.

Old sets are scarce in Burma, where five decades of brutal military rule brought both a cultural malaise and poverty that turned intricately carved wooden traditional chess sets into luxury items.

They were sold off piece by piece.

“Visitors from other countries love to buy ancient chess pieces when they come here. Myanmar sold the pieces as examples of ancient artistic creation to



Players engage in a contest of wits during a chess federation match in Yangon. In Burma’s unique version of the game called sittuyin, elephants rampage across the squares. Military generals march across the playing surface, and players have creative freedom to arrange many of the pieces as they wish.

tourists. Now they are nearly all gone,” Win Aung said.

With new carved sets costing around U.S. \$300 — far beyond the reach of ordinary people in the still impoverished nation — chess groups are modernizing to chase mass appeal.

Cheap plastic pieces and a rule book, in both Burmese and English, are now on the market, and the tech-loving younger generation can play the ancient game on mobile phones — now widely available as the country opens after decades of restrictions.

Web application firm Total Game Play launched a mobile version in late 2013 and says it has since been downloaded up to 200,000 times.

The firm’s 25-year-old marketing manager, Sai Pyae Phyo Han, said local gamers like sittuyin’s colorful characters and the ability to switch between a “formal army, Thai army and an ogre army.”

“I want to produce more mobile games that are uniquely Myanmar and make culture entertaining,” he said.



App for Easy Riding

The reputation of Jakarta, the capital of Indonesia, as one of the world's most congested cities is typically not an advantage with investors. However, one company has become the country's most visible technology success with an app that relieves some of the pain of its maddening traffic.

The ride-hailing apps that are part of daily life from New York to New Delhi are usually used to summon

cars. Jakarta, the world's sixth-largest urban sprawl and by some measures the most car-clogged, needed something new.

In hindsight, the Go-Jek mobile app for hailing rides on motorcycles was a no-brainer. But its sudden success took even its founder by surprise. The app's name is a play on ojek, the Indonesian word for freelance motorcycle taxis, now a rare sight in Jakarta after many drivers joined Go-Jek's green-jacketed, GPS-coordinated ranks. Go-Jek also has introduced a slew of additional services to the app, including delivering food, groceries, cleaners, massage therapists and beauticians to homes.

"We really had no idea it would be adopted so widely and so quickly," said Nadiem Makarim, who admits the company struggled to keep pace when tens of thousands began downloading the app. Makarim believes Jakarta's carnageddon had arrived at a "pain point" of a huge unmet demand for a solution. *The Associated Press*

ONLINE Money Advice

Financial technology firm Mesitis Pte Ltd. launched a robo-advisory business for high net worth individuals in 2016, its CEO said. The company is trying to capitalize on a growing trend by the rich to seek online investment advice at a lower cost. A new, tech-savvy generation of wealthy clients is creating opportunities for fintech startups, challenging private banks.

Wall Street is quickly catching up by building or buying robo advisors. Asia has been slow so far to join that trend, but in 2016, fintech firms geared up to launch such products in Singapore and Hong Kong.

Singapore-based Mesitis' robo advisor will offer advice to those who typically hold investable assets worth at least U.S. \$1 million.

Based on a computer algorithm, it aims to make money by charging clients 30 basis points on assets, its CEO Tanmai Sharma, told the Reuters Global Wealth Management Summit in June 2016. *Reuters*

ROBOTS THE NEW RAIN MEN?

To better predict South Asia's seasonal monsoon, scientists are preparing to release robots in the Bay of Bengal to study how ocean conditions might affect rainfall patterns.

The monsoon, which hits between June and September, delivers more than 70 percent of India's annual rainfall. Its arrival is awaited by millions of farmers, and delays can ruin crops. Yet, the rains are hard to predict. They can be affected by weather phenomena and could become more erratic with climate change and air pollution.

"It's such a complex system," said Ben Webber, an oceanographer at the United

Kingdom's University of East Anglia's School of Environmental Sciences, which is leading the U.S. \$11 million project. "The processes that occur in the Bay of Bengal are not well understood."

A big mystery is how the water currents work, with colder and fresher water streaming into the northern part of the bay, while warmer and saltier water flows in farther south from the Arabian Sea. While scientists have known that small changes in surface temperatures can have a big impact, they have never thoroughly studied the changes during monsoon season.

"We don't know what we're going

to find," Webber said. Working from an Indian research ship out of the port city of Chennai, the scientists will spend a month releasing seven underwater robots across a 400-kilometer stretch. The robots are programmed to navigate up and down through the water to a depth of 1,000 meters, measuring salinity, temperature and current.

At the same time, scientists from the University of Reading and the Indian government will take atmospheric measurements. By comparing the two sets of data, scientists hope to better understand how ocean conditions affect monsoon patterns. *The Associated Press*



Hindu priests offer prayers to Varuna, the Hindu god of rain.



RADIO SIGNAL STIRS TALK OF EXTRATERRESTRIALS

ISTOCK

REUTERS

A curious radio signal picked up by a Russian telescope is probably not a transmission from an extraterrestrial civilization. Astronomers in California, however, are taking a second look anyway, the SETI Institute said in August 2016.

A group of Russian astronomers detected what appeared to be a non-naturally occurring radio signal in 2015 in the general location of a star system 94 light-years from Earth.

Their findings emerged after Italian researcher Claudio Maccone, chairman of the International Academy of Astronautics committee on the Search for Extraterrestrial Intelligence, or SETI, told colleagues of a presentation he heard about the signal, according to Seth Shostak, a director at the SETI Institute.

"I don't think we're taking it terribly seriously," Shostak said. "The Russians looked in this direction 39 times, and as best we can tell they found it once."

Most likely, the radio signal was caused by terrestrial interference or a satellite, a common occurrence, Shostak said.

If the Russians thought they had a serious signal from an extraterrestrial, they also likely would have disclosed it sooner, he said.

"They didn't say anything about it for more than year. If we had found a signal, we'd check it out and call up other astronomers to check it out as well," Shostak said.

Nevertheless, over several nights in August 2016, SETI astronomers used an array of radio telescopes in California to study the suspect star, HD 164595, which has one known planet in orbit.

The planet is about the size of Neptune, but it circles its star far closer than Mercury orbits the sun. HD 164595 could have other planets in orbit that are more suitably positioned to contain water, which is believed to be necessary for life.

So far, though, astronomers have not detected any unusual signals from the star, Shostak said.

"We have to be very careful not to get cynical about false alarms," he said. "It's easy to say 'Aw man, it's just another case of interference,' but that risks not paying attention when you should."

COLD COMFORT

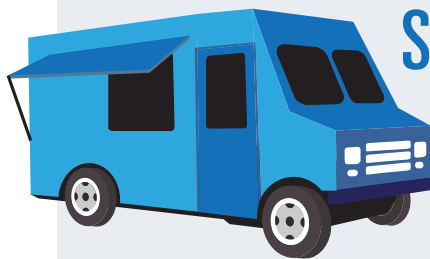
South Koreans can now soothe themselves after a big night out with hangover-fighting ice cream.

A convenience store chain has launched the Gyeondyo-bar, which translates as “hang in there,” and according to the company is the first ice cream bar marketed specifically to combat the aftereffects of alcohol consumption.

Drinking is big business in South Korea, and so are hangover cures, which generate U.S. \$126 million in annual sales, ranging from pills and beverages to cosmetics for women who want to keep their skin soft after a boozy night.



South Korea is exporting its remedies. Its most popular hangover beverage, Hut-gae Condition, made by a unit of the CJ Corp. conglomerate, has been sold in China, Japan and Vietnam since 2014. The drink also is featured in the popular 2014 music video *Hangover* by Korean pop star Psy and U.S. rapper Snoop Dogg. Reuters



SINGAPORE MAKES STREET FOOD HISTORY

Hungry diners queued up at a small, modest street food stall in Singapore in July 2016 to get a taste of the restaurant's local delights worthy of a coveted Michelin star.

Hong Kong Soya Sauce Chicken Rice and Noodle and Hill Street Tai Hwa Pork Noodle made dining history when they became the first street food stalls in the world to be awarded a star by Michelin as French critics revealed a Singapore guide of 29 establishments.

Singapore is the first Southeast Asian country and the fourth in Asia to be rated by the Michelin Guide. It has more than 100 open-air “hawker” centers and 6,000 stalls selling popular multiethnic meals.

Chan Hon Meng, owner of Hong Kong Soya Sauce Chicken Rice and Noodle, said he was honored to receive the recognition as he cooked up treats for the extra customers.

Chan hopes his stall's success will encourage more young people to enter the hawker trade, which is starting to suffer from a lack of successors for the stalls, which are primarily run by elderly cooks.

“I am very excited. Never knew hawker food can go global,” Chan said in front of his stall. “Hopefully the next generation will also pick this up.”

Roy Seeto, who often visits the pork noodle stall, praised Chan. “I think he deserved the award. Really deserved it,” Seeto said.

The 51-year-old chef said he had no immediate plans to increase prices of his food, such as his signature chicken rice dish, which he serves about 150 times per day at lunchtime for U.S. \$1.85 per plate.

Reuters

RUNNING OUT OF SPACE

An Indian man obsessed with setting Guinness world records got 366 flags tattooed on his body and had all of his teeth removed so he could put nearly 500 drinking straws and more than 50 burning candles in his mouth.

Har Parkash Rishi, who claims to have set more than 20 records, now calls himself Guinness Rishi.

Born in 1942 in a cinema hall in New Delhi, Rishi first got into the *Guinness Book of World Records* in 1990 when, with two friends, he rode a scooter for 1,001 hours.

The passion to get his name in the book led him to perform bizarre acts, including delivering a pizza

from New Delhi to San Francisco and gulping a bottle of ketchup in less than four minutes.

He even got his family involved. His wife, Bimla, holds a 1991 record for writing the world's shortest will: “All to Son.”

While it is the tattoos on his body, more than 500 in all, that brought him fame, Rishi says the toughest one was stuffing the straws in his mouth.

“I am the world record holder of 496 straws in my mouth. ... For that record, I needed space. I had to remove every tooth so that I could put maximum straws in my mouth,” Rishi said. Reuters





FACING CHANGE

Soldiers painted their faces for a military parade to honor outgoing Philippine President Benigno Aquino III in June 2016. The parade took place a few days before Aquino left office to make way for incoming President-elect Rodrigo Duterte. During the ceremony at Camp Aguinaldo in Quezon City, top military leaders and other dignitaries honored Aquino, who is credited with jump-starting the modernization of the Philippine military.

Photo By: **ERIK DE CASTRO** | Reuters

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