



MARITIME REVIEW

PUBLICATION OF THE MARITIME LEAGUE

Issue No. 22 - 6

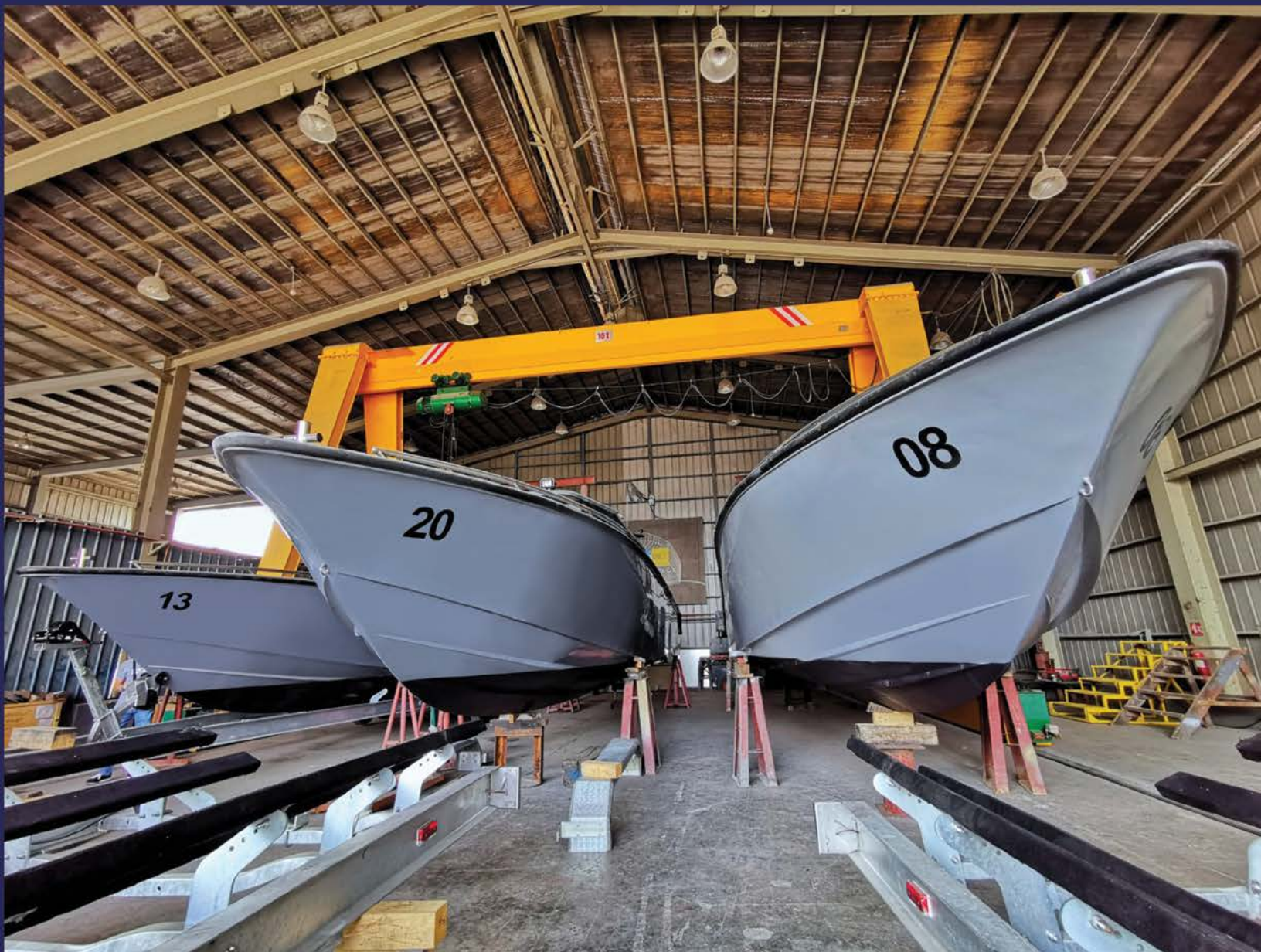
NOV - DEC 2022

THE QUEST FOR NET ZERO EMISSIONS BY 2050

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- » **MEPSEAS South-East Asian Marine Protection Project Concludes**
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- » **Korean Register to Support Methanol Bunkering in Ulsan**
- » **UN to Use Satellites to Spot Industry Methane Emissions**
- » **800K Seafarers will Need Carbon Skill Training by Mid 2030s**

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The Maritime Review is published bimonthly on behalf of the Maritime League and is supplied to members as a part of their annual membership package. The opinions expressed by the writers do not necessarily reflect those of the Maritime League

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In 2015, 196 countries adopted the historic Paris Agreement to reduce global warming and build resilience to climate change. Its overall goal: limit warming to no more than 1.5 degrees Celsius. Between 2015-17, parties to the agreement began submitting climate action plans known as nationally determined contributions (NDCs). Initial commitments, even if fully implemented, would only be enough to slow warming to 3 degrees. Urgent calls for action and ambition gained momentum as the plans would not stop catastrophic impacts. During 2020-21, in the lead-up to the COP26 climate talks, countries have begun revising their NDCs to strengthen climate action. With science affirming a shrinking window of opportunity, the plans must include urgent actions to cut carbon emissions and reach net zero by 2050. By 2030, to keep warming to 1.5 degrees, countries must cut emissions by at least 45 per cent compared to 2010 levels. And by 2050, the transition to net-zero emissions must be fully complete. SOURCE: IMO

MARITIME EVENTS CALENDAR

DECEMBER 2022

- 1-3 INMEX CHINA - POLY WORLD TRADE CENTER, GUANGZHOU, CHINA
 4-8 SHIP CHARTERING, LAYTIME AND DEMMURAGE MASTERCLASS VIRTUAL CONFERENCE
 6-7 LNG SHIP/SHORE INTERFACE CONFERENCE AWARDS & EXHIBITION
 7 MARINTEC CHINA - SHANGHAI, CHINA
 AMERICA SQUARE CONRENENCE CENTRE, LONDON, UNITED KINGDOM
 7-9 INTERNATIONAL MARITIME EXPO (INMEX CHINA 2022)
 POLY WORLD TRADE EXPO CENTRE, GUANZHOU, CHINA
 7-10 MARINETEC CHINA - SHANGHAI NEW INTERNATIONAL EXPO CENTRE, SHANGHAI, CHINA
 9 MARITIME TECHNOLOGY CONCLAVE SOUTHERN REGION (CONFERENCE ON INDIA MARITIME TECHNOLOGY SOUTHERN REGION)
 CHENNAI, INDIA
 12-16 TRAINING COURSE ON PACKAGING AND SHIPPING INFECTIOUS MATERIALS
 12-16 SEMINAR ON LEGAL MANAGEMENT AND THE SHIPPING BUSINESS NAIROBI, KENYA
 13-15 MAURITIUS MARITIME WEEK - THE RAVENALA ATTITUDE, TURTLE BAY, BALACLAVA, MAURITIUS
 14 DROP SHIPPING IN A POST-WAYFAIR WORLD WEBINAR (1 HOUR) - ONLINE
 14-15 LITTORAL INDIA - UAE SHIPPING SUMMIT - DUBAI, UNITED ARAB EMIRATES
 28 NEW YEAR CREDIT UNION EDUCATIONAL CRUISE CONFERENCE (CRUISE CONFERENCE FORT LAUDERDALE) FORT LAUDERDALE, USA
 28-4 NEW YEAR CREDIT UNION EDUCATIONAL CRUISE CONFERENCE ABOARD MS EURODAM, KEY WEST, USA

JANUARY 2023

- 12 CRUISE JOB FAIR BERLIN - BERLIN, GERMANY
 12-13 MARITIME OCCUPATIONAL HEALTH & SAFETY SUMMIT 2023 WORLI, INDIA
 17-18 MARITIME AUTONOMOUS SYSTEMS REGULATORY CONFERENCE 2023 LONDON, UNITED KINGDOM (UK)
 16-20 K-LOVE CRUISE - FORT LAUDERDALE, USA
 19-20 PORTS IN INDIA - MUMBAI, INDIA
 19-22 KREUZFAHRT AND SCHIFFSREISEN - MESSE STUTTGART, STUTTGART, GERMANY
 21 SMALL SHIP CRUISING EXPO - LOWRY CONFERENCE CENTER, DENVER, COLORADO, USA
 21-FEB12 COLORADO INDEPENDENT WAREHOUSE SHOW -USA
 21 SMALL SHIP CRUISING EXPO (SSCE) - DENVER, USA
 23-24 INTERCEM SHIPPING FORUM (INTERCEMSF) - ATHENS, GREECE
 23-25 MARITIME WEEK AFRICA - CAPE TOWN, SOUTH AFRICA
24 MARITIME FORUM #178 - DEPARTMENT OF FOREIGN AFFAIRS MARITIME AND OCEAN AFFAIRS OFFICE (DFA-MOAO)
 26 LONDON SHIP FINANCE FORUM - GROSVENOR HOUSE, JW MARIOTT HOTEL, LONDON, UK
 26-27 WORLD OF SHIPPING PORTUGAL - AN INTERNATIONAL RESEARCH CONFERENCE ON MARITIME AFFAIRS - CARCAVELOS, PORTUGAL
 30-31 TECHNOLOGY, SYSTEMS & SHIPS SYMPOSIUM (TSS) WASHINGTON DC, USA

FEBRUARY 2023

- 1-2 SHIP RECYCLING CONGRESS - PARK PLAZA VICTORIA AMSTERDAM, AMSTERDAM, THE NETHERLANDS
 1-2 MARITIME RECONNAISSANCE AMD SURVAILLAMCE TECHNOLOGY LONDON, UNITED KINGDOM
 3 CANADIAN AVIATION SYMPOSIUM - CANADA
 7 EUROPEAN DYNAMIC POSITIONING CONFERENCE (EDP) LONDON, UNITED KINGDOM
 7 THE ANNUAL JOINT SHIPPING CONFERENCE - NEW YORK, USA
 7-8 HELLENIC MARITIME FORUM - (HMF ATHENS) ATHENS, GREECE
 7-8 AMERICAN MARITIME FORUM MIAMI CONVENTION CENTER, KOZHICODE, INDIA
 7-9 MIDDLE EAST BUNKERING CONVENTION 2023 -DUBAI, UNITED ARAB EMIRATES
 8-10 ASSOCIATION OF PACIFIC PORTS WINTER CONFERENCE HONOLULU, USA
 9 ANNUAL CAPITAL LINK GREEK SHIPPING FORUM (12TH ANNUAL)

- 11 ATHENS, GREECE
 CRUISE, BBQ & BLUES FESTIVAL & CAR SHOW ORO VALLEY, USA
 11-12 PALM BEACH MARINE FLEA MARKET AND SEAFOOD FESTIVAL WEST PALM - BEACH, USA
 13-24 PANAMA CANAL CREDIT UNION EDUCATIONAL CRUISE CONFERENCE PANAMA CITY, PANAMA
 16-18 LOGISTICS 2023 - PRAGATI MAIDAN, NEW DELHI, INDIA
21 MARITIME FORUM# 179 - CEBU PORTS AUTHORITY (CPA)
 24 EAST COST MARITIME FORUM THE LALIT GREEN EASTERN KOLKATA, KOLKATA, INDIA
 27-1 SEA THE FUTURE 2023 - PATTAYA, THAILAND
 28 SUBSEA TIEBACK FORUM & EXHIBITION - GALVESTON, USA
 28-2 SUBSEA TIEBACK FORUM AND EXHIBITION MOODY GARDENS HOTEL SPA AND CONVENTION CENTER, GALVESTON, USA

MARCH 2023

- 2 HAMBURG SHIP FINANCE FORUM - HAMBURG, GERMANY
 2-3 SHIPPING FINANCING PART 1 - STANDARD TERMS AND CONDITIONS SEMINAR TRAINING PROGRAM - SINGAPORE
 3-6 DOWNTOWN KNOXVILLE BOAT SHOW, USA
 8-9 MARITIME BATTERY FORUM - ABELDA-LOCATIE 3E KATENDRECHTSE HOOFD, ROTTERDAM, THE NETHERLANDS
 9-10 SHIPPING FINANCING PART 2 - MANAGING THE SHIPPING FINANCING PORTFOLIO SEMINAR TRAINING PROGRAM (SHIPPING FINANCING SINGAPORE) - SINGAPORE
 12-14 MARLOG12: INNOVATIVE TECHNOLOGIES FOR PORTS AND LOGISTICS TOWARDS A SUSTAINABLE RESILIENT FUTURE - EZBET EL-NOZHA, EGYPT
 13-15 FUJAIRAH BUNKERING & FUEL OIL FORUM 2023 - FUJAIRAH, UNITED ARAB EMIRATES
 13TH INTERNATIONAL FUJAIRAH BUNKERING & FUEL OIL FORUM (FUJCON 2023) - FUJAIRAH, UNITED ARAB EMIRATES
 13-15 NAVEXPO - LORIENT, FRANCE
 15-17 ASTA GLOBAL RIVER CRUISE EXPO - BUDAPEST, HUNGARY
 17-19 OPEN SHIPPING DAYS - WAAGNATIE EXPO AND EVENTS, ANTWERP, BELGIUM
 20-23 NATIONAL SHIP REPAIR INDUSTRY CONFERENCE (NSRIC) WASHINGTON DC, USA
21 MARITIME FORUM #181 - MARITIME ACADEMY OF ASIA AND THE PACIFIC (MAAP)
 21-23 CMA SHIPPING EXPO & CONFERENCE - STAMFORD, USA
 21-23 WORLD MARITIME WEEK - BILBAO EXHIBITION CENTER, BARAKALDO, SPAIN
 27 ANNUAL CAPITAL LINK INTERNATIONAL SHIPPING FORUM NEW YORK, USA
 28-30 MEDITERRANEAN PORTS AND SHIPPING GRAND HYATT ATHENS, ATHENS, GREECE
 30 DIGITAL SHIP - HAMBURG, GERMANY
 31 BRITISH COMMISSION FOR MARITIME HISTORY NEW RESEARCHERS' CONFERENCE - PORTSMOUTH, UK
 31 NEW RESEARCHERS IN MARITIME HISTORY CONFERENCE PORTSMOUTH, UK

APRIL 2023

- 12-15 MTB MARINE ASIA 2023 - SEOUL, KOREA (SOUTH)
 18-20 OCEAN BUSINESS - SOUTHAMPTON
25 MARITIME FORUM #182 - BUREAU OF FISHERIES AND AQUATIC RESOURCES (BFAR)
 25-27 SEA ASIA 2023 - SINGAPORE, SINGAPORE

May 2023

- 2-5 EXPO SHIPPING EXPOMARIT, ISTANBUL
 4-5 MARITIME RECONNAISSANCE AND SURVEILLANCE TECHNOLOGY USA CONFERENCE 2023 - ARLINGTON, UNITED STATES OF AMERICA (USA)
 10-11 UNMANNED MARITIME SYSTEMS TECHNOLOGY 2023 LONDON, UNITED KINGDOM (UK)
 12-14 HAMBURG ANCORA YACHTFESTIVAL, NEUSTADT /HOLSTEIN
 23-25 MARITIME INDUSTRY GORINCHEM, NL
30 MARITIME FORUM #183 - PHILIPPINE NAVY (PN)

JUNE 2023

- 6-9 NOR-SHIPPIING - OSLO, NORWAY
 13-15 SEAWORK MARINE CIVIL, SOUTHAMPTON, UK

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A CHRISTMAS GIFT FOR MOTHER EARTH

by VAdm Emilio C Marayag Jr AFP(Ret)



Photo Credit: The United Nations Framework Convention on Climate Change (UNFCCC)

The 27th Conference of Parties (COP27) on Climate Change took place on November 6-20 in Sharm el-Sheikh, Egypt. The theme of the conference was “Delivering for People and the Planet.” COP27 President, Egypt Foreign Affairs Minister Sameh Shoukry, presided over the conference administered by the UN Framework Convention on Climate Change (UNFCCC) Executive Secretary Simon Steill. The 193 member-countries and numerous NGOs worldwide sent over 35,000 representatives. The principal objective of COP27 is to “accelerate global efforts to confront the climate crisis.” Addressing this extremely difficult situation entails mitigation, adaptation, and finding means to implement the action plans.



COP27 is where the Loss and Damage Fund was set up. Photo Credit: Kiara Worth at UNFCCC.

One notable result of the conference is the “Loss and Damage Fund” which was set up to assist the most vulnerable nations with climate disasters –typhoons, earthquakes, floods, wildfires, etc. The recent destructive floods in Pakistan, wildfires in many areas, and disastrous storms elsewhere facilitated this initiative. While the mechanics on how to run the fund are yet to be established,

this outcome is considered historic by some observers.

Another item which was passed upon was a call on the members to collectively invest at least \$4 trillion per year to develop and harness renewable energy sources to achieve a “net zero” greenhouse gases (GHG) emission by 2050. This will involve transformation of the financial system with active participation of governments, central banks, commercial banks and other financial institutions.

The conferees also agreed to reduce by 50% emissions of GHG by the year 2030 to keep the global warming increase to 1.5 degrees Celsius above the pre-industrial levels. The Intergovernmental Panel on Climate Change (IPCC), based on its studies, reported that beyond 1.5 degrees Celsius increase, extreme droughts and other calamities will adversely affect the global food system. The conference proceedings could have triggered the resumption of formal climate change talks between the U.S. and China on the issue of GHG emissions.

On the other hand, the conference failed to reach an agreement to phase out fossil fuel use as the big GHG emitting countries refused to do so. Some accounts point out that there was an increase of lobbyists from oil producing countries and the big consumers of fossil fuel. In 2021, the Glasgow summit (COP26) called upon the phasedown of “unabated” coal power and the phaseout of “inefficient fossil fuel subsidies.” While only 62 of 193 member-states announced they have plans to mitigate and adapt to climate change, only 24 have submitted this year. The 62 members comprise 83% of the world’s GDP, and consume 69% of power generated by fossil fuel and other sources.

The threat of global warming, contrary to some critics, is real. Since 1988 the UN Environment Program (UNEP) and the World Meteorological Organization (WMO) have prepared a number of Assessment Reports on Climate Change. The UN created the IPCC in 1988, through Resolution 43/53 of the UN General Assembly’s 70th plenary meeting, to provide policy makers with periodic

scientific assessments, and the implications including potential risks of climate change. The body also proposes mitigation and adaptation options.

In 1992-1993, the UN Framework Convention on Climate Change was adopted. In 1994, 50 member-states ratified the Convention and the UN established the Secretariat in Bonn, Germany. The first COP took place in Berlin in 1995, and thereafter an annual global conference is held in host nations worldwide. The COPs that came out with very significant results are the 1997 Kyoto Protocol (COP3) and the 2015 Paris Agreement (COP21). The former binds the developed member-nations to emission reduction targets; while the latter set the target for global temperature increase of below 2 degrees Celsius by the end of the century, called for intensified actions, and more investments for a sustainable low carbon future.



Professor Petteri Taalas has been the Secretary-General of WMO since 1-January-2016 as appointed by the World Meteorological Congress. He is now serving his second term (Jan 2020-Dec 2023). Photo Credit: WMO.

As of late, WMO Secretary-General Petteri Taalas revealed that from 1990 to 2021, the aggregate amount of carbon dioxide (CO₂) emissions increased by 50%. Reckoning from the pre-industrial period, the increases of CO₂ is 149%, methane by 268%, and nitrous oxide by 124%. The CO₂ comes from fossil fuels, methane (CH₄) from the wetlands and rice paddies, and nitrous oxide (N₂O) from natural sources, the ocean, and industrial processes. About 8% of total GHG emission originates from food waste.



Ukraine war threatens climate targets. Photo Credit: DW Global Media Forum.

Apart from the usual sources of GHG emissions, the war in Ukraine also contributes to the climate crisis. Global inflation has affected most countries as prices of energy, food commodities, and transportation are above normal projections. Large quantities of weapons systems and ordnance spent in the ongoing shooting war produce GHGs, and the threat of a nuclear winter continues to hang in the horizon.

The gargantuan global effort to face the climate change crisis brings to mind the adage, "Think Globally, Act Locally," which claimed to have been started in 1915 by Patrick Geddes, a Scottish planner and conservationist. Geddes contends that human development must take into account the local culture, identity, economy, and create an indirect harmony with the surrounding environment. The environmentalist groups in the 1970s coined the exact phrase and since then other organizations applied the adage in many of their objectives, structures, and processes.

Many interest groups agree with the holistic approach to prevent climate change by encouraging people and communities to think globally and act locally. However, there are some issues associated with this. For one, there is a rift between priorities of the developed and developing countries regarding environmental objectives and preferences. Secondly, any climate action has a corresponding reaction, i.e., lesser demand for some GHG emitting source such as fossil fuels while a higher demand for various other alternative fuels. In addition, environmentally focused initiatives may not be compatible with the goal of combatting climate change.

While local leaders can, on their own, formulate and implement environmental conscious solutions that would contribute to arresting GHG emissions, they must harmonize their actions by considering their possible consequences. For example, the manufacturing of electric vehicles and non-plastics to replace vehicles with internal combustion engines and plastic materials with cotton, paper, cork, or other wood products may require additional energy produced by GHG emitting power sources. I recall many years ago as Board Chair of the AFP Commissary and Exchange Service, a decision was made to disallow the use of plastic bags in the commissary stores, and instead use reusable bags and empty carton boxes. However, those recyclables were costlier, inferring that more energy was spent. Nevertheless, in the long run, the benefits of recyclables have proven to outweigh the negative consequences.

Overall, the results of COP27 – the creation of a "Loss and Damage Fund," commitment to invest in the development and operation of renewable energy sources, and submission of mitigation and adaptation reports by some leading member-states, can be viewed positively. There are more actions to do, and the sooner they are implemented, the better for Mother Earth's human race, including its flora and fauna.

As we join the worldwide celebration of the birthday of our Lord Jesus Christ, let us not forget to take good care of Mother Earth and gift her with clean air, land, sea, and sky as her responsible custodians. These are the best gifts we can ever give back to Mother Earth for the next generations to come. 🚢

MEPSEAS SOUTH-EAST ASIAN MARINE PROTECTION PROJECT CONCLUDES

by IMO

The conclusion of a successful 5-year initiative to protect the marine environment in South-East Asia from the negative effects of ships and shipping has been marked at a high-level meeting (25-27 October 2022) in Viet Nam with the adoption of a MEPSEAS-Halong Statement by the participating countries.

The Marine Environment Protection of the South-East Asian Seas (MEPSEAS) project has seen 7 partner countries – Cambodia, Indonesia, Malaysia, Myanmar, Philippines, Thailand and Viet Nam – make substantial progress in ratifying and implementing key IMO environmental treaties. During this process, countries implemented national legal and policy developments and benefitted from related capacity building in port and flag state inspections to support enforcement of the selected Conventions.

The project also supported country-specific port biological baseline survey training, the Green Shipping-Green Port-Green Shipyards (GGG) initiative of the Philippines and the holding of a regional maritime technology conference, among other activities.

As the MEPSEAS project draws to a close, Mr. Jose Matheickal, Chief, Department of Projects and Partnerships of IMO, said MEPSEAS has been one of the most successful projects IMO has handled in terms of delivery and impact on marine conservation.

“Ratification and implementation of some important IMO Conventions prioritized under this project are really going to contribute to the marine protection of the region,” he said. “It was extremely pleasing to see the progress made and commitments delivered by the countries under the project. We started with a scenario where most countries have not even started the accession process and we are exiting the project when the countries have not only acceded to the Conventions, but also developed implementing legislations and practically demonstrated port state control in their ports. It was worth the journey,” Mr. Matheickal added.

The MEPSEAS project was phase II of a collaboration between IMO and Norwegian Agency for Development Cooperation (NORAD) which worked in conjunction with the seven partner countries to implement the Convention on the Control of Harmful Anti-Fouling Systems in Ships (AFS), the Ballast Water Management Convention (BWM), the London Protocol and the International Convention for the Prevention of Pollution from ships (MARPOL) (particularly Annex V regulations covering garbage from ships).

The aim of MEPSEAS was that, by the end of the project, countries would have acceded and implemented their chosen Convention and have in place long-term plans to ensure the protection of the South-East Asian Seas for years to come – aims which have been achieved.



The MEPSEAS project culminated in the Technology Conference in Singapore. Photo Credit: IMO

At the conclusion of the MEPSEAS Third High Level Regional Meeting in Ha Long City, Viet Nam, all participant countries adopted the Ha Long Statement which commits them to continue to work in the spirit of MEPSEAS to ratify and implement more international Conventions related to the protection of the marine environment. (Read the Ha Long Statement here.)

Mr. Matheickal highlighted what he called a “ripple effect” from the project. The model used is deemed to have been a great success, particularly the structure of regional coordination and national consultation that was built through National Task Forces, and the contribution from strategic partners such as Singapore, the Tokyo-MoU Secretariat, ASEAN, Women in Maritime-Asia and Partnerships in Environmental Management for the Seas of East Asia (PEMSEA).

The project model has motivated other regions to implement similar projects such as the Caribbean region where a project (Caribbean Sustainable Maritime Transport Project – CaribSMART) is being designed by taking the lessons from the MEPSEAS project. *“The ‘ripple effect’ of MEPSEAS is more than we had originally anticipated,”* said Mr Matheickal.

In fact, the Philippines have seen such merit in having a national task force as the mechanism to deal with all IMO Conventions, they have decided to formalize theirs under a new name as a permanent fixture via presidential decree.

“It looks like other countries may follow suit. Such inter-ministry mechanisms are a great legacy of the project,” said Mr. Matheickal.

After the Ha Long High-Level Meeting, Mr. Jose Matheickal reflected on how IMO can harness the lessons from the MEPSEAS initiative: *“How do we go forward? We ensure sustainability is integrated into project design and implementation by developing the local expertise – that contributes to sustainability beyond the project – developing the policies and legislations that will be there forever, developing the inter-ministerial mechanisms that will be used for many countries in the future and by continuing the IMO support in sustaining the capacity building through our Integrated Technical Cooperation activities in the region.”*

MEPSEAS technology conference. The MEPSEAS project culminated with the MEPSEAS Technology Conference in Singapore on 16-17 November held in collaboration with the Maritime & Port Authority of Singapore. Two classification societies and IMO’s Head of Marine Biosafety, Theofanis Karayannis, were also in attendance.

The event’s theme was “Environmental solutions for sustainable shipping in South-East Asia” and focused on the latest technologies and solutions for ballast water management; antifouling systems and the introduction of new antifouling measures; and ship-waste management.

The conference was an opportunity to discuss the need for the development of improved ballast water technologies. There was also a chance for delegates to visit a shipyard in Singapore where they saw new ballast water technology in use. And the Philippines gave a presentation showcasing new technology being developed in their country.

MEPSEAS project. The MEPSEAS project formally comes to an

end on 31 December 2022. Originally planned as a four-year program, NORAD extended its financial assistance for a year due to the impact of Covid-19.

The Third High Level Regional Meeting in Quang Ninh was an opportunity to take stock of the overall status of MEPSEAS, and of participating countries’ progress. It was also a chance for those attending – Heads of Maritime Administrations, National Focal Points, national and regional experts, and the IMO Project Coordination Unit – to reflect on the Project’s key achievements and milestones.

The MEPSEAS project promoted national legal and policy developments and related capacity building in port and flag state inspections to support enforcement of the selected Conventions. And it also supported specific port biological baseline survey training, the Green Shipping-Green Port-Green Shipyards (GGG) initiative of the Philippines and the holding of a regional maritime technology conference, among others.

It built on the phase I IMO-Norad foundation project which saw substantial progress by countries in implementing or acceding to IMO environmental treaties. Myanmar joined the initiative at the start of phase II. For countries which have acceded to the relevant treaties in the foundation project, the MEPSEAS project has allowed them to focus on effective implementation.

How the MEPSEAS project was structured. The MEPSEAS initiative used an intervention model using 4 main pillars:

On the ground involvement. Each country had to commit in writing to deliver on the MEPSEAS aims. One important aspect was for them to appoint their own national consultants to work alongside international and regional consultants.

An easy-to-understand “traffic light” scorecard showing each participant country’s progress towards ratification. IMO support was provided in the form of performance-driven interventions. Help was given to progress through the milestone stages – but moving to the next milestone was only possible once the previous one had been achieved.

High-Level Regional Meetings were held every two years to take stock and share lessons learned.

Partnerships and use of strategic partners with substantial expertise and their own network to promote and support the goals of the project.

The seven countries were asked to choose their two highest priority IMO environmental Conventions on which they would focus. One of the early milestones each participant country had to reach was the creation of a national taskforce. These brought together stakeholders in their countries such as Environment, Transport and Finance Ministries, and other interested parties.

Most of the countries didn’t have such an inter-ministerial forum to deal with marine environmental issues and some required a presidential decree to form a mechanism of that kind.

A MEPSEAS regional high-level platform was created, and regular regional high-level meetings were held which brought together the high-level policy makers to take stock and share lessons. The project was also included as a standing agenda of the meeting of the highest level regional maritime body – the ASEAN Maritime Transport Working

Group. It regularly discussed the progress of the Project and provided guidance.

A technical expert group was formed with international and regional consultants, but most work was to be done by the national consultants in each country. This enabled the building of domestic expertise to ensure the methods and ethos of MEPSEAS would be sustainable beyond the life of the project.

The seven countries involved demonstrated a spectrum of capabilities, but cooperation between them was encouraged and experience and lessons learned were shared.

Strategic partners in the region, for example, Singapore and Tokyo MOU, worked alongside other strategic partners such as Partnerships in Environmental Management for the Seas of East Asia (PEMSEA) and the Association of Southeast Asian Nations (ASEAN). The involvement of women in the project was a key aim and Women in Maritime’s Asia branch (WIMA Asia) was represented in all meetings.

Creating a project brand. For phase II of the initiative, it was decided that the project should have a formal name, and the MEPSEAS brand was born.

Creating an identity and bespoke branding for the project gave it higher impact. It has inspired a similarly branded scheme, Carib-SMART, and the preparatory phase of this project is also funded by Norway.

Changing Colours: Progressing from red to green. The objective of MEPSEAS was that over the period the initiative was running, the seven countries involved would hit several pre-determined milestones before they could move on to the next stage of the process.

The milestones included the setting up of a national taskforce, drafting national legislation and a policy strategy that would enable ratification to take place. Other objectives were to put in place experts to provide training and to draft legislation and port/flag state control procedures, and to pilot the launch of port state control inspections.

In order to track the progress of the seven participating countries transparently, a score card, or dashboard, was set up using a red/yellow/green “traffic light” system to signify whether they had not yet started towards a milestone, were in progress, or had completed the task.

When the project began, most countries had yet to ratify the IMO conventions. For many, getting to that point was a highly complex process involving various stages of consultation, legislation and finally parliamentary approvals.

The score cards below show countries’ progress from the beginning of the IMO-Norad Phase 1 intervention to the end of MEPSEAS phase 2.

Baseline scenario at start of Phase 1

Countries	Conventions	National Task Force	Draft National Legislation	Draft National Policy Strategy	Ratification	Draft National Action Plans	National Training Institute Identified	National Training Experts Identified	National Training on Implementation	Detailed Draft Regulations	CME Training	Draft Port/Flag State Control Procedures	Pilot Launch of PSC Inspection in key port	
CAMBODIA	MARPOL I & II	Incomplete	Incomplete	Incomplete	Complete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Complete In Progress Incomplete
	MARPOL V	Incomplete	Incomplete	Incomplete	Complete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	
INDONESIA	AFS	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	
	BWM	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	
MALAYSIA	BWM	Incomplete	Incomplete	Incomplete	Complete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	
	MARPOL I & II	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	
PHILIPPINES	AFS	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	
	BWM	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	
THAILAND	MARPOL V	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	
	LP	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	
VIET NAM	AFS	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	
	BWM	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	Incomplete	

Note: Myanmar did not participate in Phase 1

Scenario at end of MEPSEAS (Phase 2)



Countries	Conventions	National Task Force	Draft National Legislation	Draft National Policy Strategy	Ratification	Draft National Action Plans	National Training Institute Identified	National Training Experts Identified	National Training on Implementation	Detailed Draft Regulation	CME Training	Draft Port/Flag State Control Procedures	Port Launch of PSC Inspections in key port
CAMBODIA	MARPOL I & II	Complete	In Progress	In Progress	Complete	Complete	Complete	Complete	Complete	In Progress	Incomplete	In Progress	Incomplete
	MARPOL V	Complete	In Progress	In Progress	Complete	Complete	Complete	Complete	Complete	In Progress	Incomplete	In Progress	Incomplete
INDONESIA	AIS	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete
	BWM	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete
MALAYSIA	BWM	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete
	MARPOL I & II	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete
MYANMAR	BWM	Complete	In Progress	In Progress	Complete	Complete	Complete	Complete	Complete	In Progress	Incomplete	Incomplete	Incomplete
	MARPOL I, II & V	Complete	In Progress	In Progress	Complete	Complete	Complete	Complete	Complete	In Progress	Incomplete	Incomplete	Incomplete
PHILIPPINES	AIS	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete
	BWM	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete
THAILAND	MARPOL V	Complete	Complete	Complete	In Progress	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete
	ISPS	Complete	Complete	Complete	In Progress	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete
VIETNAM	AIS	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete
	BWM	Complete	Complete	Complete	In Progress	Complete	Complete	Complete	Complete	Complete	Complete	Complete	Complete


Putting in place a legal framework. One of the key elements of the initiative was to build a sustainable body of legislation-drafting expertise within the countries themselves.

Each country had its own procedures to reach the point of ratification, but they all involved complicated legal processes to get there. With the help of international experts and national consultants, MEPSEAS provided legal training in how to develop model legislation.

Workshops provided hands-on instruction which enabled the national teams to amend and enhance this for their own country-specific draft legislation.

Port State control. The final step in the MEPSEAS process was for each of the 7 countries to demonstrate that they had port inspection procedures and other port state controls in place.

This milestone was considered as the end point of the MEPSEAS project intervention after journeying with the countries through the entire process of acceding to conventions through to implementing and enforcing them.

The expertise and resources of Tokyo-MoU significantly assisted with this step. 

Source :<https://www.imo.org/en/MediaCentre/PressBriefings/Pages/MEPSEAS.aspx#:~:text=The%20MEPSEAS%20project%20formally%20comes%20to%20an%20end%20on%202031%20December%202022.>



“

“How do we go forward? We ensure sustainability is integrated into project design and implementation by developing the local expertise – that contributes to sustainability beyond the project – developing the policies and legislations that will be there forever, developing the inter-ministerial mechanisms that will be used for many countries in the future and by continuing the IMO support in sustaining the capacity building through our Integrated Technical Cooperation activities in the region.”

-Mr. Jose Matheickal

”

KOREAN REGISTER TO SUPPORT DEVELOPMENT OF METHANOL BUNKERING IN ULSAN

by Korean Register



International classification society Korean Register (KR) and Ulsan Port Authority (UPA) have signed an MOU to support methanol-fueled ships and establish the South Korean port as a low-carbon, eco-friendly energy hub.

Methanol is a clean burning marine fuel which produces 99% less sulfur oxides (SOx), 80% less nitrogen oxides (NOx), and 25% less greenhouse gases (GHG) compared to conventional marine fuels.


A growing number of dual fuel methanol vessels are being ordered by international shipping companies, and in October South Korean shipping company KSS Marine took delivery of the country's first methanol powered vessel, MV Savonetta Sun, a 50,000-dwt product tanker.

The agreement was made in response to the low-carbon energy transition underway in the shipping and port industries.

UPA Vice President JEONG Chang-gyu said, "UPA is actively working to make eco-friendly, and low-carbon fuels become more of a universal feature in shipping and port markets. We will support the widespread use of methanol-fueled ships and methanol bunkering in cooperation with KR using Ulsan port, one of the key energy hubs of North-East Asia."



Ulsan Port

Both organizations will collaborate on regulatory reform, deregulation of methanol-fueled ships and methanol bunkering, utilizing independent tank terminals in Ulsan as methanol storage facilities, testing methanol bunkering at Ulsan Port and building methanol supply infrastructure in Korean ports. 



UN TO USE SATELLITES TO SPOT INDUSTRY METHANE EMISSIONS

by Vicky Viray Mendoza

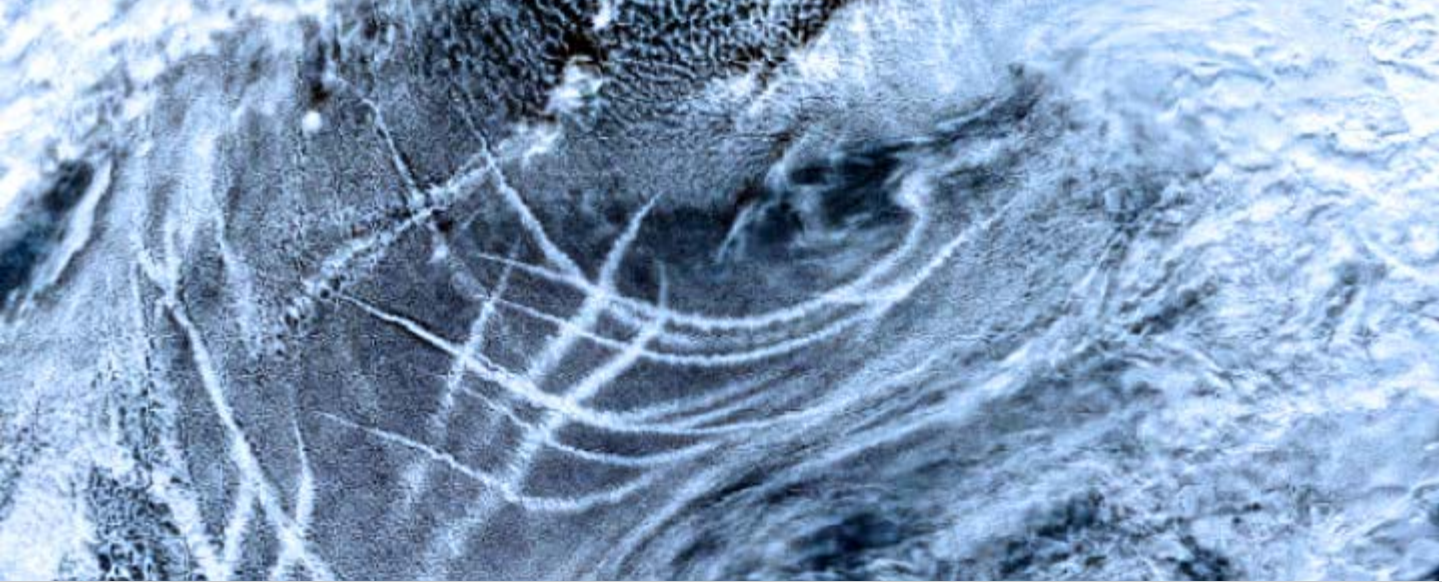


Photo Credit: NASA

The maritime industry can help combat climate change by reducing Methane emissions to keep our global temperature at 1.5°C. Industrial Methane emissions are increasing sharply.

The UN announced a new satellite-based system to detect Methane emissions and enable the public and private sectors to act on the findings.

The Methane Alert and Response System (MARS) is the first public global system connecting Methane detection with notification processes. It is a new initiative to scale up global efforts to detect and act on the major emission sources in a transparent manner, as well as fast-track the operations of the Global Methane Pledge.

MARS was launched at the 27th United Nations Climate Change Conference (**COP27**). It was set up as part of the UNEP International Methane Emissions Observatory (IMEO) strategy to get policy-relevant data into the right hands for emissions mitigation. Methane is a powerful greenhouse gas, a stronger heat-trapping gas than Carbon Dioxide, and adds at least 25% to global warming. Methane emissions of 20%-33% come mostly from the oil and gas industry according to the [ECONOMIST](#).

“Cutting methane is the fastest opportunity to reduce warming and keep 1.5°C within reach, and this new alert and response system is going to be a critical tool for helping all of us deliver on the Global Methane Pledge,” said U.S. Special Presidential Envoy for Climate, John Kerry.

MARS will use state-of-the-art satellite data to locate the major emission sources. Beginning with very large point sources from the energy sector, MARS will later integrate data from lower-emitting areas. Gradually, data on smaller sources, such as coal, waste, livestock, and rice will be added.

“We are seeing Methane emissions increase at an accelerated rate,” said Bezos Earth Fund Chief of Science, Data and Systems Change, Dr. Kelly Levin.

This effort to further diminish Methane emissions descends at a time when the maritime industry is rapidly accelerating its adoption of Liquefied Natural Gas (LNG) as the main fuel source for maritime vessels. Environmentalists argue that the shipping industry’s preference for LNG contributes to the increase in Methane emissions, while trade groups such as SEA-LNG counter that the newest generation of engines is reducing and eliminating methane slip (i.e., the release of unburnt methane).

“Reducing Methane emissions can make a big and rapid difference as this gas leaves the atmosphere far quicker than Carbon Dioxide. The Methane Alert and Response System (MARS) is a big step in helping governments and companies deliver on this important short-term climate goal,” said UNEP Executive Director, Inger Andersen.

“With this initiative, armed with greater data and transparency, companies and governments can make greater strides to reduce Methane emissions, and civil society can keep them accountable to their promises,” said Bezos Earth Fund Chief of Science, Data and Systems Change, Dr. Kelly Levin.

The data is clear and emissions can now be spotted from satellites. We will need to reduce global methane emissions by at least 30% by 2030, just to keep the world at 1.5°C.

“Fortunately, action on Methane emissions are one of the most cost effective and impactful action a country can take,” said Global Methane Hub CEO, Marcelo Mena. 🚢

REPORT EXAMINING ECOLOGICAL IMPACT OF AMMONIA AS A SHIPPING FUEL

by Environmental Defense Fund



Outputs were tested across eight habitats using multiple ecological receptors in the report

A joint study released by Environmental Defense Fund (EDF), Lloyd's Register (LR), and Ricardo PLC examines the potential marine environmental impacts of Ammonia spills during its use as a shipping fuel.

Ammonia generated from renewable energy is considered a sustainable alternative to fossil fuels as the shipping industry decarbonizes. The study, which used extensive modelling due to the scarcity of real-world data, focuses specifically on the impacts of large Ammonia fuel spill scenarios on marine habitats.

Potential effects on aquatic environments and associated ecological receptors were assessed in scenarios if a spill were to occur during bunkering, or in the case of a ship's collision and sinking. In addition, possible mitigation measures and specific spill management practices for these scenarios were modelled and studied.

"The shipping industry must make a rapid energy transition to address the climate emergency. But it is also clear that we must proceed with caution. We owe it to future generations to ensure we are championing true climate solutions that will not negatively impact our rivers, our oceans or our health," said Marie Hubatova, Director of Global Shipping for EDF's Global Transport team.

The study examined potential Ammonia fuel spills during bunkering and collision scenarios, under a variety of conditions, including time of day, temperature, humidity and solar radiation. The outputs were tested across eight habitats (rivers,

estuaries, wetlands, coastal waters, coral reefs, mangroves, polar regions and the deep sea) using multiple ecological receptors (bacteria, plankton, macrophytes, invertebrates, fish, birds, reptiles, and marine mammals).

The study found that estuaries, mangroves and wetlands are particularly sensitive to potential Ammonia fuel spills compared to the polar regions and the deep sea. Within these habitats, it is typically fish which are most sensitive to an Ammonia spill, with birds and mammals to a lesser degree.

Lauren Dawson, Senior Consultant, Water and Environment Practice, Ricardo, said:

"Examining the impact of Ammonia is a challenge because of the vast conditions a ship might face while at sea or even when bunkered. Critical factors to consider include the various ship and storage types, the underlying principles which determine the fate of Ammonia in the environment, and the diversity of aquatic habitats and species that could be affected. Ultimately, what we found is that Ammonia is more threatening to fish species, and particularly to ecosystems with less saline water and higher temperatures."

It is therefore important to study the impact of Ammonia carefully for particular regions where these habitats intersect with major shipping channels and ports, such as the Strait of Malacca. The findings of the report provide an excellent step forward to delivering a baseline upon which future assessments can be refined."

The results were then compared to previously studied habitat and species sensitivity to conventional oil-based fuels. Overall, an Ammonia spill has a relatively smaller dispersion distance and lower persistence within the environment when compared to heavy fuel oil (HFO) and marine gas oil (MGO).

Existing reports show that oil-based fuels have higher impacts on invertebrates and birds, compared with Ammonia. Ammonia has a medium impact on all other ecological receptors, except bacteria, whereas oil-based fuels have medium impacts on plankton, fish, macrophytes, reptiles and marine mammals (see the Table summarizing the environmental impact level in page 5 of our summary report).

While the maritime industry has prior experience with Ammonia transported in gas carriers and used as refrigerant, the introduction of Ammonia as a shipping fuel creates new challenges related to safe bunkering, storage, supply and consumption for different ship types. The potential toxicity of Ammonia cannot be ignored; without mitigation measures and solid spill management practices, an Ammonia fuel spill could have negative impacts on aquatic environments. Therefore, a robust regulatory framework must be developed for Ammonia to be a viable, low carbon alternative for shipping.

“There are many questions around the use of Ammonia as a shipping fuel. Studies like this support the industry’s understanding of the environmental impacts as well as the operational and safety challenges. Greater clarity about the risks posed to marine ecosystems will allow industry stakeholders to make better informed decisions on the multiple transition pathways

under consideration,” said Andy Franks, Senior Risk Specialist, LR Maritime Decarbonization Hub.

This study presents a first look at Ammonia’s potential ecological impacts as a fuel. Further research is needed to evaluate the full range of ecological and health implications (especially to a ship’s crew) of Ammonia, including the increased nitrogen deposition from chronic Ammonia leakage and combustion by-products to determine its safety.

“All future fuels come with specific challenges. We have been using oil to power ships for almost a century now and we had to learn how to do so in a safe way. We can’t go through the same process with Ammonia,” said Ricardo’s Hubatova. *“We have to make sure we get it right from the very beginning. A robust regulatory framework and good management practices are essential for the safe use of Ammonia.”*

Depending upon its safety, Ammonia produced with renewable energy is already projected as one of the possible main future fuels of shipping. It is estimated that maritime shipping emits approximately 1,056 million tons of carbon dioxide (CO2) per annum and is responsible for nearly 3% of global greenhouse gas emissions.

You may download the full report and executive summary from: [Alternative fuels for shipping | Environmental Defense Fund \(edf.org\)](https://www.edf.org/alternative-fuels-for-shipping)

Source: <https://www.lr.org/en/latest-news/new-Ammonia-report-on-impact-to-diverse-habitats/>



HOW DOES OVERFISHING THREATEN CORAL REEFS?

by NOAA

Overfishing can deplete key reef species and damage coral habitat.

THREATS TO CORAL REEFS OVERFISHING

Coral reef fish are a significant food source for over a billion people worldwide. Many coastal and island communities depend on coral reef fisheries for their economic, social, and cultural benefits.

BUT too much of a good thing can be bad for coral reefs.

FISHING NURSERIES
Nearshore habitats serve as nurseries for many fish. Catching young fish in nets removes them before they can help replenish the population.

MARINE DEBRIS
Traps set too close to reefs and marine debris, such as ghost traps, lost nets, monofilament, and lines, can damage coral reefs, which take a long time to recover.

INDISCRIMINATE FISHING
Use of non-selective gears, like nets and traps, often removes more herbivorous fishes. These fish eat algae and help keep the ecosystem in balance.

FISHING SPawning AGGREGATIONS
Some species gather in large numbers at predictable times and locations to mate. Spawning aggregations are particularly vulnerable to overfishing.

FISHING TOO MANY BIG FISH
Large fish produce more young that are likely to survive to adulthood. Their absence means fish populations dwindle over time.

HOW YOU CAN HELP

- Educate yourself on local fishing rules and regulations. Your state fishery agency or bait and tackle shop can help you learn more.
- Make sustainable seafood choices. Learn more at www.FishWatch.gov.
- Only take what you need. Catch and release fish that you don't plan to eat.
- Be a responsible aquarium owner. Know where your fish come from and **DO NOT** release unwanted fish into the wild.

MARITIME ENVIRONMENT

Coral reef fish are a significant food source for over a billion people worldwide. Many coastal and island communities depend on coral reef fisheries for their economic, social, and cultural benefits. But too much of a good thing can be bad for coral reefs.

Coral reef ecosystems support important commercial, recreational, and subsistence fishery resources in the U.S and its territories. Fishing also plays a central social and cultural role in many island and coastal communities, where it is often a critical source of food and income.

The impacts from unsustainable fishing on coral reef areas can lead to the depletion of key reef species in many locations. Such losses often have a ripple effect, not just on the coral reef ecosystems themselves, but also on the local economies that depend on them. Additionally, certain types of fishing gear can inflict serious physical damage to coral reefs, seagrass beds, and other important marine habitats.

Coral reef fisheries, though often relatively small in scale, may have disproportionately large impacts on the ecosystem if conducted unsustainably. Rapid human population growth, increased demand, use of more efficient fishery technologies, and inadequate management and enforcement have led to the depletion of key reef species and habitat damage in many locations.

Threats to coral reefs: Overfishing

Coral reef fish are a significant food source for over billion people worldwide. Many coastal and island communities depend on coral reef fisheries for their economic, social, and culture benefits. But too much of a good thing can be bad for coral reefs. 🚤

Source: <https://oceanservice.noaa.gov/facts/coral-overfishing.html>

• Fishing Nurseries

Nearshore habitats serve as nurseries for many fish. Catching young fish in nets removes them before they can help replenish the population.

• Marine Debris

Traps set too close to reefs and marine debris, such as ghost traps lost nets, monofilament, and lines can damage coral reefs, which take a long time to recover.

• Indiscriminate Fishing

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Some species gather in large numbers at predictable times and locations to mate. Spawning aggregations are particularly vulnerable to overfishing.

• Fishing Too Many Big Fish

Large fish produce more young that are likely to survive to adulthood. Their absence means fish populations dwindle over time.

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- Learn more: www.fishwatch.gov
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PHL CONVEYS ACCOMPLISHMENTS UNDER A MARINE ENVIRONMENT PROJECT

by MARINA



As the Marine Environment Protection of the Southeast Asian Seas (MEPSEAS) Project will mark its end in December 2022, the Philippines, as one of the Lead Partnering Countries (LPCs), shared its accomplishments from the said project during the Third High-Level Regional Meeting on MEPSEAS held on 25 to 27 October 2022 at Ha Long Bay, Viet Nam.

The Philippine delegation headed by the Maritime Industry Authority (MARINA) Deputy Administrator for Operations (DAO) Nannette Z. Villamor–Dinopol, provided the country’s benefits and plans of sustaining the gains from the MEPSEAS Project.

“The Philippines aims to mobilize a whole-of-nation approach cooperation in protecting, conserving, and managing the marine environment and natural resources for the present and future generation,” DAO Dinopol highlighted.

In her presentation, she shared the institutionalization of a National Task Force dedicated to facilitate the ratification of, accession to and implementation of maritime conventions through the establishment of the Inter-agency Coordinating Committee to Facilitate the Ratification of and Accession to and Implementation of Maritime Conventions (ICCFRAIMC), which was created through Executive Order No. 159.

Likewise, she reported the improved procedure for ratification and implementation of International Maritime Organization (IMO) Instruments through the adoption of a Roadmap for the Ratification and Implementation of Maritime Conventions by each concerned agency.

Further, DAO Dinopol presented the following issuances by the MARINA as the National Focal Point for the MEPSEAS Project: (a) MARINA Quality Procedure No. 04-01, series of 2021 or the Procedures on the Ratification and Implementation of Maritime Conventions; and (b) MARINA Administrative Order No. 16-22, series of 2022 or the Guidelines on the Formulation, Revision and Referencing of Memorandum Circulars, Proposed Bills, Draft Executive Orders, Draft Department Orders, Implementing Rules and Regulations of a Law and Circulars.

DAO Dinopol also informed the attendees that the country is preparing its National Strategic Action Plan Framework, following the eight (key components in the implementation of other Maritime Conventions.


Meanwhile, Engr. Ramon C. Hernandez, Director of the MARINA Shipyards Regulation Service, shared the operationalization of the Maritime Training Institute (MarTi) which serves as the implementing and administrative entity for the development of human resources in MARINA and the maritime sector as a whole.

MarTi also aims to increase the number of competent and qualified maritime professionals/workforce in the country through the conduct of training, workshops, and other related formal and informal educational programs in compliance with the national and international best standards.

He also reported about the implementation of the Ballast Water Management (BWM) and Anti-Fouling Systems (AFS) Conventions as part of the Marine Environment Protection Strategy, which is under the Program 10 of the 10-year Maritime Industry Development Plan (MIDP) and the strengthened partnership with relevant government agencies and funding institutions.

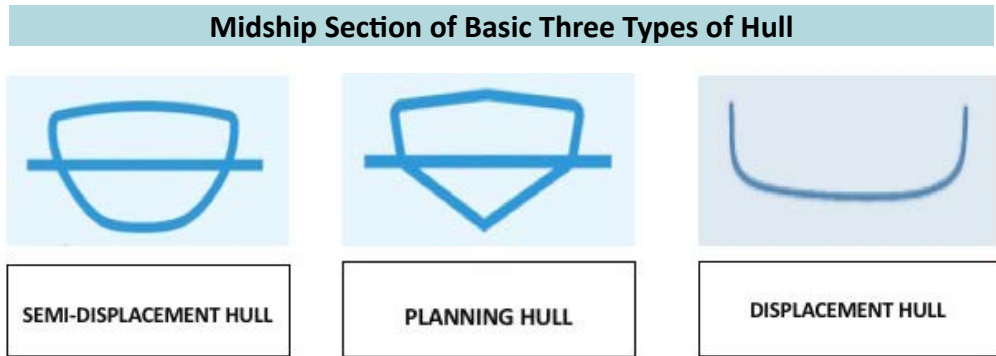
He likewise provided the updates on the activities undertaken by the Government of the Philippines based on the National Strategic Action Plan (NSAP).

The Philippine delegation is composed of the MARINA Deputy Administrator for Operations Nannette Villamor–Dinopol, MARINA – SRS Director Engr. Ramon C. Hernandez, Officer-in-Charge of the MARINA – Overseas Shipping Service (OSS), Ms. Precila C. Jara, and MEPSEAS National Consultants.

The MEPSEAS Project is a 5-year project (2017-2022) of the IMO in cooperation with the Norwegian Agency for the Development (NORAD) providing assistance to East Asian countries in ratifying and implementing IMO Instruments for the protection of the marine environment. 

BASIC NAVAL ARCHITECTURE AND MARINE ENGINEERING REVIEW NOTES

by CAPT Tomas D Baino PN (Ret)



INTRODUCTION. This article is a product of research by the author on three types of hulls mainly used in the design of fast patrol boats, frigates, and transport vessels of the Navy.

1. Three Types of Hull

- Planning Hull – designed for motor torpedo boats that typically have a displacement of about 250 tons with a deep V midship section in order to ride on top of the water with greater speed and power.

Main Characteristics:

- » Weight sensitive; hull is made of light-weight materials;
- » Deep “V” hard chime section of the hull with small draft at waterline;
- » Propulsion unit consists of lightweight engine, high revolution per minute, diesel or gasoline marine engine;
- » Minimum or very small freeboard margin or reserve of buoyancy;
- » Not suitable in rough sea operations; limited to calm water coastal operation;
- » Attainable speed in excess of 30 knots during calm sea conditions; and
- » Limited capacity payload.

Fig. 1
Motor Torpedo Boats



Semi-displacement Hull – commonly used in the design of frigates and destroyers with a sharp fine bow in order to slice through the water with reduced bow waves, and frictional resistance with greater speed between approximately 18 to 30 knots.

Main Characteristics:

- » Limited cargo capacity; hull is made of exotic light-weight materials;
- » Has a sharp bow to reduce bow wave resistance between hull forward section and water frictional resistance;
- » Very sleek design with limited displacement not greater than 2500 tons;
- » Propulsion units consists of typical medium speed, revolution per minute of marine diesel engines;
- » High freeboard typically greater than planning hull with sufficient reserve of buoyancy;
- » Limited suitability in rough sea operations up to sea state 6 with wave height not greater than 2 to 3 meters high;
- » Attainable speed typically not greater than 30 knots during calm sea cruising; and
- » Medium capacity pay load.

Fig. 2
Combatant Ship



- **Displacement type Hull** – designed with greater displacement capacity and large reserve of buoyancy. Because of greater hull displacement, this type of design ploughs through the water in the speed of advance. Logistical support vessels and transport vessels are examples.

Main Characteristics:

- » Non-weight-sensitive hull made of high tensile strength materials;

- » Large body section for greater cargo capacity;
- » Propulsion unit consists of heavy weight, slow speed revolutions per minute; bunker oil or diesel engine;
- » Very high freeboard with greater margin of reserve buoyancy;
- » Very suitable for rough seas or all-weather operation at high seas;
- » Attainable speed typically not greater than 24 knots; and
- » Bigger capacity payload.

OBSERVATIONS

A MILESTONE IN HULL DESIGN IMPROVEMENT OF DISPLACEMENT TYPE HULL

Fig. 3a

Original Hull Design of a Blunt Bow



Hull forward section is a blunt bow which creates bow waves with greater frictional resistance. Wave turbulence at the forward waterline is more pronounced.

Fig. 3b

New Design with Sharp Bow and Laminar Flow



Sharp bow design replaced the blunt bow; with a reduced bow wave frictional resistance with laminar wave flow at the forward waterline at the bow.

DIAGRAM OF THE DIFFERENCE OF LAMINAR FLOW AND TURBULENT FLOW OF WATER AROUND THE HULL

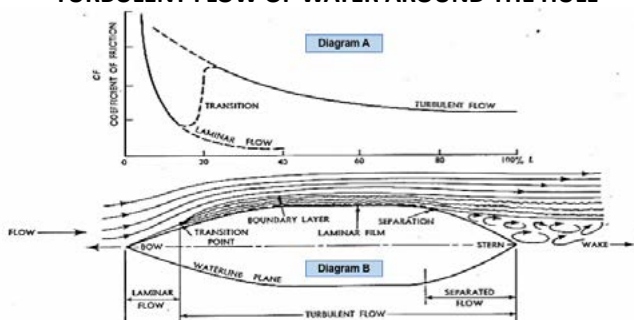


Fig. 3c

The resistance in **Diagram A** shows that turbulent flow at the bow is greater in a **blunt bow** which greatly affects the speed of advance of a vessel with greater fuel consumption and not proportionate to the speed of advance. Whereas, a **sharp bow** has a laminar flow that slices through the water which is proportionate to the speed of advance, and proportionate to fuel and power usage per nautical run made good.

Diagram B shows the coefficient of friction versus the water line length of the ship's hull; a vessel with a sharp bow shows laminar flow at the boundary layer and slices the water with less friction resistance at 20% of the waterline length. At this point, turbulence flow occurs as the sharp bow slices through the water instead of pushing the water with greater bow wave frictional resistance.

RECOMMENDATION. Bow wave frictional resistance is always the main concern of the Naval Architect in the design of vessels so as to balance the proportionate amount of power needed with the most economical means of fuel consumption per nautical mile run made good in cruising at sea. Modern tank tests and computer-generated designs can balance accurately. A hybrid design of a vessel between displacement and semi-displacement is good for economy of operation. 🚢

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ABOUT THE AUTHOR



CAPT Tomas D Baino is a registered naval architect and civil engineer in the Professional Regulation Commission in the Philippines. He was a former instructor on Basic Naval Architecture Stability and Trim at the Naval Officer Qualification Course at the Naval Training Command of the Philippine Navy and Basic Naval Architecture at the Philippine Military Academy, Baguio City. Likewise, his part time job is also to teach Basic Naval Architecture at NAMEI Polytechnic Institute. He was the former Commanding Officer of the Naval Shipyard, Philippine Navy and was involved in co-production of the 78-Foot Gunboat with Halter Marine Shipyard of USA and Patrol Craft Escort Refit Program of the Philippine Navy and Joint United States Military Advisory Group.

Upon his retirement from the NAVY in 2004, he served as a consultant with BFAR for the acquisition of Fishery Monitoring Control Vessel from Spain, and also with DOTr for the acquisition of 12 Multi-Role Response Vessel for the PCG under JICA Loan Grant. He served with the Development Bank of the Philippines Maritime Leasing Corporation in 2006 for local construction of RORO Vessels.

He earned a post graduate diploma in Naval Architecture at the University College of London specializing in Submarine Design under the sponsorship of UK Ministry of Defense and training in Hydrodynamic with Defense Evaluation Research Agency also in UK. He also had undergone an orientation seminar with Blomh and Voss on MEKO Warship Design and Construction in Hamburg, Germany.

PN RESERVIST - A LIFE OF SACRIFICE AND COMMITMENT AND IT'S ALL WORTH IT

by LTJG Christian R Chua PN(Res)

Many, up to now, refer to AFP Reservists as "Reservist lang" by which they mean we are not part, or of a lower class compared with the regular force counterpart. They seem to think that we do not share the same "courage" and "heroism" as with a regular soldier, when the time comes for an actual battle to call on us. Unfortunately, the only time we can prove ourselves is when that time comes. But by God's grace, and fortunately for us, that day has not come upon us yet, as war or battle is the last thing any human being would ever want, most especially the soldiers who have committed to lay down their lives to fight.

Nevertheless, before I say more about the PN Reserve Force, please allow me to express my respect to our brothers in the AFP Regular Force, as they are the ones whose vocation has been to answer the call of duty for the protection and security of our country.

To be a soldier –that is what we Reservists want to be– we admire the discipline, the courage, the sacrifice and commitment, and the honor that goes along with it. As PN Reservists, we are earnestly giving all we have to become a good sailor, to mirror our regular navy comrades. Although we are hungry for education and training towards military proficiency, and thirsty for extensive knowledge and military professionalism, we aim to give back beyond our best to improve the environs while strictly observing military protocols and adhering to the chain of command, which is the core virtue of the military that we ultimately admire.

A Life of Sacrifice

While we are judged to be "reservist lang" by the general public, little do they know that PN Reservists also have their share of sacrifice to be able to sustain their participation in the naval activities. Aside from their absence from their families during supposedly precious day-offs, oftentimes they have to leave from work that can cost them a portion of their livelihood. They pay for their transportation to and from the camps during activities, and at times some other provisions. They pay for their documentary requirements which includes government clearances, papers, and prints. They are even willing to provide for their own uniforms if they have to, just to present themselves worthy alongside their regular comrades.

The PN Reserve Force is composed mostly of these ordinary people doing their fair share of their bit to do extraordinary achievements for the country and its citizens. They are a father providing just enough for his family but still spending to be where they need to be during mission; a mother leaving her children for her reservist duty; an employee multi-tasking to be able to do their reservist function; a leader working late nights for his troops; or administrative staff doing accounting and motivating

their personnel in their PNRF organization. We are just as ordinary as the majority of the Filipinos, financially and professionally, but with the heart and passion to serve our fellowmen and others who are in need.

A Life of Commitments

Like any organization, I would say, the PNRF is not a perfect one, and will never be, as there is no such thing. All organizations have their gaps to connect and improvements to be implemented. There is this fact that there are a lot of things needed to be done "in the" and "for the" organization. But on the other hand, that is the very reason why we reservists are volunteering our time and expertise, "para makatulong" (to be able to assist) the PN and the AFP.

However, the familiarity of an AFP Reservist with civilian organization, while being new to the AFP organization, they will be faced with military protocols, policies and requirements that are confined only to military organizations. Not to mention the management and motivating of volunteers. The challenge of adjustment is really of great extent, including the demand for time. Many in fact lose their interest, and will simply no longer show up.

Again, we will have to go back as to why we have joined as a reservist, which is basically the passion for duty, honor and the prestige of the military culture and discipline. We can always join any organization conducting community service, rescue operations, or the ones aiming for socio-economic development, but we prefer to do all these while preparing ourselves to defend our country.

These challenges to be faced, being a reservist is not a life of privilege but a life of service. One must possess a high level of commitment to serve, as well as to be able to persevere and contribute to the national security and defense of our country.

It is All Worth It

With all humility, I am deeply honored to share a few of the numerous valuable contributions of the PN Reserve Force.

Along with regular counterparts and many other government agencies, the AFP Reserve Force nationwide was a big portion of the AFP contingent in the fight against Covid-19 serving in security detail, administrative, or medical fronts, during hard lockdowns and quarantines, ensuring safety, security of the citizens, and control of the virus.

During the height of the Covid-19 pandemic, PN Reservists faced the deadly risk yet were at the forefront, repacking, hauling, and distributing relief goods operations in Metro Manila, providing food lifeline to thousands of families that are confined to their homes, and denied of work-generated income due to lockdowns.

Furthermore, PN Reservists are perpetual participants of

Furthermore, PN Reservists are perpetual participants of several Civil Military Operations delivering medical and dental services to the less fortunate, and connecting with our people.

Technical expertise were also shared by our highly trained and experienced maritime shipping captains and chief engineers. They have provided valuable recommendations and information with regard to the safety standards, maintenance and upkeep of our PN Vessels.

Our Duty

Everyone in the PN Organization has a role to fulfill, and each one is as equally important as the other. Our part and duty as a PN Reservist plays a vital contribution to the much needed human assistance development of our countrymen. In this fast changing geo-political, social, and natural environmental situations in the

world, the PN Organization will need much more additional hands of a trained and organized force that they can seamlessly work with at the snap-of-a-finger for our country’s humanitarian work and territorial defense needs.

All the sacrifices and commitments made by Reservists in the Naval Reserve Command –and to many more sacrifices and commitments as we move forward– I attest that it is all worth the personal resources and selfless efforts expended by each Reservist to achieve the goals and objectives of each of their missions. It is for every person we were able to help and give hope to, every enemy we were able to deter, and every inch of our territory that we keep.

It is in this vein that I hope many more will join to press on and be ready for our next mission. 🚢

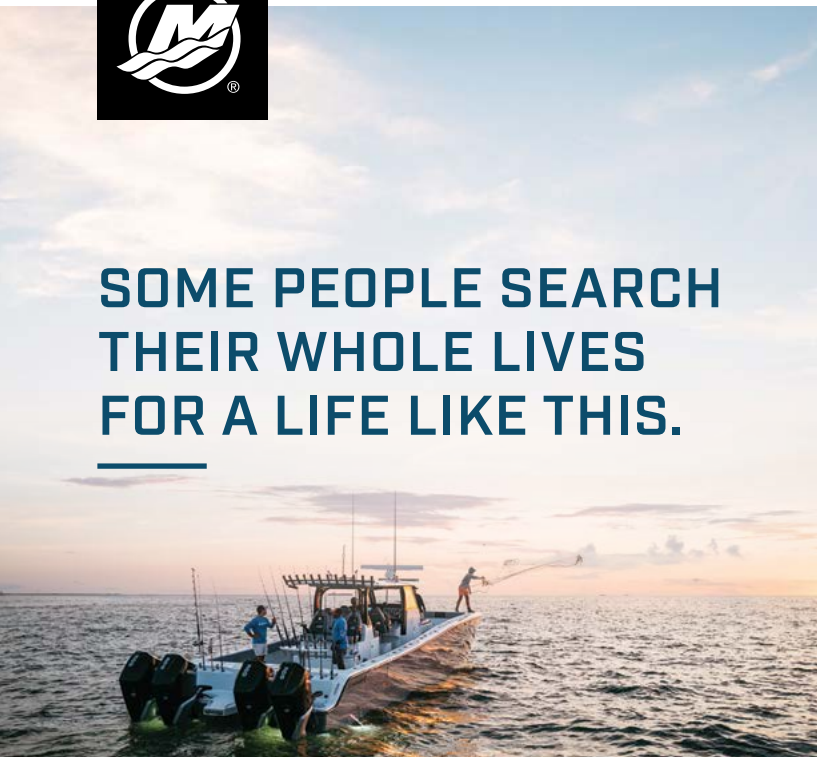


LTJG Christian R Chua PN(RES) as Reservist of the Year.





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FAST-GROWING TILAPIA HARVESTED AFTER USING NFRDI TECHNOLOGY

by DA-NFRDI



Through the Department of Agriculture-National Fisheries Research and Development Institute's (DA-NFRDI) technology demonstration on tilapia culture that highlights the use of quality strains and extruded floating feeds (EEF), tilapia can be harvested within 3 months after reaching its marketable size.

On 6-September-2022, a total of 189.5 kilograms of the Nile and Red tilapia were harvested from the Villar SIPAG Farm School in San Jose del Monte, Bulacan. NFRDI researchers taught the farm school staff the best practices for culture tilapia based on scientific studies. "Ang mga pinalaking tilapia dito sa Villar SIPAG Farm School ay strain ng Nile at Red Tilapia galing sa BFAR-National Freshwater Fisheries Technology Center (BFAR-NFFTC). Pinili namin na male tilapia fingerlings ang ihulog sa pond para mas mabilis ang kanilang paglaki. Extruded floating feeds ang pinakain namin dito para mas cost efficient. Bahagi ng technology demo natin ay ang pagtuturo ng tamang kaalaman kung paano alagaan, pakainin, at palakihin ang mga tilapia," said Frederick Muyot, senior science research specialist, Freshwater Fisheries Research and Development Center of NFRDI.

(The tilapia chosen for the Villar SIPAG Farm School is a strain of the Nile and Red Tilapia from BFAR-National Freshwater Fisheries Technology Center (BFAR NFFTC). They chose the male fingerlings for a higher certainty of fast growth. The fingerlings were fed with extruded floating feeds for cost efficiency. Part of the technology demo is teaching the right knowledge about how to care, feed, and grow tilapia fingerlings, said Frederick Muyot.)

He added that aside from being more nutritious, good-tasting, and highly digestible, the EEF is efficient and environment-friendly compared to sinking feeds. "This type of feed is proven to be more effective in increasing growth performance compared to other feed types resulting in more harvest by 19% - 35%, and promotes higher weight gain and uniform sizes of fish at harvest," he added.

The technology demonstration on tilapia culture is a collaborative effort of NFRDI, BFAR-NFFTC, and Villar SIPAG Farm School to showcase fishery technologies for increased income of fish farmers and contribute to the overall fish production of the country. 🚩

FRP BOATS FROM BFAR-7 TO ASTURIAS, CEBU

by BFAR-7

BFAR-7, through the Cebu Provincial Fishery Office (PFO), granted Php245,000 worth of fishery livelihood projects to the Asturias Municipal Government to help the town's small-scale fishermen.

Cebu PFO turned over on Friday, 2-September-2022 the projects, specifically two 30-footer fiberglass reinforced plastic (FRP) boats; one 20-footer FRP boat; and five sets of gill nets.

The FRP boats, in particular, were sent with marine engines and complete accessories.

These projects were earmarked this year under the Targeted Actions to Reduce Poverty and Generate Economic Transformation (TARGET) program, which aims to provide livelihood interventions to "targeted" fishing communities to alleviate the poverty situation among the marginalized fisherfolk sector.

The project cost, which was allotted under the TARGET program, was estimated at Php245,000: Php140,000 of which was allocated for the two 30-footer boats; Php50,000 for the 20-footer boat; and P55,000 for the five gill nets. 🚤



Details & Photos | Nimrod Ursora & Aldrin Vargas, BFAR-7 Cebu PFO

COMMANDER OF U.S. MARINE CORPS FORCES PACIFIC AIMS FOR BETTER ACCORD WITH PH NAVY IN VISIT

by Philippine Navy



NAVAL STATION JOSE ANDRADA, Manila – The Commander of the U.S. Marine Corps Forces Pacific visited the Philippine Navy (PN) headquarters on 11-November, and discussed about strengthening the relationship between the U.S. and the Philippines. LT GENERAL William Jurney was received by the acting Flag Officer in Command, MAJ GENERAL Jonas Lumawag, during the former's courtesy call with the aim to sustain ties with PH counterparts.

"We are very happy for your continuous help in modernizing the PN and Marines by simply helping us with exercises," MGEN Lumawag stated.

"We can plan for the things that would benefit the both of us and project those things, there is always room for all of us to get better," LTGEN Jurney conveyed.

Recognizing and honoring veterans were also among the reasons of LTGEN Jurney's visit. 🚩



THE CITY OF PULA, CROATIA RECEIVES ITS FIRST FRIEND OF THE SEA SUSTAINABLE AWARD

by Friend of the Sea



*In a first, Friend of the Sea Confers the Sustainable City Award to Pula in Croatia
Photo Credit: Friend of the Sea*

The City of Pula, Croatia has become the first on the global stage to receive the Friend of the Sea Sustainable City Award. This special recognition was delivered on 17-June-2022 by the Founder and Director of the international certification program, Paolo Bray. The award praises the city's efforts to preserve the environment and improve its citizens' quality of life by embracing sustainable solutions.

The Croatian city stands out for its many sustainable initiatives to increase environmentally responsible behaviors among its citizens and promote nature conservation. The award was received by the Head of the Administrative Department for Local Self-Government of the City of Pula, Anja Ademi.

Friend of the Sea, a project from the World Sustainability Organization that promotes sustainable practices for protecting the marine ecosystem, has recognized the City of Pula for its commitment to preserve and protect the environment and its species.

"We recognize the city of Pula's impressive record in adopting sustainable practices and marine conservation initiatives. For this reason, we decided to award it with the Friend of the Sea placard," said Paolo Bray, Founder and Director of the World Sustainability Organization.

"Hopefully, this recognition will present additional motivation for local companies, organizations, and operators to seek further improvements in the domain of environmental awareness and spur them to apply for the Friend of the Sea certificate," Dr. Bray adds.

The City of Pula is also among the 100 most sustainable destinations in the world, demonstrating its ability to work with all its stakeholders, particularly environmentally conscious companies, individuals, and associations committed to adopting sustainability.

Recently, the incumbent mayor of Pula, Filip Zoričić, pledged to involve companies and operators to move toward sustainable practices by 2025.

Numerous initiatives have been carried out over the past


years to improve the state of the environment in Pula, in particular, to address the climate crisis.

Apart from the City of Pula, on June 17th, Friend of the Sea also awarded the Sustainable Aquarium certification to the Pula Aquarium for its contribution to promoting environmental policies and animal welfare. During the official ceremony, a sea turtle rehabilitated in the Aquarium's Rescue Center was released into the sea at Ambrela beach.

Ambrela Beach, one of the city's most popular seaside spots, is currently undergoing the last stages of the certification process to receive the Friend of the Sea Sustainable Beaches label. The requirements include complying with proper waste disposal, environmental awareness, the absence of disposable plastic, water quality, and respect for the natural ecosystem.

Some of the activities that the City of Pula has implemented to improve the environmental conditions, particularly in the domain of climate change mitigation, include: the establishment and continuous improvement of the waste management system, a green model of storm water drainage in urban areas, rainwater generation gardens, new eco-buses that use compressed natural gas, sustainable public transport options with electric bicycles and electric scooters, continuous expansion of bicycle path networks and enrichment with new facilities (including smart benches and charging stations), as well as the implementation of energy renovation projects of buildings and many educational initiatives.

In addition to the already implemented activities, the City of Pula plans to introduce other environmentally friendly measures such as co-financing the purchase of energy-saving devices and the installation of solar panels.

The World Sustainability Organization is an international non-governmental organization whose goal is to mainstream sustainability to protect the planet and endangered species by encouraging businesses to adopt environmentally responsible practices through its two main certification programs – Friend of the Sea and Friend of the Earth. 



NAVAL AIR WING SENDS OFF SCANEAGLE UAS ALPHA FLIGHT


by Naval Air Wing - Philippine Fleet



Sangley Point, Cavite City, September 2022 – The Naval Air Wing (NAW) conducted a simple send-off ceremony of the ScanEagle Unmanned Aerial System (UAS) at Headquarters Naval Air Wing, Naval Base Heracleo Alano, Sangley Point, Cavite City. Said ceremony was spearheaded by CAPT JUARIO C MARAYAG PN(GSC), Acting Commander, Naval Air Wing.

The send-off ceremony marks the first deployment for the Maritime Unmanned Aerial Reconnaissance Squadron 71 (MUARS71), NAW after completing their 1-year in-country training.

The “Alpha Flight” of MUARS-71 is composed of five (5) officers and nine (9) maintenance crew. This is their first deployment for this type of air asset for the Philippine Navy to conduct different missions like patrols and surveillance to secure the sovereignty of our nation.

The ScanEagle UAS was acquired by the Philippine Navy from the United States and it was formally accepted on 25- November-2020 at Magluyan Hall, Naval Base Heracleo Alano, Sangley Point, Cavite City. 

MARITIME LEAGUE VP REELECTED AS AGFO PRESIDENT

by RAdm Margarito V Sanchez AFP(Ret)



The Association of General and Flag Officers (AGFO) Inc., reelected Maritime League Vice President VAdm Emilio C Marayag Jr AFP(Ret) as President and Board Chairman for CY 2023 during the recently conducted Annual Membership Meeting and Election on 25-November-2022 at Camp General Emilio Aguinaldo, Quezon City. Admiral Marayag will serve his second year as President and his fifth year as member of the Board.

Among those elected for a 3-year term were 3 Maritime League (ML) members – LtGen Edilberto Adan, ML Secretary VAdm Edmund Tan and BGen Ramona Go, and 2 retired Army generals MGen Gerardo Layug and BGen Miguel Sol.

Also elected were BGen Restituto Aguilar and BGen Romeo Fajardo who will serve for a 2-year and 1-year term, respectively.

The other members of the Board are LtGen Oscar Rabena, PMGen German Doria, ML Member Commo Amado Sanglay, PBGen Jose Bandong Jr., BGen Robert Theodore Romero, PBGen Crisogono and BGen Andrew Regacho.

Before his reelection VAdm Marayag rendered his annual report to the assembly highlighting the Association's significant activities covering member's welfare, fellowship activities, board and management team actions, financial status and pending projects due for completion in 2023. He also enjoined the members to actively participate in AGFO affairs and to make the Association, as its founding fathers conceived, a "cradle of noble heroes" given the looming security challenges, from economic and social well-being to climate change and maritime zone defense. 🚩



U.S. PROVIDES MEDICAL TRAINING AND EQUIPMENT TO SUPPORT PCG OPERATIONS IN PALAWAN

by U.S. Embassy Manila



Members of the PCG receive dive equipment donated by the U.S. Embassy Civil Affairs Team during a turnover ceremony aboard the BRP Teresa Magbanua on 5 November.

Manila, 10-November-2022—The U.S. Embassy Civil Affairs Team (CAT) recently donated medical and dive equipment and conducted training for the Philippine Coast Guard (PCG) to support search and rescue and maritime law enforcement operations in Palawan.

On 5 November, the donation of 12 sets of dive equipment and emergency medical supplies was turned over to the PCG aboard the MRRV-9701 Teresa Magbanua—the largest vessel in the PCG fleet.

“The U.S. Embassy CAT is honored to continue its work with the PCG in Palawan to ensure that all crew members are prepared to respond to various maritime situation,” U.S. Embassy CAT Leader Capt. Stephen Coleman said at the turnover ceremony.

The equipment turnover marked the culmination of a five-day medical training led by the U.S. Embassy CAT to enhance the PCG’s trauma care and lifesaving capabilities during maritime security operations. The training was based on U.S. military guidelines for trauma life support in prehospital combat medicine.

“This medical first responder training is useful to our personnel here in the PCG district in Palawan. This is especially important for the members of the Special Operations Group who are the first responders during emergencies, including humanitarian response and disaster relief operations,” PCG District Palawan commander Commodore Rommel Supangan said in Pilipino. “This training gives them more knowledge to enable them to fulfill their missions.”



PCG personnel demonstrate lifesaving techniques at the culmination of a five-day medical training conducted by the U.S. Embassy Civil Affairs Team in Palawan.

U.S. Embassy CATs are a part of U.S. efforts to build shared capabilities with partner nations around the world. In the Philippines, they have collaborated with local government units, provincial disaster risk reduction and management offices, and the PCG on several initiatives, including disaster preparedness, medical first responder training, and support to local COVID-19 response 🚢

AROUND 800,000 SEAFARERS WILL NEED CARBON SKILL TRAINING BY MID-2030s

by Vicky Viray Mendoza

An estimated 800,000 seafarers will require additional training by the mid-2030s to enable the shipping industry to transition towards alternative low carbon fuels or zero-carbon fuels and green technologies. The goal is to keep global warming to 1.5C or less by 2050, according to a DNV Study commissioned by the Maritime Just Transition Task Force Secretariat.

Findings also point to the uncertainty of alternative fuel options which is causing knock-on effects on seafarer training. In its general conclusions, the report notes a lack of clarity, viability, and uptake of alternative fuels, and uncertainty over regulatory developments and finance, the confluence of which make it difficult to plan further training for seafarers. Once there is more certainty on the trajectory of the green fuel transition, it will be easier to train the seafarers.

DNV's study looked at three decarbonization forecast scenarios. The research modelled these scenarios based on the **50% Emission Reduction by 2050; Zero Carbon by 2050;** and Decarbonization by 2050.

The first scenario is based on IMO's original 2018 target of 50% Greenhouse Gas (GHG) Emission Reduction by 2050 that would require training of up to 300,000 seafarers to be able to work with green fuels by then.

The second scenario is the **Zero Carbon by 2050** that modelled Lloyds Register and University Maritime Advisory Services (UMAS). It foresees 450,000 seafarers would require additional training by 2030.

The third scenario which aims for full industry-wide **Decarbonization by 2050**, will require additional seafarer training, involving an additional 800,000 seafarers by the mid-2030s who will handle alternative fuel mixes by then.

Under all three scenarios, there is an immediate need to start building the seafarer training infrastructure in place. Nearly 2 million seafarers will need to be upskilled through the green transition process. Otherwise, a skills gap will hit the maritime workers in the mid-2030s.

In response to the DNV report findings – that each of the three different scenarios for maritime emissions reduction would require thousands of seafarers to receive additional training – the **Maritime Just Transition Task Force** has put together a 10-point Action Plan at COP27 with practical recommendations for the shipping industry, governments, workers, and academics.

The Action Plan makes recommendations for industry, governments, seafarer unions, academia, and training providers in terms of meeting the challenge of training for alternative fuels. The recommendations are:

- Strengthening global training standards;
- Ensuring a health-and-safety-first approach; and
- Establishing advisory national maritime skills councils.

The recommendations of the Action Plan call for strengthening


training standards by overhauling STCW, and are thus set to upskill seafarers to meet the maritime decarbonization objectives. They are also to advise and oversee training and best green practices.

Are the seafarers in agreement to take on this challenge? *"The good news is that seafarers are prepared and willing to be part of this transition. But crew want to know that the fuels they're handling are indeed safe, and that we as an industry have the training pathways established to upgrade their skills,"* said Stephen Cotton, General Secretary, International Transport Workers' Federation (ITF).



National governments can revise and/or establish standards and training requirements for alternative fuel types through amendments to the STCW Convention at the International Maritime Organization. The Task Force aims to ensure seafarers who are the workers at the frontline of decarbonization are properly looked after and trained for the shipping sector's energy transition. The making of reskilled, upskilled, and new green skilled seafarers will need to be a collaborative effort by all stakeholders.

The research was undertaken to ensure that the shipping sector's response to the climate emergency puts seafarers and communities at the heart of the solution.

As such, maritime safety was likewise stressed by DNV Maritime CEO, Knut Ørbeck-Nilssen. *"Decarbonization is bringing new opportunities, new technologies but also new risks. Our first priority must be to achieve safe decarbonization. We must take a collaborative approach to safeguard our people, our ships, and our environment,"* he said. 

SOUTH CHINA SEA DISPUTES - A ZERO SUM UNDERTAKING

by Karl M Garcia

Conflicting island and Maritime claims are the subject matters for the South China Sea (SCS) territorial disputes. The sovereign states involved are some ASEAN nations; outside ASEAN would be Taiwan and China.

An estimated 3.37 Trillion worth of global trade passes through SCS annually which accounts for a third of the global maritime trade 80percent of China's energy imports and 39.5s% of China's total trade passes through the SCS.

The disputes involve both maritime boundaries and islands. There are several disputes, each of which involves a different collection of countries:

1. The Nine-Dash Line area claimed by the Republic of China (1912-1949), later the People's Republic of China (PRC), which covers most of the South China Sea and overlaps with the exclusive economic zones claims of Brunei, Indonesia, Malaysia, Philippines, Taiwan, and Vietnam.
2. Maritime boundary along the Vietnamese coast between PRC, Taiwan, and Vietnam.
3. Maritime boundary north of Borneo between the PR C, Malaysia, Brunei, Philippines, and Taiwan.
4. Islands, reefs, banks, and shoals in the South China Sea; Islands, reefs, banks, and shoals in the South China Sea to include Paracel Islands, Pratas Island, Vereker Banks, Macclesfield Bank, Scarborough Shoal, and the Spratly Islands between PRC, Taiwan, and Vietnam; and parts of the area contested by Malaysia and Philippines.
5. Maritime boundary in the waters north of the Natuna Islands between the PRC, Indonesia, Taiwan and Vietnam.
6. Maritime boundary off the coast of Palawan and Luzon between PRC, Philippines, and Taiwan.
7. Maritime boundary, land territory, and the islands of Sabah, Ambalat, between Indonesia, Malaysia, and Philippines.
8. Maritime boundary and islands in the Luzon Strait between PRC, Philippines, and Taiwan.

DOES MIGHT MAKE RIGHT?

Power Asymmetry

The concept of power asymmetry, developed by Brantly Womack, "inevitably creates differences in risk perception, attention, and interactive behavior between states, and ... can lead to a vicious circle of systemic misperception.

The rise of China has transformed the territorial disputes over the Paracels and Spratlys in the SCS from relatively low-level bilateral tensions into a litmus test for relations between a big power and its smaller neighbors.

How do Malaysia, Philippines, and Vietnam as relatively smaller or weaker states manage their respective claims in relation to great power China?

Malaysia's strategy may be described as one of accommodation and enmeshment, whereas Vietnam is engaged in a complex mix of internationalization, internal balancing, and assurance-seeking. In the Philippines, the strategy is one that relies on institutionalism and external soft balancing.

What strategies have the small states of Malaysia, Philippines

and Vietnam adopted to preserve and enhance their leverage against great power China in relation to their territorial claims?

Each of these states have employed different strategies, which depend on (1) the degree of threat perception or fear/suspicion of China (e.g., Malaysia being least suspicious and therefore most accommodating); (2) their strategic orientation culled from historical experience (e.g., internal balancing rather than alignment for Vietnam); (3) ideational or value preferences (e.g. institutionalism for the Philippines, non-alignment for Malaysia); or even (4) path dependence, or how history and past policies have locked in certain options (e.g., US alliance for Philippines).

A future research agenda arising from this exploratory paper will need to address questions such as: *Can a typology of small state strategies for dealing with asymmetry be developed based on a study of China-ASEAN relations? How successful have these strategies been in mitigating the effects of asymmetry and in promoting freedom of action for the smaller states? How does China itself deal with power asymmetry and manage perception problems in its relations with smaller states arising from its own size and strength?*

Solutions

Prof. Pankaj Jha a pundit for the Modern Diplomacy Magazine, proposed last 2020 when Vietnam was the ASEAN chair for Vietnam to do the following:

1. Institute a high powered committee to expedite and build consensus on the draft for the Code of Conduct or COC among ASEAN.
2. Undertake Trilateral Initiatives with dialogue partners and claimants.
3. Create a Standard Operating Procedure or SOP among ASEAN nations and release a statement maintain status quo.
4. Formulate a Treaty of Amity and Cooperation on the SCS.
5. Vietnam to make a universal appeal to the international community.

Mark J. Valencia wrote in Modern Diplomacy questioning the proposal for call for a United Stand against China as if China would allow it. He suggests not to do that approach. And, to be mindful of China's interests.

Bill Hayton, who is associated with the Yusof Ishak Institute, suggests to use the avenue of the ICJ, citing the Malaysia-Singapore example:

The ICJ was able to rule that Pedra Branca belonged to Singapore while Middle Rocks belonged to Malaysia even though the two are just a kilometer apart. It ruled in favor of Singapore over Pedra Branca mainly because Singapore had carried out acts of physical administration there, notably by building a lighthouse on the rock. The judges also specified a different fate for a third feature, South Ledge, because it is underwater at high tide and therefore not a 'territory.' It ruled that sovereignty could only be settled later, once the two countries had agreed on a boundary between their territorial seas.

The ICJ rejected Malaysia's vague claims that Pedra Branca had belonged to the Sultanate of Johor "from time immemorial"

and instead examined the documented evidence of occupation and administration. It reached a conclusion based on the international legal principle of *à titre de souverain*—asking which state could better demonstrate that it had exercised actual authority over the feature. While legal principles such as this have their origins in Medieval Europe, they can now be considered global. They have been used to adjudge disputes in contexts as diverse as the Red Sea and the Caribbean as well as in Southeast Asia. It would be quite possible to apply them to all the disputed islets in the South China Sea.

By ruling out vague claims of sovereignty “from time immemorial” and demanding specific evidence of physical acts of administration, the ICJ also gave the South China Sea claimants a route out of their impasse. Governments and their advisers do not need a comprehensive knowledge of every period of South China Sea history to reach conclusions about sovereignty. They simply need to examine the evidence for physical acts of occupation and administration by the different state authorities.

LCDR Arnold Enriquez PN wrote on the Philippine-Indonesia Border Agreement in the Royal Australian Navy Sea Power Soundings:

Prospects in the South China Sea Maritime boundaries and borders do not really exist in the South China Sea. As such, it is important to distinguish between maritime borders/boundaries and maritime frontiers in the maritime realm. Boundaries or borders are where political limits are demarcated, whereas frontiers tend to be rather flexible, since they are geographic zones where states have yet to establish complete political control or are in the process of doing so. Thus, a significant portion of the various claimed maritime zones in Southeast Asia may be considered as maritime frontiers.

Nevertheless, the recent conclusion of negotiations over maritime boundaries between Indonesia and the Philippines is a significant development for the two ASEAN member states. This is viewed as a positive turn amidst rising tensions in the South China Sea sparked by worsening disputes over competing maritime claims. The successful conclusion of the talks between Jakarta and Manila holds an important lesson for all claimant states over disputed waters in the South China Sea. The current prevailing law to settle maritime boundaries is articulated in the UNCLOS, which has a gravitas and consequence far beyond local custom. Thus, the Philippines–Indonesian Border Agreement clearly signifies the emergence of a state practice whereby a maritime boundary dispute shall be settled through and aligned with prevailing international law.

Further, the Maritime Border Agreement of the Philippines and Indonesia is a prime example of conflict prevention and management of disputes regardless of the existence of boundaries. They have shown that it can be done by putting shared aspirations and common interests forward for the sake of regional stability and security. (16 Issue 43, 2021). Conclusion. As a democracy, a maritime nation and member of the community of nations, the Philippines has a vested interest in becoming a more influential and constructive actor in the security affairs of the region. This means that the Philippines will need to pay greater attention to the strategic dimension of its treaty commitments, its multilateral relationships, and to work more cooperatively on transnational issues.

Strengthening and nurturing bilateral relations is undeniably a prerequisite for initiating border negotiations as it affects success

particularly in addressing maritime border issues. The favorable outcome of the Philippines–Indonesia Maritime Border Agreement has shown how good diplomatic relations between neighboring countries are important to maritime border settlement. It has also been proven that collaborative approaches or any similar undertakings may successfully end border disputes with proper consideration for the prevailing international law. Although the author also considers certain prerequisites are necessary and not all disputes can be easily settled in the same manner, as is the case in the South China Sea, nevertheless it can still be done. The Philippines–Indonesia Maritime Border Agreement was instrumental in the promotion of peace and stability in the Southeast Asian region with the expansion to other agreements such as the TCA in addressing terrorism. This Maritime Border Agreement has certainly opened more opportunities for collaboration and cooperation, not only with Indonesia but also with the rest of the ASEAN member states, especially in acknowledging the dynamic and volatile security environment in Southeast Asia and the rest of the world.

Conclusion. There must always be a balance of diplomatic solutions and military solutions. We cannot avoid having superpower neighbors with whom all we could do is to maintain vigilance through our national security and national defense measures. Though a united stand by ASEAN is questioned by a pundit, my humble opinion is to proceed with the united stand, but mindful of everybody’s interests. There is also the ICJ approach which the Philippines is very familiar with. We had a milestone in conflict resolutions by having a maritime border agreement with Indonesia which was 20 years in the making. The bottom line goal is to make a maritime dispute cease to be seen as a zero-sum undertaking by all claimant countries to give agreements a chance to truly work for peace and security. 🚢

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A BRIEF HISTORICAL BACKGROUNDER ON PHILIPPINES-INDONESIA MILITARY RELATIONS

by CGA CDR Mark R Condeno

THE BEGINNINGS

On 21-June-1951, a Treaty of Friendship between the Philippines and Indonesia was signed during the administration of President Elpidio R Quirino. Seven years later, the pillars were strengthened with the signing of the Cultural Agreement between the two countries on 29-April-1959 during the term of President Carlos P Garcia, two significant accords that would pave the way for the formulation of a Naval agreement on 30-January-1961.

PAF GOODWILL MISSION



The treaty of Friendship was further solidified with the First Philippine Air Force (PAF) Goodwill Mission to Indonesia from 26 May to 02-June-1953 led by the PAF Commander COL Benito Nicano Ebuena PAF.

The PAF Contingent consisted of a 30-man team with 8 North American F-51D Mustang Fighters, 1 Douglas C-47, and 1 PBY Catalina. The Flight Commander was PAF Chief of Air Staff COL Tomas Tirona.

The Group was scheduled to depart Nichols Air Base on 27-May-1953 but departed on Tuesday 26 May to accept the invitation of then British Royal Air Force Far East Chief, Air Chief Marshall Sir Clifford Sanderson, RAF based in Singapore.

The Mustangs and C-47 would proceed first to Singapore and then to Indonesia, while the PBY Catalina with MAJ Luis Mirasol PAF Flight Surgeon headed directly to Jakarta as the advance party.

A tour of the TNI-AU Air Bases, Army Camps, and Naval Stations were provided to the group apart from the parade and review, and courtesy call to the Indonesian Officials. The visit highlights the long-term good bilateral relations of the Philippines and Indonesia.

A FRIENDS RESPONSE IN TIME OF NEED

In March 1963, seven Philippine Air Force Douglas C-47 Skytrain transported relief goods and brought in a 20-man Philippine Air Force Medical Team led by COL Jesus Azurin PAF and Department of Health Contingent led by Dr Rausoro Cabailo to assist the victims affected by the eruption of Mount Agung in Bali, Indonesia with its 18 men and women, and 36 PAF Pilots and Flight Crew involved in the operation.

THE PHILIPPINE NAVY-THE ANGKATAN LAUT REPUBLIC OF INDONESIA Joint Patrol Agreement

The Joint Patrol Agreement was signed and put into effect on

25-July-1963 though the formulation of the agreement begun in January 1961. The opening steps on the JPA began on 10-April-1961 when the Commander of the Naval Operating Forces Philippine Navy and Commander, Task Force 31 made a visit to Tarakan, Indonesia with the primary purpose of opening radio contacts at the Indonesia Naval Station in Tarakan and the PN Naval Station in Batu-Batu. The PN contingent was warmly received by no less than the Chief of Naval Operations of Indonesia.

The visit resulted in the essential exchange of information and intelligence; designated patrol areas for both Navies against smuggling and piracy; improvement of communications on the aforementioned naval stations; and assisting the repatriation of illegal entrants of both countries.

By 1962, further improvements to correct the operational weak points of the Patrol Agreement were made, and in July 1963, the Joint Patrol Agreement was finally signed by the Flag Officer in Command (FOIC, PN) and the Chief of Naval Operations of Indonesia.

Also present during the signing held in Manila were the Operational Commanders responsible for the area of Combined Task Force 31 with its Commander of the Kodamar VII-Indonesian Navy.

Four years later, in 1967, after the end of the Confrontation, both Indonesia and the Philippines decided to reactivate the JPA with the the establishment of radio contacts between Batu-Batu Naval Station and Kodamar VII in the City of Manado.

By June of that year, the Vice Commander of the Philippine Navy and the Assistant Chief of Naval Staff For Intelligence (N-2) representing FOIC, PN visited Jakarta and was reciprocated by the Indonesian CNO when it visited Manila the following year. These visits show the Two Navies' positivity on the JPA and the full implementation of the agreement's Implementing Rules and Regulations (IRR).

In September 1965, Border Crossing Stations were established in Marore and Miangas, Northern Sulawesi, Indonesia and the Philippine Coast Guard Station in Mabila Balut. Later, communications with Philippine Coast Guard Station Davao for the the Indonesian Border Crossing Station of Marore and Miangas were established.

In 1971, after the Conference in Manado, Indonesia with Commodore Prasadjo Madi of Task Force 6 of the Indonesian Navy CAPT Estelito Veloso PN and his staff on board our Flagship the Destroyer Escort RPS Datu Kalantiaw (PS-76) skippered by CDR Cecilio Yutadco PN visited the various Islands of Indonesia such as Makassar, Bitung, and Bino. Indonesian Naval Officers admired the appearance of PS-76 in their littoral waters.

JOINT EXERCISES

In 1972 as the two military forces begun significant strides under the agreement to hold the annual Joint Naval Exercise known as "Philindo Jaya" or "PHILINDO I" with 12 warships and 1,600 personnel. It would take some nine years.

Two years later in 1974, a Joint Amphibious Exercise

between the Navy and Marine Forces of the two countries was on the planning stage, at the recommendation of the then Flag Officer in Command of the Philippine Navy VADM Hilario Ruiz AFP to Indonesian President Suharto when he visited the Philippines in 1971.

Amphibious Exercise in PANAY ISLAND and EAST JAVA

Since then, the leaders of both Naval Forces VADM Hilario Ruiz and Admiral Muhamad Sudomo worked to make it a reality. Prior to the Naval Exercise scheduled late 1975, VADM Ruiz was awarded by the Indonesian Government in September 1975, "The Bintang Jalasena Utama" or the 1st Class Indonesian Navy Meritorious Service Star for breaking new ground in Philippines-Indonesian Naval Relations.

The previous Naval exercises were held in their respective territorial waters, but on the third 2-day "PHILINDO JAYA" exercise, the two forces held the manoeuvres in the South China Sea with each Navy fielding out 3 warships.



Indonesian Navy MBB BO-105 Helicopter from KRI Multatuli (561) supported the Amphibious Exercise in East Java, Indonesia. The Photograph as based on the publication provided was taken by or is credited to DISPENAL or the Indonesian Navy Communications Branch. (April 2021).

The most significant of these exercises was the one week Joint Landing and Amphibious Exercise held in the Island Province of Panay between the Philippine Marines and the Korps Komando Tentara Nasional Indonesia-Angkatan or the Commando Corps of the Indonesian Navy which would later be the Korps Marinir Tentara Nasional Indonesia-Angkatan Laut (Indonesian Marine Corps).


The aforementioned exercise was a milestone in Indonesian Naval History as it was the first time that an Indonesian Force landed in a Foreign soil. Four years later, in January 1979, the largest exercise between the two countries dubbed "PHILINDO V" marked a milestone as that time. It was the Philippine Marines that conducted a Landing Exercise in East Java, Indonesian Territory.



The exercise involved Landing Ship Tanks and Transports from both sides as well as Tanks from both Marine Forces with Indonesian and Philippines BO-105 helicopter support. These

Bilateral Naval Exercises between Philippines and Indonesia were the first in the region. By 1986, two Indonesian NC-212 were provided to the Philippines on a loan basis.

Since its establishment, the JPA has proven itself to be a vital factor in combatting, piracy, illegal entry, and smuggling among other trans-national crimes affecting the Philippines and Indonesia.

It has been shown that the constant communication based on JPA between the two navies further strengthens the bilateral relations between Indonesia and the Philippines, and is the foundation of the annual Cooperative Patrol Philippines-Indonesia (CORPATPHILINDO) 

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BOOK REVIEW: CYBERSPACE IN PEACE AND WAR

by Vicky Viray Mendoza

INTRODUCTION. This book is a way to make you a more intelligent critic of decisions that countries make with respect to threats from cyberspace. It is for those who ask what their country should do about cyberespionage or whether countries should integrate cyberspace into their threat planning, or cyberwar into their war planning, including military power.

PART I. FOUNDATIONS

1. EMBLEMATIC ATTACKS. 13 intrusions took place from 1987's Cuckoo's Egg espionage targeting the energy and atomic laboratories to 2013's Snowden's espionage to unmask the NSA. These are Prototypical Events. 11 intrusions during 1995-2017 targeted big banking systems, fund wiring, credit rating, and hospitals. These are **Cybercrime System Intrusions**. 10 intrusions happened during 2005-2015. In 2009, Chinese hacked Lockheed's F-35 systems. In 2012, NSA declared a dozen groups in China were accountable for most APT attacks. The Mandiant report stated at least 1 group worked for China's PLA. In 2014, the U.S. indicted 5 PLA members for cyber-espionage, and a Pittsburgh labor union. These are **Advanced Persistent Threats (APT)**. 7 intrusions during 2000-2016 hacked internet servers of Estonia in 2007 and Georgia in 2008; and a large-scale attack on GitHub hosted by China Unicom. These are **Distributed Denial-of-Service (DDOS)** Attacks. 15 intrusions during 2007-2020, targeted mostly infrastructure and defense systems. In 2017, Ukraine accused Russia of hacking its power grid, financial system, and malware in Kiev airport. These are Disruptive and Destructive Attacks. In 2016, data was released from the Democratic National Committee to malign Sen. Bernie Sanders. The George Soros Foundation hack was linked to Russians. These are **Doxing Attacks**. In the early 1990s, cyberwar was just a theory on compromising computers. Cyberespionage, cybercrime, DDOS attacks, and cyberattacks are real. Intrusions in 2016 continued and influenced U.S. 2018 elections. Cyberwar has yet to become part of war, but the prospect is nil having no precedent. But Pearl Harbor and 9/11 had no precedent either.

2. SOME BASIC PRINCIPLES. **Cyberwar** is a systematic **cyberattack** campaign for political or military ends. Strategic cyberwar can influence or weaken a country. Tactical cyberwar is carried out as part of an integrated military operations. Those authorized to carry out cyberattacks on a country's behalf are called **Cyberwarriors**. **Cybercrime** is the criminal use of a **cyberattack** or **cyberespionage**. A **cyberattack** uses digital information to interfere with a system's operations, to produce bad information, thus, bad decisions. **Cybersecurity** is having a secure information system, whereas hat researchers make vulnerabilities known to those who maintain the code. Gray and Black hats hoard vulnerabilities to use or sell. Intelligence agencies are customers of Gray hats. Black hats serve cybercriminals. Noise-tolerant environments are **Agoras**, and noise-intolerant environments are **Castles**. With **Agoras**, the risk from bad information is low, but the benefit of access to information is high (Wall Street). With **Castles**, the risk from bad information is high, but the benefit of access to external information is low (nuclear plants). Low persistence

and high stealth argue for early use. High persistence and low stealth argue for waiting. Cyberattacks argue for "wait in peace and deploy in war." If the reusability of an exploit is low, the ability to create exploits remain. If the weapon is the exploit, it is a one-time use. If the weapon can create exploits, it is renewable.

3. HOW TO COMPROMISE A COMPUTER. Systems can be hacked in 4 categories, each with multiple attack modes. **Abuses by Random External Users** consists of attacks in which external users abuse their privileges. **Abuses by Authorized Internal Users** consists of attacks by authorized users who abuse their privileges. **Altered Instructions via Supply-Chain Attack** consists of supply-chain attacks on the coded systems. Finally, **Malware** is a category of attack that directly alters instructions in the target system. Any one attack may call on more than one category. Two kinds of attacks: (1) exploits a system's instructions and malware; and (2) inserts their own instruction. The first can only generate unwanted limited effects. Malware can make systems do anything the hardware permits.

4. CYBERSECURITY AS A SYSTEMS PROBLEM. Cybersecurity is attained by limiting what apps consider valid. Equipment from hackers can be easily made secure by limiting what commands it will accept. One way to prevent corrupted content taken from websites is to include a sandbox in the browser. Cybersecurity is a technology and people problem. The wiser path to attaining a permanent improvement lies in technology. Symmetric encryption uses the same key to encrypt plain text into cipher, and decrypt cipher into plain text. Asymmetric encryption uses different keys for both operations. A cyberattack is a penetration, thus the first defense must be a barrier against penetration. Firewalls were created to filter out harmful messages but may not detect malware. Air-gapping can secure networks by isolating systems, giving an option to keep off the internet. Literal air-gapping has no electronic connection. Virtual air-gapping runs over connected networks but only accepts encrypted packets within the network. The more machines use the Internet, the greater the attack surface for hackers. If the cyberattack is coercive, a threat to one sector can threaten all sectors. An automated patch is a powerful measure. Always minimize risk. Database managers must log data requests and transfers. Compromises on massive data must reinforce security-mindedness.

5. DEFENDING AGAINST DEEP AND WIDE ATTACKS. Against an impatient foe, one who will quit if a compromise takes too long, a system with more barriers is far more secure. It takes a great deal of time and energy in finding vulnerabilities to generate a set of usable tools. Once they work, hackers tend to reuse or recycle them with variations. A scalable attack need only hit one electric power company, but if the attack leads to a cascading failure, the effects may be regional or nearly national in scale. An attack can infiltrate multiple systems and be undetectable until activated. If hackers understand how defenders detected them, they can take steps to make activities look like every day ebbs and flows and evade detection. Watching how defenders react teaches hackers

what to do next; watching hackers work teaches defenders what step to take next. Signatures of cyberattacks can be circulated to organizations to better prepare themselves, by inputting these signatures into prevention/detection systems against cyberattacks using the same signatures.

6. DETERRENCE BY DENIAL. The softer the target, the more effort for general investment in broad-scale attack tools and less to defenses of any target. The harder the target, its vulnerabilities are unique, and more attention is paid to target-specific operations. The larger and more political the attacker's organization, the more the psychology of discouragement merits attention. The hackers may be discouraged if the goal of the cyberwar bureaucracy is at risk from bad news. Without bad news, the attacker has no way of knowing if their investment is futile. A cyberattacker can be defeated if it did not penetrate the system; or having penetrated the system, failed to attain goal of disruption; or having achieved the goal, failed to extract serious costs as the target was capable of recovering faster than the attacker believed. A unit's ability to fend off intrusions will make the attacker think twice. Other attackers are discouraged by what they hear or conclude about failed attempts by others.

PART II. OPERATIONS

7. TACTICAL CYBERWAR. A Cyberattack against military targets carried out at war can be a decisive force multiplier if employed carefully. Tactical cyberwar involves injection of fog and friction into enemy military operations. Corrupted information makes foes doubt data they hold. Fog and friction increase the gap between war in theory and war in practice. The possible effects of cyberwar are: Disruption --taking military systems down; Corruption --a missile that fails to point in the right direction; Eruption --an intense virtual illumination on the battlefield; and Interception --the collection of real-time intel on enemy targets which can be more powerful than cyberwar. Avoid creating a large spike in activity within the target network. Coordinate cyberattack and cyberespionage when using the same penetration techniques. Discovery will unravel all attacks, and will be cleaned up. A cyberattack entails deception and surprise. A surprise cyberattack can eradicate defense and offense. And cyberattackers can limit scope to get less attention. It can time an attack when pressure is greatest; find your vulnerability; make penetration hard to find; and appear to exploit a vulnerability but strike another. The U.S. art of war is a merciless overwhelming force. Chinese war strategy is small scale but if well-timed is capable of catching the adversary unprepared. This is called Assassin's Mace. Cyberwar's use of an adversary's computer against them is a Chinese tactic called "attacking with a borrowed sword." China will spend to hold U.S. superiority at bay. However, supremacy is useless and superiority is unnecessary in cyberwar.

8. ORGANIZING A CYBERWAR CAMPAIGN. Operating a campaign requires attention to how the enemy reacts. Operating a Call-for-Fires Model settles in at the tactical level: what was done, what worked, and how much did it help the kinetic effort. Cyberwar may not be effective in war. Digitization and networking may add complexity to warfighting. With complexity, attack surface rises faster than its size as complexity creates vulnerabilities in system connections. Thus, militaries are likely to be more susceptible to tactical cyberwar. Planners of kinetic attacks worry of counterattacks. If hacking the enemy's command and control

can create confusion and delay the counterattack, the mission may have a better chance of succeeding with lower casualties. If the target thinks the attacker went after its nuclear site, infers the attacker set up a disabling nuclear strike, nuclear escalation will ensue. If the target thinks the attacker did not intend to strike its nuclear site or had no inkling of the damages, it may choose not to react.

9. PROFESSIONALIZING CYBERWAR. Attacks could be tested in vivo. Probes can check whether codes remain. The brave may run an attack just before the point where they create effects noticeable to the target's defenders. Implants can be pinged to see if they respond to test signals. But too much testing will alert defenders and may prompt patching the vulnerabilities. Any attempt to create wanted effects on the battlefield risks creating collateral damage. Training inculcates a set of skills and shows the few who are really good at hacking. It provides a winnowing function, a drop-out ratio similar to Special Forces. Time and connectivity are features of cyberspace. Both suggest the value of careful contingency rules of engagements apply only in a valid need for an instant response. Only few risks arise from limiting the president to adopt cyberattacks to contingencies. But neither time nor connectivity vouches for predelegation of cyberattack authority. Cyberwar is no substitute for an armed force but it can be a force multiplier. There is a larger principle at work: complexity gives rise to vulnerabilities, whose discovery and exploitation can leverage small units to a large effect.

10. IS CYBERSPACE A WARFIGHT DOMAIN? The U.S. military has a real need with a serious capability to shape its information systems. DOD's foes have a clear interest in preventing its operations. NSA has hired some of the world's smartest in cybersecurity. It has more scope to shape its cyberspace, and uses this vigorously. Information assurance is about how militaries minimize threats but it works in service of Mission Assurance. Offensive cyberwarriors do reconnaissance. In no other military endeavor is intelligence so integral to warfighting; and their reconnaissance is not simply to observe and report. The only harm from **DDOS** (distributed denial-of-service) attacks is making public network access unavailable. Systems have to be penetrated well before they are attacked, and the choice has to be well made before the upcoming conflict is clear. The desire to see cyberspace as a warfighting domain is a deeply ingrained doctrine in the minds of those who carry out the doctrine. The concept is misleading and pernicious. If the U.S. military calls cyberspace a domain, it is to organize, train, and equip forces for combat in that medium. Militaries do this for electronic warfare without even being elevated on a separate domain.

11. STATIGIC IMPLICATIONS OF TACTICAL CYBERWAR. If foreign governments believe that adherence to Windows/Intel is the root of U.S. ability to hack their systems, they may have common cause with other countries to build a network foundation of codes that the U.S. cannot control. Iran has disconnected its internet from the rest of the world and has replaced Windows. Countries have adversaries enamored with tactical cyberwar thinking it can shift the correlation of forces. The best way to persuade them is not demonstrating tactical cyberwar can be defeated on its own terms but that its consequences can be managed. NATO has taken the challenge of information system security to heart. The notion of collective defense includes both attack and defense. A collective

effort can disarm an enemy more effectively than a single effort. Because defenders can't disarm cyberattackers, collective defense is just defense.

12. STABILITY IMPLICATIONS OF TACTICAL CYBERWAR. A strong first-mover advantage may tempt one to move first to disarm the adversary. Because nuclear confrontation is thought to favor the first mover, strategists urge building a survivable second-strike capability for stability. Introducing an influential and fragile military system may spur a foe to knock it out first. If the cyberattacker believes he can fail but the attacker could bring down the enemy's systems ahead of the conflict. The downside is expending zero-day vulnerabilities reduces the cyberwarrior's better weapons. Cyberattacks are not vulnerable to a first strike; not accident prone; unreliable early warning systems; unreliable due to rogue hackers; attackers fearing access is imperiled; not for rapid decision making; low value in predelegation; and reliant on surprise. A country can carry out a cyberattack, and deny it. It is attractive because it promises release without risk and may avoid external critique. Tactical cyberwar provides a way to get the jump on an enemy as the first strike with reduced risk. But cyberespionage affects International relations.

PART III. STRATEGIES

13. STRATEGIC CYBERWAR. The art of a cyberattack lies not in destroying but in confusing target systems. If hackers penetrate the electric grid and tamper with voltage levels, the overloaded circuits can take down entire systems. Although infrastructure and banks are privately owned, the ultimate object of coercion is the government. In a cyberattack, governments will redirect the ire to private infrastructure owners whose poor defenses allowed the public to suffer the inconveniences of cyberwar. In almost every classified Pentagon study on how a confrontation with Russia and China, or Iran and North Korea may play out, the adversary's first strike against the U.S. is a cyber barrage aimed at civilians. It will fry power grids, stop trains, silence cellphones, overwhelm the internet; stall food and water supplies; and close hospitals. A SIOP is a single integrated operating plan. In a SIOP, the target list reflects demand while a cyberwar's target lists real targets. The coercive effects of cyberattacks are speculative. Better targets are harder to penetrate. Damage is temporary and not repeatable. As a threat, strategic cyberwar may be unbelievable; as a reality, it may not cause enough damage. And once both sides engage, it is hard to terminate.

14. CYBERWAR THREATS AS DETERRENCE AND COMPULSION. Anger is an emotion with a large retrospective view. Fear is emotional and rational, a function of what may happen. If fear dominates anger, then coercion will work. If anger dominates fear, then coercion will backfire. The pressure of a threat in the long run is no greater than the costs in labor time, resources, and decreased usability of managing the risk to networks and systems to tolerable levels. If the threat is sufficiently fearsome, a rational country would pay upfront for cybersecurity and resilience. The unknowns are larger in cyberspace, and the victim may profit from calling the coercer's bluff or stalling for time to boost defense. The uncertainties of cyberspace underpin the narrowness of a retaliation window. If leaders are uncertain about the effects of a retaliatory cyberattack, they may not judge with confidence within the deterrence window, and revenge may fail to impress, or may be an overkill.

15. THE UNEXPECTED ASYMMETRY OF CYBERWAR. Many have argued less-developed countries could become as fearsome as highly developed ones as they bootstrap their offensive cyberwar capabilities by exploiting markets for malware and zero days. Small countries can buy digital espionage services, enabling them to conduct operations like electronic spying or influence campaigns that were once the purview of major powers like U.S. and Russia. Russian cybercriminals actively supply countries with malware. An Iranian tool surfaced in the attack on Ukraine in 2015 when Russian hackers shut down parts of Ukraine's power grid. FireEye found out Iran's Triton malware was built by Russia. Chinese have envied the popularity of U.S. software and content, and that so much internet traffic goes through U.S. routers. Its attempt to internationalize internet governance by praising the International Telecommunication, and pushing down major U.S. Internet firms while lifting up local Chinese firms reflects its anti-U.S. attitude. China is developing more engineers and raising funds for research although it is unclear whether all these will translate into the cutting edge that U.S. companies have. Huawei and ZTE have been blacklisted in much of the U.S. and Western markets. The move from Cisco to Huawei was at the expense of China's cybersecurity.

16. RESPONDING TO CYBERATTACK. Cyberattack-retaliations in cyberspace remain weak. The closest there has been to retaliatory cyberattacks were the late 2012 DDOS attacks on U.S. banks by Iran, which had discovered 2 years earlier that its nuclear program was set back by the Stuxnet worm; and the 2020 Israeli cyberattack on an Iranian port in response to the Iranian attempt on Israeli water works. In the end, a country may retaliate immediately in response to a cyberattack. But the victim country should consider the attacker's motives in attacking before retaliating in order to ensure that it is defeating the attacker's strategy as well as altering the attacker's calculus. Even if it retaliates, it need not do so immediately. And there are responses other than state-on-state retaliation. The country needs to consider how the target of retaliation will respond.

17. DETERRENCE FUNDAMENTALS. The 4 key prerequisites of a deterrence policy are **Credibility**—the will to retaliate; **Attribution**—the ability to determine who to retaliate against; **Thresholds**—the distinction between acts that merit retaliation and acts that do not; and the **Capability** to punish. Retaliation in cyberspace cannot disarm. Therefore, retaliation has no other rationale but deterrence to fall back on. Cyberdeterrence is symmetric and repeatable because to credibly signal threats and create deterrence requires assured repeatability. It differs from criminal deterrence, which is asymmetric; and nuclear deterrence, which may not be repeatable. One purpose of a deterrence is to reduce the likelihood of future attacks and the expenses on defenses. The case for Cyberdeterrence—the threat or retaliation following a cyberattack—rests on the premise that damage from a cyberattack could be intolerable and defense may not be cost-effective. Deterrence is a form of behavior modification that rule of law was invented to do. Any tailored threshold or punishment may be communicated to potential attackers. This implies willingness to tolerate public disclosure and different attackers are treated differently.

18. THE WILL TO RETALIATE. An important purpose of a deterrence policy is not only to ward off further cyberattacks but also to maintain a reputation for not being trifled with. Maintaining a

reputation may help ward off a physical attack on an interest the attacker is not sure the U.S. would defend. Everyone thinks the U.S. would respond to an attack on its homeland. The attacker would presumably be looking at the U.S. response to a cyberattack as a way of determining how strongly the U.S. would defend a peripheral interest. A strong response to a cyberattack should indicate a feisty U.S., raising the odds that the U.S. would mount a response to a physical and cyberattack on what might seem not worth fighting over. But this should be analyzed carefully. No cyberattack prefatory to a kinetic campaign has ever taken place. Russian cyberattacks on Georgia were carried out to hinder Georgia's media response to the invasion, not to test Georgia or facilitate a subsequent kinetic attack. The enemy's interpretation of a vigorous U.S. response to a cyberattack, say on the U.S. banking system, is not evidence that the U.S. would also militarily defend a minuscule Asian island --it is not particularly obvious -- but not hollow either.

19. ATTRIBUTION. A dozen years ago, the primary argument against Cyberdeterrence was the difficulty of making good attribution after a cyberattack. In response to that belief, both government agencies and commercial cybersecurity companies improved their ability to attribute. Thus, attribution improved considerably. It is doubtful however that the Chinese would have agreed to stop their industrial espionage if they did not think an unrestricted industrial espionage campaign could be conducted without leaving enough fingerprints to merit U.S. sanctions. Attribution is not a sure thing. Repeated intrusions by known actors are more likely to be caught than one-time cyberattacks by unknown actors. Because the consequences to countries of seeing their cyberwar organization caught have not been decisive, their Operations Security (OPSEC) falls short of where it could be. Once consequences matter, OPSEC will rise to complicate attribution --albeit neither fast nor cheap. Finally, if attribution must be proven rather than simply asserted, difficult trade-offs are needed between making a credible case or protecting sources and methods.

20. WHAT THRESHOLD FOR RESPONSE? One advantage of a zero-threshold policy is it allows the target country to show its will to retaliate for large attacks. A cat's-paw maneuver can follow if the enemy does retaliate, inviting counter-retaliation. There is another strategy called salami slicing, which is a series of small moves, none of which seem like sufficiently actionable departures from accepted practice, but makes a big difference cumulatively, and crosses the threshold. The failure of the U.S. to respond to China's claims over reefs in the South China Sea emboldened China's next ploy of building underwater reefs into islands, which further emboldened it to claim and enforce sovereignty claims. China would thereby exercise control over the entire South China Sea, yet surely would have invited retaliation without the veil of salami slicing. A defense that damage is unintended is a weak defense. The downing of Malaysian Airlines Flight MH17 over Ukraine skies by Russian insurgents may have thought it was a Ukrainian military aircraft. The point of deterrence is to influence the enemy's Will rather than its Competence. Past U.S. administrations did not respond to failed North Korean missile launches in the physical world. A country can yield to deterrence by denying any intention to carry out the act, but reversing means admitting it was done. To compel a country to stop assumes the activity has taken place

and thus may have been acceptable prior. The law of armed conflict does not recognize espionage as a *casus belli*. A case for changing this has yet to be made.

21. A DETERMINISTIC POSTURE. A policy of determinism has its advantage --It creates a serious penalty for stepping over the threshold. The U.S. has been edging toward a more deterministic policy over the last few years. China lacks one. A probabilistic deterrence posture has many advantages: (1) establishes no safe zone; (2) does not make the world safe for cyberwar; (3) does not reassure unpredictable allies; (4) weakens counter-deterrence; (5) creates less need to explain; (6) permits tailored deterrence; (7) permits time for contemplating a proper response; (8) permits a sub-rosa response; (9) does not risk over-commitment to a force-on-force framing; and (10) does not jeopardize where deterrence postures really matter. The costs and benefits of declaring a threshold are strongly related to the choice of retaliation under ambiguous conditions. Israel, which is in a far more hostile neighborhood may fear for its survival if considered a patsy, but figures that its hostile neighbors already deem them a jerk and thus Israel is always ready to retaliate. U.K. threatened to retaliate against Italian submarines, suspecting they were sinking Republican ships during the Spanish Civil War. The Italians stopped.

22. PUNISHMENT AND HOLDING TARGETS AT RISK. One problem with cross-domain retaliation is ensuring the other side understands what the retaliation is for. If one single cyberattack draws another in rapid response from the other side, the correlation is clear. If the response is outside cyberspace, the initial violation is unclear. The retaliator can be explicit, but may be lying. It may have been another violation that really triggered retaliation. Risks may be limited by a combination of: Implicit deterrence against catastrophic attacks; Primary deterrence against the use of force; Criminal deterrence against non-state attacks; and Secondary deterrence against follow-on attacks. CYBERCOM's adoption of "persistent engagement" is now moot as an alternative to deterrence-by-punishment. Rather than wait for cyberattacks to reach friendly (BLUE space) networks, CYBERCOM intends to elucidate the attack infrastructure of hostile hackers, disrupting their plans in neutral (GRAY space) networks, and the hackers' own networks (RED space). Tools and techniques of persistent engagement are rightfully highly classified and have precedents. CYBERCOM has made its intentions and its success known. The U.S. should retaliate a cyberattack because punishment is a cost-effective way to limit risk from future cyberattacks.

23. CYBERWAR ESCALATION. Each side may escalate the cyberspace component of their confrontation in order to find the most advantageous level of conflict. One side could stop escalating not out of fear of the other side's escalation but because it has few cost-effective opportunities at higher levels. The various uncertainties that prevent one side from knowing exactly where the penetration is, or where the other side is on the escalation ladder, trashes any notion of precision. Escalation in cyberspace is likely to be bumpy. There will be only one escalation phase --from unproblematic cyberattacks on military targets to problematic cyberattacks against civilian targets. Countries may escalate by successively widening the set of what they deem licit targets rather than increasing intensity. Cyberattacks cannot disarm the enemy's ability to respond in kind. The timing of a

response ought to be predicated on what they are to accomplish in the context of one's warfighting strategy. Each country should understand the reaction of the other side and third parties to escalation and understanding of cyberwar norms. In cyberspace, the defender may not realize how threatening his behavior seems to the enemy.

24. BRANDISHING CYBERATTACK CAPABILITIES. Countries brandish to make threats or to counter threats. Brandishing is a capability like any cyberattack which can spur countermeasures, thus, should not be done casually. Those who brandish should first determine whether the point of doing so is to look powerful, or to make the other side look powerless. The DNC hack was an attempt to gain recognition for Russian cyber capabilities and prestige on the world stage. Simply declaring a capability without demonstration proves nothing. But a demonstration would have to be shaped to accommodate the risk it would itself constitute an attack. If the other side reacts with its own cyberattack, then the whole point of escalation dominance, which is to inhibit the other side from taking action—is lost. States may brandish offensive cyberwar capabilities to give teeth to a deterrence policy. Its success as a policy option depends on what other countries conclude about the motive for the timing of such brandishing. A country that threatens retaliation in cyberspace could use brandishing to give substance to a threat. Absent a threat, what is the need for retaliation?

25. NARRATIVES AND SIGNALS. An important narrative is how countries wish to describe cyberspace. It helps if cybersecurity is not seen as a zero-sum game—not as two battle fleets lined up against one another but more of a mutual assistance on the rough high seas. Retaliation is a challenge where coordination among narrative, attribution, and response is expected. If a cyberattack is harmful enough to deserve a response, leaders must present a compelling case for who did it and respond in ways that should deter repeats. This is called the critical-proven-harsh combination: the cyberattack is critical; the attribution has been proven; and the response is harsh. Signals are actions meant for the leader of a country's adversary. Narratives are meant for the public. Japan and China both claim Senkaku. Japan arrested a Chinese fisher in 2010 for coming too close to Senkaku, and ramming Japanese vessels. Under Chinese pressure, Japan released the fisher and refused to apologize. China tested Japan's resolve to back its territorial claims in East China Sea. Showing *certainty* in the face of doubt can matter more than showing *courage* in the face of fear. Signaling without narrative is intense as signals may not be read correctly.

26. CYBERATTACK INFERENCES FROM CYBERESPIONAGE. In a crisis, countries will be looking at indicators. But, as with all things cyberspace, intrusions into networks are likely to garner greater importance over time. As long as the methods of cyberespionage, notably implants, look like the methods of cyberattack, the discovery of one will raise fears about the others. Discovery may or may not happen—but it is more likely to happen in a crisis when systems are being scrubbed more diligently. Figuring out when the intrusion took place is a forensic art. The target's reaction may be shaded by its understanding of the security dilemma in cyberspace. If so, the wiser course of action may be to counter with one's own deterrent signals. Signaling through the manipulation of cyberespionage traces may be misread. The lesson is knowing what message you want your cyberespionage to carry if caught. To

prevent inflamed tensions, double down on operational security and do not assume success. Avoid adding military targets when in crisis; approach them with techniques different from those used in cyberattacks. When brandishing capabilities or signaling intent, generate a narrative assuming discovery.

27. STRATEGIC STABILITY. Does cyberwar lead to strategic instability? There are no first-strike advantages, the indications and warnings of use is defensive rather than offensive, and the arms race in cyberspace is not as damaging as their physical world counterparts. However, countries may react to events out of fear and ignorance. What one side may find normal another finds menacing. A covert move might be discovered and needs to be explained. A move with only tactical implication could be viewed through a strategic lens; agitation may follow. Cyberwar is heir to all these risks, engendering worry. There is little track record of what it can do. Attribution is difficult. Espionage, crime, and attack look very similar to one another at first glance. Nonstate actors can simulate state actors and vice versa. Everything is done in great secrecy, so what one state does must be interpreted by others. Mistakes in cyberspace do not have potential for physical catastrophe as in the nuclear arena. Unfortunately, this may lead people to ignore the role of uncertainty in assessing the risk of inadvertent crisis.

PART IV. NORMS

28. NORMS FOR CYBERSPACE. Writing norms can be challenging when certain behaviors are deemed reprehensible. Writing is the easy part. Due attention must be paid to whether countries able to violate such norms agree to abide by them. More attention is needed to work out mechanisms that can get violators to concede or not contest judgments that such norms have been violated. If these mechanisms can be established, existing norms can be placed on firmer footing and further norms can be generated with confidence that agreement implies compliance. The punishment for violating cyberspace norms ought to be consistent with the treatment of other norms violations. The West may want to punish Russia for a cyberattack on Ukraine's electric grid in 2015 and 2016. But to punish Russia while not punishing much more lethal norm violations would be absurd. There are difficulties of mounting an instant response in cyberspace. Las Vegas rules state what starts in cyberspace stays in cyberspace. NO attack from cyberspace, whether it causes substantial damage—even death—merits a kinetic response.

29. THE ROCKY ROAD TO CYBERESPIONAGE NORMS. Norms against Economically Motivated Cyberespionage (EMCE) were initially against going after certain targets. The U.S. position was mainly not to spy on commercial companies. But Snowden made it difficult to deny U.S. spied on commercial companies. China argued no one could prove they carried out EMCE. The February 13 Mandiant Report made this argument moot. An avalanche of similar cases by U.S. cybersecurity firms followed. Few in Beijing pretended China did not carry out EMCE. In 2018, U.S. trade action against China cited instances where Chinese hackers went after intellectual property. China's EMCE was not normative cyberspace behavior but rather trade behavior. The second norm relates to cybercrime: state-sponsored is understandable *unless* results are converted to criminality. U.S. reaction to the DNC hack brings a third norm: cyberespionage is understandable *unless* results are used for political influence operations. Norms prohibiting attacks on infrastructure bans cyberespionage on each other's

infrastructure. Seeking norms than red lines to curb unwanted behavior means negotiations, which take time.

30. SINO-AMERICAN RELATIONS AND NORMS IN CYBERSPACE.

The state of Sino-American relations could spell the difference between global peace and strife. Cyberspace is blurry in their relationship and the bad feelings produced by differences in cyberspace can reduce strategic trust and complicate the resolution to other conflicts, e.g., the South China Sea. Although cyberspace is among the top 5 issues the U.S. has with China, it does not make the top 10 list in China. Presidents Obama and Xi on 25-September-2015 struck a deal. Xi committed China to adhere to norms of cyberespionage that *disallowed none* of what U.S. did, yet *forbade much* of what China did. Surprisingly, China kept its end of the agreement with drastically less cyberespionage attacks for a year. By Spring 2016, a Chinese group was suspected of penetrating the U.S., Canada, and Euro petrochemical companies; another Chinese group (APT10) hacking U.S.–managed services to access victim companies. China’s state-employed hackers had likely been covering their tracks by using English or Russian to write embedded codes.

31. THE ENIGMA OF RUSSIAN BEHAVIOR IN CYBERSPACE.

Russians are quite competent at compromising systems, and have deep expertise in espionage such that U.S. Intelligence considers Russian hackers far more skilled than Chinese. Its electronic warfare capabilities are first rate, having sophisticated tools for a sophisticated cyberwar strategy. Russia is exploring the integration of psychological warfare and cyber. Having met considerable success, Russia is likely to proceed. They are in a try-and-see mode regarding cyberspace. And most of Russia’s bad behavior consists of sheltering cybercriminals. Russia and China equate cyberespionage with Information Warfare. While Russia seems hostile in cyberspace, the Russians did sign a deal with the U.S. in 2013 providing a hotline to defuse control of cyberspace weapons, but the U.S. tilted more towards prosecuting cybercrime. Does Russia have a cyberwar strategy? Why is Russia accused as the source of so many hacks? Why did Russia not use more cyberattacks vs Ukraine? If Russia is using cyberattacks to signal the West, why is there no narrative with its signaling? Probably, Russia is still groping.

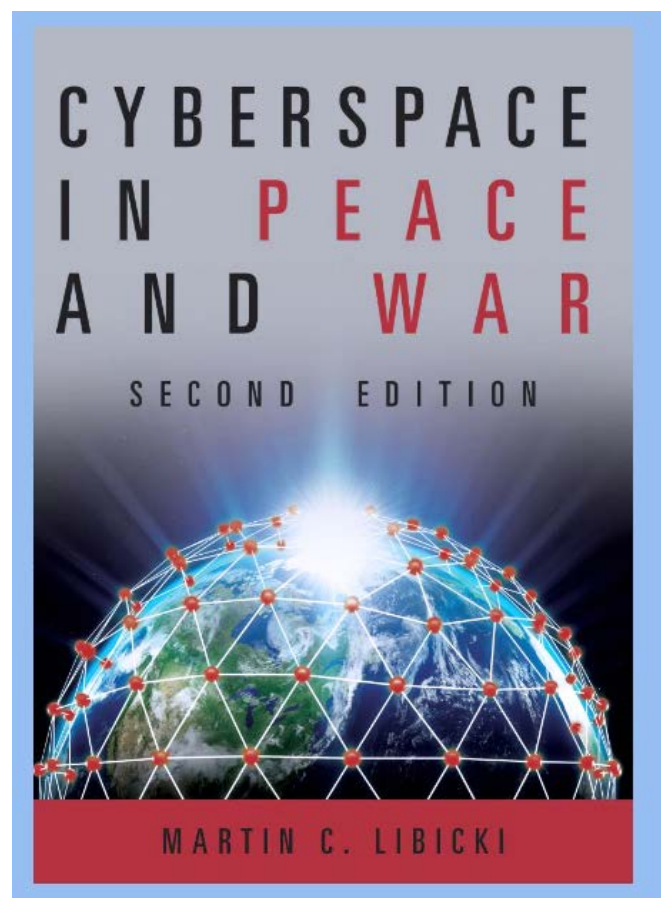
32. CYBERSECURITY FUTURES.

Measures can beget countermeasures that beget more counter-countermeasures. Techniques morph rapidly in cyberspace. Cyberattackers are cracking increasingly sophisticated countermeasures, but not obstacles to entry. Then comes popular legitimization of cyberattacks by going after the arrogant (*HB GARY*) or the obnoxious (*Westboro Baptist Church*). A military battlefield of devices that took orders only from warfighters now take them from one another. The problem with machines taking cues from one another is in confounding the source of unwanted behavior. Architecture more than coding explains why systems are subject to remote malware. Complexity is the main reason of unwanted responses of programs to carefully manipulated inputs. Cybersecurity has the attributes of confidentiality, integrity, availability. More information is circulating widely and entrusted to more hands. Secrets are harder to keep. Adding monitors to control logic can facilitate maintaining control, or knowing controls have been hacked. Fundamental solutions may arise: Trusted Distribution; Intensified Air-Gapping; Conformance monitoring; and 1-touch System Restoration.

33. CYBERWAR: WHAT IS IT GOOD FOR?

The surprise element helps offense win battles, but the limitations of surprise suggest the defense wins wars. It may be that the most important event in cybersecurity that in recent years it was composed of absolutely nothing that were feared to happen. The Russians have exercised discretion in carrying out major cyberattacks in confronting Ukraine. The originators of *WannaCry* made little money. China’s restraint in commercial cyberespionage suggests the benefits of intellectual property theft may be overstated.

RECOMMENDATION. The book *Cyberspace in Peace and War*, authored by Dr. Martin C. Libicki, and published by USNI is a comprehensive analysis of cyberwar, cyber offense, cyber defense, and cyberspace. The current and prospective cyberwarriors and students in the cyber realm will find this literature quite useful and much deeper than just computer hacking as it elaborates much on political and cultural dynamics behind the cybercrimes. They will pick up new and important points on defense policy, strategy, and tactics in the cyber arena from this edition. Cybersecurity is an imperative. Even Navy flagships are subject to cyberattack which may involve jamming the revered GPS. 🚢





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