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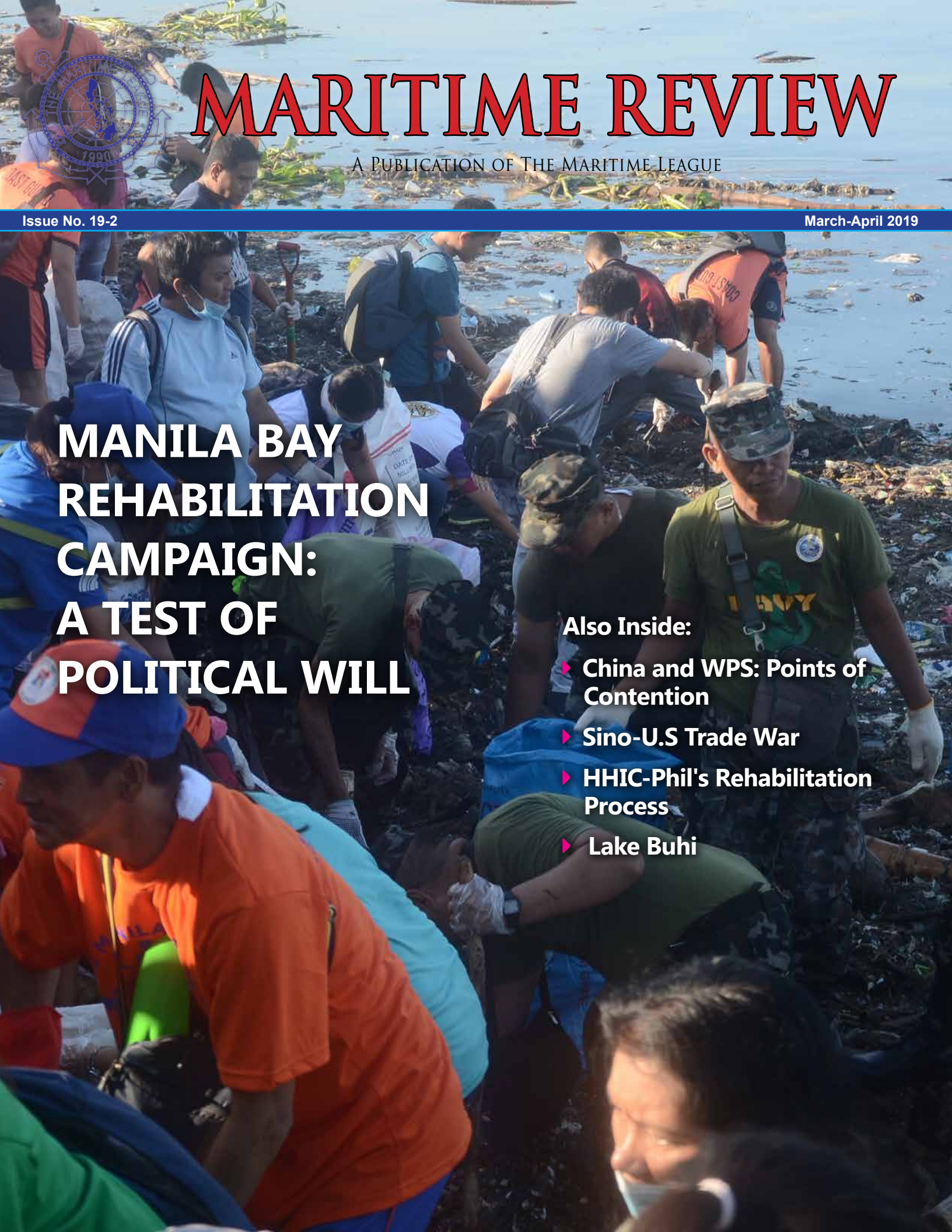

MANILA BAY REHABILITATION CAMPAIGN: A TEST OF POLITICAL WILL

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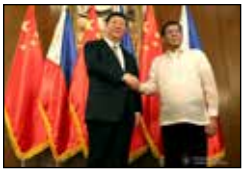
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About the Cover:

Thousands of volunteers, including military and uniformed personnel, join the Manila Bay Clean-up Drive. Photo Credit: Philippine Navy

Manila Bay Rehabilitation Campaign: A Test of Political Will

by VAdm Emilio C Marayag Jr AFP (Ret)

The Philippine government launched early this year a coastal and marine environmental campaign to clean up, rehabilitate and preserve **Manila Bay**. Dubbed ***"Battle for Manila Bay,"*** the move is in compliance with a Supreme Court decision. It also tests the political will of the government.

Clearly, this noble task is aligned with Section 16 of the Constitution, to wit: *"The State shall protect and promote the right of the people to a balanced and healthful ecology in accord with the rhythm and harmony of nature."*

Twenty years ago, a group of concerned citizens filed before a **Regional Trial Court in Imus, Cavite** a complaint against several government agencies for "the clean up, rehabilitation and protection of **Manila Bay**." The grievance arose from evident heavy pollution and degradation of the ecological system of the bay, once a beautiful body of water that provided recreation, seafood supply, and livelihood to the coastal residents.

In 2002, the trial court ordered the respondent agencies to act on the petition. Instead, they elevated the decision to the Court of Appeals. Three years later, in 2005, the Appellate court sustained the Lower court's verdict. In their final attempt to vent their side, the agencies went up to the Supreme Court.

In December 2008, the high court validated the lower court's decisions and ordered the government to submit quarterly reports to the court-organized **Manila Bay Advisory Committee (MBAC)** chaired by one of the justices. As an initial compliance, the government created the **Manila Bay Coordinating Committee (MBCC)** to synchronize plans and actions. For some reason, the **MBCC** held its first meeting in 2009, and the second only in 2017.

The high court further tasked the **Department of Environment and Natural Resources (DENR**) to implement its **Operational Plan for Manila Bay Coastal Strategy (OPMBCS)** that calls for managing liquid waste, solid waste, informal settler families and illegal structures, habitat and resource, and enhancing partnerships and governance. The MBAC approved the enhanced strategic plan (OPMBCS) in 2017.

Two years later, on 27-January-2019, **DENR** spearheaded the **Manila Bay** coastal and environmental campaign with the participation of various government agencies and non-governmental organizations. The immediate task is to make some portions of the bay safe for public swimming in December. This entails removing garbage and debris, and closing down commercial establishments surrounding the bay that are not compliant with liquid waste disposal rules.

The government estimated the fund requirements at Php42.95B for the clean up and relocation of some 220,000 informal settler families living along the numerous tributaries of the bay.

Three weeks later, on 19-February-2019, the President issued Administrative Order No. 16 directing both the National Government Agencies (**NGA**) and the Local Government Units (**LGU**) to *"expedite the rehabilitation and restoration of the coastal and marine ecosystem of **Manila Bay**."* It created a mechanism, the **Manila Bay Task Force (MBTF)**, to achieve the broad function envisioned by the Order. This executive issuance focused on the relocation of informal settler families, information drive, and social welfare and livelihood.

The principal actors in the campaign are the **DENR** and the **Department of Interior and Local Governments (DILG)**. **DENR** implements the national environmental laws while **DILG**, through the local government units (**LGUs**), enforces devolved environmental rules and regulations. With clear objectives to be achieved, a dedicated task force, and a proposed budget, the government appears ready to pursue the formidable goal.

But some quarters are not fully convinced that such endeavor would succeed in the near future because of lack of consultations with many stakeholders. Some legislators are calling the suspension until a detailed action plan is shown to the public. Another group stated that the budget and the time frame are inadequate considering the magnitude of the campaign.

For example, the **DENR** estimated that only 10,000 informal settler families annually may be relocated out of the estimated total of 220,000. This translates to 22 years of resettlement, assuming that other unauthorized parties will not occupy the vacated areas. Also, the Administrative Order did not include any provision on funds allocation. Moreover, some studies reveal that the state of **environmental and natural resources (ENR)** devolution to the LGUs is *"partial and at worst miniscule and insignificant," and that "ENR laws are weakly enforced."*

The Philippines ranked 66th out of 180 nations in the 2016 **Environmental Performance Index (EPI)**. In the 2018 EPI, the country deteriorated, and ranked 82nd.

The opening salvo of the **"Battle for Manila Bay"** starting January 27 attracted attention of various groups and some LGUs. Of note are

offers from several top business tycoons to help in the clean up, the joint de-silting project of the City of Manila, with its ***Sagip Manila Bay Program***, and the **Department of Public Works and Highways (DPWH)**, and garbage removal by thousands of civilian volunteers, soldiers and other uniformed personnel. This joint project involves dredging and removal of 225,000 cubic meters of the heavily silted bottom of a 1.5-kilometer coastline along the bay walk between the US Embassy and the Yacht Basin.

Protecting the marine and coastal environment depends on several factors: geographical location and size, government leaders' determination, and the attitude of the people. Examining the political, economic, social and environmental aspects and allowing participation of private cause-oriented groups will certainly contribute to the action plan.

In the past 6 years, the private sector has initiated at least two separate clean up drives: **Estero de Paco in Manila** and **Maningning Creek in Taytay, Rizal**. Between the two, the latter brought some lessons worth looking into.

In recovering the 3-kilometer long **Maningning Creek** beginning 2012, the **"creek saviors"** took a few years investigating the area and conferring with the residents and prospective sponsors. Once population support was secured, the "creek saviors" implemented their action plan by using **"bokashi"** balls and collecting floating and partially submerged garbage on a regular basis. Result: cleaner water, elimination of foul odor and more solid river floor. Residents consequently planted the banks with bamboos and vegetables that provided livelihood.

Given the vast area of **Manila Bay** itself (187,000 hectares of water surface and 190 kilometers of coastline) and the 17 river

Photo Credit: UNTV

systems that connects to it, and the large number of population and **LGUs** around it, the **MBTF** has to revisit time and again its campaign plan. It should continue frequent interaction with the environmental law enforcers, the local leaders and the informal settlers families. The private institutions, including the media, are strong partners whose talents, skills and finances could expedite the attainment of the goal. Once clean up and rehabilitation tasks are accomplished, government authorities should consider, as part of its preservation crusade, the complete ban of reclamation of any portion of **Manila Bay.** The experiences of other countries on reclamation projects point to a multitude of negative effects on human activities from general public safety to ecosystems.

The future generations deserve better and lasting benefits from a clean and healthy **Manila Bay!** ⚓

Maritime Events Calendar

MARCH '19

13-14	LOGISTIC SUMMIT & EXPO (CENTRO CITIBANAMEX, MEXICO CITY, MEXICO, MX)
15	**MARITIME BREAKFAST FORUM #143 (MAAP, MANILA YACHT CLUB, ROXAS BLVD, MANILA)**
19-22	GREEN SHIP TECHNOLOGY CONFERENCE (RADISSON BLU SCANDINAVIA, COPENHAGEN, DK)
20-21	INTERMODAL AFRICA (SAROVA WHITESANDS BEACH RESORT, MOMBASA, KE)
26-28	NAVEXPO INTERNATIONAL (PORT DE LORIENT LA BASE, LORIENT, FR)
27-29	INMEX VIETNAM (SAIGON EXHIBITION AND CONVENTION CENTER, HO CHI MINH, VN)

APRIL '19

1-5	LNG'19 SHANGHAI (SHANGHAI WORLD EXPO AND CONVENTION CENTER, SHANGHAI, CN)
2-4	CMA 2019 (HILTON STAMFORD HOTEL, STAMFORD, CT, USA)
2-4	TRADEWINDS SHIPOWNERS FORUM 2019 (SOFITEL HOTEL HAMBURG, HAMBURG, DE)
4-5	MID ATLANTIC REPAIR & SUPPLY SUMMIT (ALFREDO KLAUS AUDITORIUM, LAS PALMAS PORT, ES)
5-7	MARINE DIVING FAIR (SUNSHINE CITY CONVENTION CENTER, TOKYO, JP)
9-11	SEA ASIA '19 (MARINA BAY SANDS, SINGAPORE, SG)
9-11	CREW CONNECT EUROPE 2019 (EMPIRE RIVERSIDE HOTEL, HMABURG, DE)
16-17	CHEMLOGISTICS INDIA (MUMBAI EXHIBITION CENTRE, MUMBAI, IN)
19	**MARITIME BREAKFAST FORUM #144 (MARINA)**

MAY '19

6-8	SEA-AIR-SPACE 2019 (GAYLORD NATIONAL CONVENTION CENTER, NATIONAL HARBOR, MD, USA)
4-7	OFFSHORE TECHNOLOGY CONFERENCE (NRG PARK, HOUSTON, TX, USA)
23-25	SUMMIT OF THE INTERNATIONAL TRANSPORT FORUM (LEIPZIGER MESSE INTERNATIONAL GMBH, LEIPZIG, DE)
23-25	IMABARI MARITIME FAIR (TEXPORT IMABARI, IMABARI, JP)
24	**MARITIME BREAKFAST FORUM #145 (HPN)**

JUNE '19

4-7	NOR-SHIPPING (LILLESTRØM, NO)
18-20	PHILMARINE '19 (SMX CONVENTION CENTER, SM MALL OF ASIA, PASAY CITY)
14-19	MAST ASIA (MAKUHARI MESSE, TOKYO, JP)
17-19	MARINE MONEY WEEK (THE PIERRE HOTEL, NEW YORK CITY, NY, USA)
20	**MARITIME BREAKFAST FORUM #146 (PHILIPPINE COAST GUARD (PCG) SMX, MOA, PASAY CITY)**
25-27	ELECTRIC & HYBRID MARINE WORLD EXPO CONFERENCE (RAI AMSTERDAM, AMSTERDAM, NL)
23-25	AUTONOMOUS SHIP TECHNOLOGY SYMPOSIUM (RAI AMSTERDAM, AMSTERDAM, NL)
25-26	MDSG COUNCIL MEETING 2019 (HQS WELLINGTON, LONDON, UK)

JUNE '19 - JULY 19'

29-10	LA MER XXL L'EXPOSITION 2019 (EXHIBITION CENTER ROUTE DE SAINT-JOSEPH DE PORTERIE, NANTES FR)

JULY '19

3-4	PTG COUNCIL MEETING 2019 (THREADNEEDLE ST, LONDON, UK)
4-5	CMG COUNCIL MEETING 2019 (THREADNEEDLE ST, LONDON, UK)
10-11	MASG COUNCIL MEETING 2019 (THREADNEEDLE ST, LONDON, UK)
26	**MARITIME BREAKFAST FORUM #147 (NATIONAL COAST WATCH COUNCIL**

China and the WPS: Points of Contention

by Commo Carlos L Agustin AFP (Ret)

Photo Credit: Philippine Presidential Communications Operations Office / Richard Madelo

In his column, "About Town" in the 12-February-2019 issue of Manila Standard 'How are we dealing with our next-door neighbor China?" **Ernesto M Hilario** reported on the impressions of our distinguished Ambassador to **China Jose Santiago "Chito" Sta. Romana**, "who spent more than four decades in China after he and several members of a delegation of student activists on a visit to the mainland had no choice but to stay on as they risked arrest by the Marcos regime if they returned to the Philippines."

With his long experience in China, **Chito**, who I first met in 2004 in the course of a visit during a Philippine delegation return trip via Beijing from a **Boao Forum** meeting in Hainan, had been a very insightful informal consultant to our **Philippine Council for Foreign Relations (PCFR) CBM Team**, the **National Security Cluster** in our series of dialogues with the **Chinese People's Institute on Foreign Affairs (CPIFA).**

Hilario was reporting on the briefing given by Ambassador **Chito Sta. Romana** a week earlier at the Cosmopolitan Church along Taft Avenue in Manila on Philippines-China relations. The forum was organized by the **United Council of Churches of the Philippines.** He continues:

> *"At the outset, **Sta. Romana** laid down what he described as the strategic framework of our bilateral relations. The starting point of current ties with our next-door neighbor, he pointed out, is the independent foreign policy laid down in the 1987 Constitution. Is it possible to have an independent foreign policy in an interdependent world? Yes, he said. This means being friends to all, enemies to none; seeking unity with all countries, including the big powers; giving priority to national interest; and upholding ASEAN unity and neutrality."*
>
> *"The Philippine government has actually made a big shift in its foreign policy. From the traditional close ties with the U.S., we now seek stronger ties with China focusing on economic cooperation, but not forging a military alliance."*

Sta. Romana explained that we have contentious and non-contentious issues with China — the contentious ones involving our disputes on the West Philippine Sea, including **Scarborough Shoal** and the totality of our Exclusive Economic Zone (**EEZ**). *"The overlapping claims are what complicate matters in the South China Sea."*

Indeed. Although the area is still considered subject to final decision as to ownership other than sovereign rights decided upon by the **Arbitral Tribunal**, most analysts consider China's encroachment as non-conforming with the rule of law.

Sta. Romana further explained that the Philippines *"has chosen to shift from an adversarial approach to a non-adversarial one, and to focus on diplomacy to settle non-contentious issues, such as economic cooperation, cultural and educational exchanges, people-to-people contacts, as well as joint efforts at countering terrorism and criminality" and that these contentious issues "should not be an obstacle to stronger bilateral relations."*

On the part of the Philippines, we have made a shift in perspective: from viewing China as a national security threat, it is said *"we now view it as a development partner."*

Sta. Romana also believes that "There's also a change in the Chinese perspective. Before, Beijing considered the country a geopolitical pawn of the US. Now, the Chinese consider the Philippines as a friendly neighbor whose national interests are separate from those of its military allies."

The column also quotes the Philippine Ambassador, *"We use diplomacy as a first line of defense, to create a good political atmosphere through high-level meetings and bilateral talks to resolve disputes. When you're on friendly terms, it's easier to talk."*

This in essence is how **PCFR** has managed to develop friendly debate with Chinese counterparts. The column continues:

> *Here, the envoy cited lessons from history. China had border*

disputes with Vietnam and Russia, but these were ultimately settled through negotiations and bilateral talks even after armed skirmishes along their borders.

The Philippines has already won gains from bilateral talks, ***Sta. Romana*** *stressed. We now have access to fishing areas in* ***Scarborough Shoal****, thus reducing the level o f tension in the SCS/WPS.*

China is now our leading trade partner. Our fruit exports, mainly banana and pineapple, can now be found in market stalls in Beijing and elsewhere, even as we still maintain sizable trade with the US and Japan. The Chinese government has also extended grants to build two bridges across the Pasig River, and feasibility studies for infrastructure projects.

The article quotes the Ambassador's positive rating of the development achievements of the Duterte approach: the **Chico River Irrigation Project** which will benefit farmers in Cagayan and Kalinga; "the **Kaliwa Dam** in Quezon province will be an alternative source of water for Metro Manila and benefit residents of Metro Manila, and the **South Railway** from Tutuban in Manila to Matnog-Sorsogon covering more than 600 kilometers that will facilitate travel to southern Luzon and the Bicol Region".

Are those identified as a **grant** really grant aid?

Many analysts consider some of these as really contentious:

- The big increase in the number of Chinese visitors to the country, now reportedly the second biggest tourist arrivals after the South Koreans, with **DOT** seeing *"a 40% growth in the number of Chinese tourists next year." Some contend that this makes it easy for infiltrators, Chinese agents, drug traffickers and other criminals to enter the country."*
- **Foreign direct investments (FDI)** from China are already 7th largest as of 2017, according to our **Board of Investments (BOI)**" which alarms those who feel we should learn from the experience of other countries lured into the "debt trap." This is far from the truth, according to Ambassador Sta. Romana. Perhaps this can be a subject of a future Maritime Forum.
- The Chinese "working for **Philippine Offshore Gaming Operators (POGOs)** that are doing business here since gambling is prohibited in the mainland, are mostly on special working permits" or undocumented, as often reported in DZMM and other news media.

The column continues: *"For the Ambassador, fears that we would fall into a debt trap with Chinese loans are unfounded since approved infrastructure projects would have to be economically viable, meaning, they would have to pay for themselves.* ***NEDA*** *has rigorous standards in approving projects with 10% rate of return to offset the cost of borrowings. Besides, we can pay our loans as the domestic economy has already reached investment grade according to international credit rating agencies."*

The **PCFR Economic Cluster** should determine whether this is a valid analysis or not. There are reports that **NEDA** has been careful with respect to these Chinese loans and that many announcements made by Malacañang are mostly premature. In hindsight, **NEDA** has agreed with previous administrations, particularly during the term of Gloria Arroyo, that reportedly had **disastrous** results for the country.

Hilario concludes, *"The Philippine economy is growing. Part of this growth would be fueled by the demographic sweet spot where our young labor force can sustain our economic gains. But our Achilles heel is poor infrastructure, and this is where we have to diversify our sources of loans to finance our accelerated infrastructure development program."*

Ambassador **Sta. Romana's** final statement: *"What is important is that we retain our sovereignty and sovereign rights"* is something contentious, according to many colleagues in the **Maritime Forum**.

We will have to wait and see. ⚓

Maritime Forum

The League organized the Maritime Breakfast Forum (MBF) series in 1995 as a venue for developing plans and programs to discuss and resolve issues in the maritime industry. The MBF is attended by stakeholders in the maritime sector and resource persons in the government and private agencies involved in maritime concerns. The MBF is regularly held, without fail, every month except December, hosted by different agencies and organizations in the maritime industry. Policies and projects presented during the forum are published in the Maritime Review for information and dissemination to the general public.

MAAP Offers LNG Cargo Handling Simulator Course

LNG Cargo Handling Simulator Course is a training program conforms to the requirements of **SIGTTO** or Society of International Gas Tanker and Terminal Operators **LNG** Shipping Suggested Competency Standard. Upon completion of the Course, the participants will be equipped with the Theoretical knowledge, background and aspects of **LNG Cargo Handling Operation** on board such as Loading and Discharging. This is in addition to the IMO Model Course 1.36 LNG Tanker Ballast and **Cargo Handling Simulator Course**. This course will be conducted in 8 days to include 5 days of Familiarization and additional 3 days for Cargo Handling Simulator.

This course is an additional specialized training outside the **STCW** Courses besides **CPTS** or Chemical Product Tanker Simulator Course under the **MAAP** Simulator Center, is a clear manifestation of MAAP to give the best training to our midshipmen, Alumni and other trainees to conform to the increasing demand of deck officers and engineers to work onboard Tanker Fleet such as Oil Chemical Tanker and **LNG** Vessels. The LNG-Membrane Type Simulator acquired by **MAAP** is the first of its kind in the Philippines featuring the latest enhancements in simulator training technology.

The entry requirements for the trainees are:

- **LNG Cargo Handling Simulator Familiarization** - Ratings with no background on LNG Carriers and with the possibility of boarding an LNG Carrier in the future.
- **LNG Cargo Handling Simulator Course** – Deck and Engine Officers with no background on LNG Carriers and with the possibility of boarding an LNG Carrier in the future.

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For inquiries, you may call +63998-5964978 or email maapmsc@gmail.com

Training Day: Cruden's Pioneering Fast Craft Simulator

by MarineNews

Marine simulators are commonplace in the training and development of crew for large vessels. Not so much for small, fast patrol and attack craft.

From the mid to late 1970s, marine simulators developed into a viable training tool for trainee mariners. Their initial popularity developed as opportunities for practical training became scarcer and a lot costlier, too. Since then, however, the advancement of the technology has brought a new dimension to professional crew training for small, fast craft. We gained exclusive insight into this hyper-realistic advanced technology from **Cruden's** CEO **Maarten van Donselaar.**

With the success of aerospace simulators in reducing costs and fast-tracking trainees, the use of simulators in the marine context has become an important part of safety training and bringing trainees up to a higher level of competency before being let loose on large vessels. Today, the most common simulators used in our industry include those that replicate, to an incredible level of detail, a ship's bridge and control, the engine room, cargo handling, communication and **Global Maritime and Distress and Safety Systems (GMDSS)** plus r**emotely operated vehicles (ROVs).**

While the current crop of simulators can give novices control of anything from a **Panamax container ship** right up to an **Ultra Large Crude Carrier (ULCC)**, very little has existed in the way of highly realistic tools for high-speed craft. Up to now, replicating the real-world effects of performance, handling and safety procedures for small, fast boats was, and still is, an incredibly complex task given the speed and rapid responses required to replicate the real-world experience. That training has therefore largely remained out of reach. Until now.

The Advent of Fast Craft Simulation. This all looks set to change following the recent unveiling of a production-ready fast craft simulator by Dutch simulator manufacturer and integrator, Cruden. Maarten van Donselaar, CEO, Cruden, explains, *"Cruden is already well-known as a provider of simulators, from our background in the motorsport, automotive and aerospace industries. For automotive and motorsport in particular, simulators play a role in the research and development of systems and vehicles. However, in the marine context, they serve predominantly as a training tool and are already widely used to train students on large vessels where movements are responses are much slower. Now though, we are*

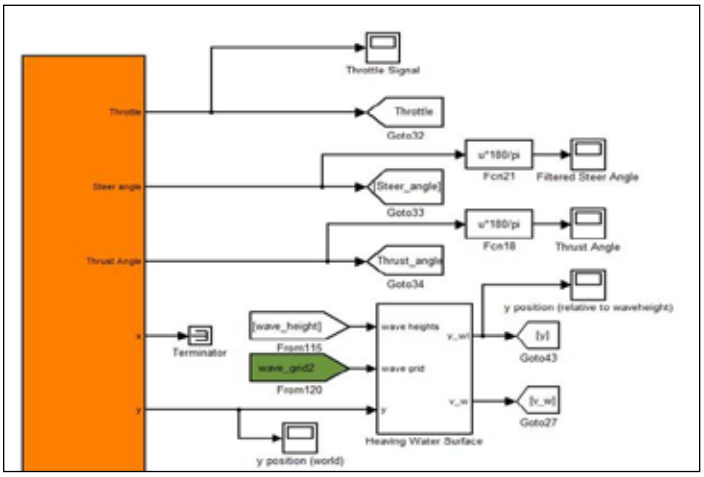
seeing a particular need for a highly realistic, dynamic training tool for fast craft that complements training at sea and one that has been developed to offer training organizations increased hours; reduced costs; repeatable, programmable conditions and scenarios; realistic and detailed data-led AAR; and protection to trainers and trainees from physical stress."

Cruden's Fast Craft Simulator is the culmination of over 6 years of development and testing to ensure the proprietary hardware and software can replicate repeatable scenarios with the utmost accuracy and sensory realism.

"The Fast Craft Simulator is more akin to a Formula 1 set-up where a few milliseconds lag in system response can unsettle the operator because drivers are very sensitive to correctly timed responses to their input or the effects of hitting a curb. Our architecture is developed to minimize latency. Over the past 6 years we've worked closely with the likes of the Florida Powerboat Industry and military end users plus training providers worldwide to gather as much knowledge on boat specifications measuring physical parameters as well as every aspect of their behavior and characteristics on the water. Of equal importance is understanding the training needs in terms of the course content and evaluation criteria. Our team of experts then designs and builds the fast craft simulators exactly according to client specification," says **van Donselaar**.

While being able to replicate the flat-water performance of a high-speed boat is impressive in itself, we pressed van Donselaar on how surface conditions can be simulated accurately.

"Once we've mapped the measured parameters of the boat to the simulation model, we then begin the validation by actually measuring how the boat responds to input in various sea states and use the results to fine-tune parameters and map the surface conditions," van Donselaar replied, adding quickly, "Only then are we able to build a variety of highly accurate scenarios."



"The integrated nature of all our systems means that the software and hardware are developed to complement each other and trainees will practice in front of ultra-high definition screens and simulation-grade projectors capable of delivering a horizontal field of view ranging from 210 degrees to a full 360 degrees. This enables the training provider to accurately assess students as the two parts of the system work together seamlessly for a hyper-realistic experience."

In addition to this, **Cruden** is currently working as part of a joint venture between the **Marine Research Institute Netherlands (MARIN)** and the Dutch Ministry of Defense to develop a new Fast Small Ship Simulator (FSSS). *"Cruden has the capability to make simulators for virtually any requirement and our team will structure the system to mirror anything from small RHIBs to 100 ft patrol boats. This includes hull mockups mounted to the motion system that moves in six degrees of freedom. This allows the trainees to experience high-speed turns and recognize violent slamming. We account for all scenarios thanks to the computer algorithms, but stop short of making it too extreme in the case of high G-force 'slamming', to eliminate any risk of knee or back injuries. The flexibility of this system is integral to making it a viable tool for craft-type training as well as defense-based scenarios,"* adds **van Donselaar.**

The arrival of **Cruden's Fast Craft Simulator** and development of the FSSS coincides with the growth of this market both for high-performance vessels used in law enforcement and search and rescue as well as special defense force and naval operations. The need for such training tools is adding a whole new dimension to the way in which mariners can learn and develop their skills.

⚓ ⚓ ⚓

Maarten van Donselaar
Cruden CEO

How the Cargo Ship Industry is Cleaning up its Filthy Act

by Bloomberg/EIN News

Air pollution from cars and factories has been regulated in much of the world since the 1970s. When it comes to the smoke-belching ships that carry global trade, the rules have been a lot looser.

Big changes start next January, though, when long-debated standards from the **International Maritime Organization** mandate steep cuts of sulfur emissions associated with respiratory disease and acid rain. Much tougher rules are supposed to take effect in 2050, when the **IMO** will require ships also reduce **carbon dioxide emissions** by at least half.

By itself, next year's cap could prevent 150,000 premature deaths and millions of childhood asthma cases each year, according to research published in the journal Nature. It will also cost tens of billions of dollars for an industry that's dragged its feet on the environment.

Necessity being the mother of invention, some of the world's most conservative companies are starting to experiment with cleaner fuels and cutting-edge technologies. Here some of the brave, new ideas in **green shipping**:

SAILS! The **AP Moller-Maersk** A/S is considering using a modern version of the old-fashioned sail to help power its ships. The devices, which are being tested on one of **Maersk's** giant tankers, look more like huge marble columns than anything you'd expect to see on a traditional yacht. Together, the two ten-storey-tall cylinders can harness enough wind to replace 20% of the ship's fossil fuels, according to **Norsepower Oy**, which makes them. **Eco Marine Power**, a startup based in Japan, has designed another sail with solar panels in its body. Chief Technology Officer **Greg Atkinson** says the firm is in talks with one of the world's biggest shippers to test the device this year.

Samsung Heavy Industries / Reuters

UNDERBELLY BUBBLES. Just as carmakers fine-tune the aerodynamics of their vehicles to get better gas mileage, shipbuilders also try to reduce the friction between a vessel's body and the water. Optimizing hull shape is one strategy. Another, being tried by firms including **Samsung Heavy Industries** and **Mitsubishi Heavy Industries**, is streaming bubbles out of tiny holes in a ship's underbelly, as a lubricant, to help it slice cleanly through the water. It's a little like floating on a carpet of air. **Samsung** says it's already installing the system on one vessel being built for **Mediterranean Shipping** and has received two other orders. The tech can cut fuel consumption by 4%-5%, said the company.

ROBOT CLEANERS. Since the earliest days of sea voyages, sailors have been troubled by grasses, barnacles and other organisms that grow on hulls. All the biggest cargo lines are now using submarine robots to strip away such debris and improve fuel efficiency. One device, developed by a Japanese startup called **Hullbot**, looks like a propeller-powered go-cart with nylon brushes and a vacuum on its belly. Thrusters on its back keep it pinned to the vessel's hull. No divers are needed, but the machine still requires a human operator to guide it by remote control.

HYDROGEN FUEL. The world's biggest shipbuilder, **Hyundai Heavy Industries,** last year announced it is developing hydrogen-fueled engines for its massive vessels. The tech is in its infancy, but some proof of concept may come later this year when a small ship being billed as the first fuel-cell passenger ferry, the "Water-Go-Round," begins operating on San Francisco Bay. Hydrogen-based ferry systems are also planned in Norway and Scotland's Orkney Islands.

BATTERY BOATS. The challenges faced by electric cars, with their limited driving ranges, are even more daunting when it comes to ocean-going ships, which can weigh 600,000 tons and must often travel thousands of miles. Shipbuilders are experimenting with smaller river vessels and other craft that stay near shore.

The Norwegian government wants two-thirds of all ferries carrying passengers and cars along its Atlantic coast to be electrified by 2030. **Kongsberg Gruppen** is offering battery-powered ship engines and developing a short-haul electric container vessel.

A Chinese-built ship launched in 2017 on the Pearl River, near Hong Kong, was the first fully-electric cargo carrier of any size, according to the **China State Shipbuilding.** The vessel is emissions-free, but even with batteries sufficient to power three dozen Tesla sedans, the 2,000-ton ship can only travel about 50 miles without recharging, says the China News Service.

EXHAUST SCRUBBERS. Within the next few years, some 10% to 15% of ships are projected to install scrubber systems, like the ones used on factory chimneys, to capture sulfur and fine particulate emissions before they escape exhaust funnels. Makers of the devices, such as Finland's **Wartsila** and Sweden's **Alfa Laval**, say there's already a big backlog of orders, so many ships won't be outfitted in time for the 2020 rule change. **Bloomberg NEF** estimates some 4800 vessels will be scrubber-equipped by 2025.

FOSSIL FUEL SWITCH. The most immediate – and consequential – change is the most mundane: switching to lighter marine gas oil, which is something closer to the diesel used for highway trucks. It's still a fossil fuel, but less polluting because it's been more thoroughly refined.

Marine gas oil is already used in Emission Control Areas, like the ones around Europe's coasts, but using it full time in order to meet the new emissions rules will cost shipping companies an extra $40-billion to $60-billion annually, according to **Goldman Sachs Group** and researcher **Wood Mackenzie**.

Liquefied natural gas is another option, but cleaner fuel requires whole new engines and port facilities to store it. In 2016, **Nippon Yusen** launched the world's first LNG-powered car carrier, and last October, a Russian super tanker the length of several football fields crossed the Baltic Sea, running on the condensed gas. ⚓

Sino-US Trade War: Implications for the Philippines

Asia Pacific Pathways To Progress / APPFI Policy Brief 2018-01

by Aaron Jed Rabena, PhD.

SUMMARY

- The Sino-US trade war is a symptom of strategic rivalry and great power transition;
- The trade war has both risks (loss of profit margins for intermediate goods) and opportunities (trade diversion) for the Philippines;
- The Philippines needs to diversify commercial markets and intensify free trade agreements to buffer the impact of trade wars;
- The Philippines should employ means to make the country a more attractive investment destination; and
- The Fourth Industrial Revolution in conjunction with the trade war is another major disruptor that the Philippines should anticipate.

The ongoing Sino–United States trade conflict affirms that war, economic or otherwise, is an extension of politics. If in an actual warfare, the weapons are firearms; in a trade war, firepower come in the form of tariffs and non-tariff measures such as investment restrictions, quotas, export controls, and administrative encumbrances. From the Cold War to the present, the normative, political, and strategic outlooks of China and the United States (U.S.) continue to be markedly divergent. This was the case during the Korean War in the 1950s, and presently, in Taiwan and in the South China Sea. Moreover, in recent years, the United States has pulled no punches in accusing China of cyber warfare (e.g., 2015 OPM Hack), waging currency wars (engaging in currency manipulation), and instigating spy wars or intelligence operations against U.S. critical and strategic industries, which indicate that both major powers also have an adversarial economic relationship.

What are the features of this Sino-U.S. trade conflict and how will the Philippines be affected?

Significance of U.S. Actions

The U.S. has, in the past, demonstrated ways of shaping the political behavior of certain states through punitive economic measures (e.g., Cuba, Iran, Myanmar, North Korea, and Russia, among others). However, the recent declaration of a "State of Trade War" against China, by virtue of **Section 301** of the **1974 Trade Act**, by U.S. President Donald Trump is by far the world's largest economic sanction ever unleashed, and arguably the gravest manifestation of economic nationalism. In July 2018, the U.S. imposed 25% tariff on 800 categories of Chinese industrial goods worth $34 billion, covering steel, aluminum, automobiles, plastics, aircraft parts, chemicals, machinery, boat parts, hard drives, thermostats, LEDs, radio transmitters, batteries, and remote controls, among others.

It was accompanied by the White House's decision to block firms with at least 25% Chinese ownership from buying U.S. companies involved in "industrially significant" technologies. Moreover, the **U.S. National Security Council** and Commerce Department plan to implement "enhanced export controls" in order to restrict China's access to certain technologies on grounds of "national security," as stipulated in the International **Emergency Economic Powers Act of 1977**. The U.S. side has likewise announced plans that it will make policies stricter for Chinese students who want to enroll in **STEM** [Science, Technology, Engineering, Mathematics] subjects. To make matters worse for Beijing, Trump threatened to slap tariffs on all Chinese goods (worth $500 billion). Chinese companies (e.g., ZTE, Ant Financial, HNA Group) have begun to suffer economic collateral damage as they became caught in the crossfire due to the tougher regulatory environment upheld by the bipartisan **Committee on Foreign Investment in the United States (CFIUS).**

The U.S. in August passed the **Foreign Investment Risk Review Modernization Act of 2018** or **"FIRRMA,"** which aims to strengthen the oversight capacity of CFIUS in screening mergers and acquisitions by foreign investors. U.S. and China are each other's largest trading partners. As per 2017 data, the U.S. is China's largest export market (19% of total Chinese exports) and third largest import source (9.2% of total imports), while China is the U.S.' third largest export market (8.4% of total American exports) and largest import partner (22% of total imports). With respect to investments, China ranks as the U.S.' 15th largest investor and the U.S. is China's sixth largest. All in all, both major powers account for around 40% of the global economy.

To Trump, the economic war had long been initiated by China, resulting in cumulative frustrations and injurious consequences for U.S. interests: the multi- billion dollar trade deficit ($375 billion in 2017), systemic intellectual property (IP) theft of U.S. industrial secrets, discriminatory compliance with **World Trade Organization (WTO)** commitments, or unfair commercial practices (e.g., insufficient market openness, enormous state subsidies, massive dumping, and forced technological transfers). In other words, Trump sees trade as a zero-sum (rather than a win-win) situation because China's rise, even if it occurs peacefully, has come at the expense of U.S. comparative advantage, a problem that cannot simply be addressed through the **WTO**.

Beyond trade, however, are other likely factors. The United States has apparently come to realize that after decades of U.S. constructive engagement with China and encouragement of Chinese integration with the liberal international order, full liberalization (deregulation and privatization), let alone democratization has been far off. In fact, engagement and integration only led to the accumulation of more Chinese economic, scientific, and military power, which now threaten American dominance and competitiveness in these areas. This is noticeable because China, under

President Xi Jinping, has become more assertive and confident in safeguarding and defining Chinese national interests, including ambitions to make China a technological powerhouse.

Consequently, this has started to manifest in a Sino-U.S. "tech race" in artificial intelligence, robotics, data management, quantum science, 5G technology, and supercomputers. It should therefore not come as a surprise if the U.S. economic battle plan aims to target the "Made in China 2025" – a state-led industrial plan to lead in advanced technologies that have dual- use (civil-military) functions (e.g., advanced IT, aerospace, marine engineering, energy vehicles, robotics, etc.). Essentially, the U.S. is attacking the key driver that has enabled China to promote its own position in a new international hierarchy: the economy. It may be argued that Trump's trade war is also meant to rattle the Chinese domestic economy in order to create political pains for Xi.

Given these, the U.S. is also caught in a bind. On one hand, should the current state of affairs – i.e., continued engagement and integration of China – hold, Chinese growth will only accelerate the redistribution of power and benefits or the power shift between China and the U.S. – thus resulting in more U.S. economic losses and diminished freedom of action over the long-term. On the other hand, if the U.S. penalizes China now, the bilateral and global trading system will be disrupted and the U.S. will sustain reputational costs as a neo-mercantilist and anti-globalization nation. Apparently, for the Trump Administration, the policy decision to confront China seems to be "now [while U.S. still has the upper hand] or never."

It should be noted, though, that Trump's industrial policy towards China might be structural in cause. Not too long ago, the Obama Administration implemented the U.S. policy of "Pivot to Asia," whose economic component – the **Trans-Pacific Partnership (TPP)** – was seen by some as an "economic NATO" or "economic containment" meant to break open China's economy and counter its rising economic influence. Analogically, in the 1980s, Japan's economic rise caused insecurity in the U.S., and prompted the latter to press the former, as the immediate competitor, to adopt structural policy adjustments and abort proposals for an **Asian Monetary Fund (AMF).**

Is China Ready for a Protracted Trade War?

Like the U.S., China is no neophyte in wielding economic muscle for the attainment of political objectives. In recent years, Chinese sanctions had been applied against Japan, Norway, and South Korea, among others. But in response to American unilateralism and protectionism, and in a bid to safeguard Chinese economic sovereignty, Beijing resorted to a range of counterattacks by means of counter-duties, legal action, internal adjustments, and proactive diplomatic engagements with third-party states. First, China specifically imposed 25% tariffs on $50 billion worth of U.S. goods (e.g., soy beans, cars, sorghum, pork, seafood, whiskey, lobster, salmon, cigars). Many argue that these products were targeted because most of them come from the Republican (GOP) states that served as Trump's political base during the 2016 presidential elections and hence doing so would create potential political costs for Trump and the GOP, especially in the upcoming midterm elections in November. And like China, American companies such as **Ford** and **Qualcomm** have also taken the hit due to higher input costs and tighter compliance supervision caused by the trade war.

Second, China sought for legal remedies by filing a case at the **WTO** against Trump's threats to press additional tariffs on Chinese goods. Third, China pledged to ensure lower tariffs, stronger IP protection, and greater openness and broader access for foreign investors in certain industries in China (e.g., automobile, shipbuilding, aviation, and finance). Fourth, to cushion the impact of and vulnerability to Trump's trade war, Beijing made quick maneuvers to drive a wedge in a possible US-led trade alliance– and avoid fighting on many flanks – by strengthening economic relations (through tariff cuts and free trade negotiations) with Japan, South Korea, India, and ASEAN, while diplomatically working with the European Union (EU) for a collective front in calling for the preservation of the multilateral trading system and a rules-based international order. Beijing has also projected the narrative that Trump's trade war is not just against them, but implicates the whole world into a **Mutually Assured Economic Destruction (MAED)**.

Other implicit counter-measures taken by China include investment restrictions to the U.S., and currency devaluation. Notably, in the wake of the trade war, China issued a travel advisory – allegedly to curtail outbound tourism to the U.S. – citing "unsafe public security." And because of Trump's threats, China showed its resolve to impose additional tariffs of 5-25% on $60 billion worth of American goods.

Nonetheless, China knows that it needs more time and a calm external environment to strengthen all the elements of its national power, which is why they have consistently pushed for compromise and continue to extend conciliatory gestures toward the U.S. such as offers to reduce the trade deficit by importing more U.S. goods, including U.S. gas. Like the U.S., China considers the current trade war as more an issue of politics (or geopolitics) than it is about trade imbalance or illegal business practices, considering their long-held view of the "U.S. threat" whereby Washington intends to stall the rise of any potential rival. Put differently, the trade war may also appear to Beijing as a "Century of Shame and Humiliation with 21st Century Characteristics" intended to "make China weak again."

The Philippines in the Sino-U.S. "War by Other Means"

As in any war, the Sino-U.S. trade war will inflict economic costs on both sides; Chinese producers and exporters would lose a large market while American retailers and manufacturers will be hurt by loss of market access to affordable goods. As a consequence, inflationary pressures will ensue and mutual losses will be incurred in terms of output (trade volume), profit, employment, and investment flows. The trade war is a classic case where consumers, firms, and businessmen can directly relate to great power politics. This holds true even for third-party trading partners given the era of closely-knit global supply chains.

The World Bank, for instance, sees that about two-thirds of U.S.' targeted Chinese tariffs has a value chain that includes ASEAN countries' electrical equipment and machinery products, particularly from the Philippines, Malaysia, and Vietnam. In the case of the Philippines, with China and the U.S. as its major trading partners, there will be sector-specific risks and opportunities given the type of goods subjected to tariffs by both economic powers.

In 2016, China became the Philippines' number one trading partner, its largest import source and third largest export market, accounting for 15.5% of the Philippines' total trade. The bulk of Philippine exports to China were storage units, digital monolithic integrated circuits, nickel ores and concentrates, semi-conductor devices, and coal. In contrast, the U.S. was the Philippines' third largest trading partner, third largest import source, and second largest export market, accounting for 11.6% of the country's total trade. Most exports to the U.S. were in electronic products, apparel articles, and clothing accessories.

The official stance of the Philippine government on the Sino-U.S. trade war is that it would not take sides, but it has called on China "to protect the East" in the name of globalization, trade liberalization, and the world trading system. More broadly, there are mixed sentiments in the Philippines on the trade war. As in any political volatility, Philippine shares were naturally dampened as the trade war kicked off, but key economic managers put forward the assessment that the Philippines is insulated because it is not trade- dependent and currently has a growing domestic market coupled with a strong external payments position, stable banking system, bullish investments, and higher economic growth. **Moody's Investor Service** published a similar assessment. The **World Bank** forecasts that the Philippine economy is poised to grow by 6.7% this year and next year.

However, there are also economic managers who believe there will be indirect impacts on the Philippines in terms of the potential decline in global economic growth constraining the major export markets' capacity to import. For local domestic producers such as the **Semiconductors and Electronics Industries of the Philippines (SEIPI)** and the **Philippine Exporters Confederation Inc. (PHILEXPORT),** many Philippine electronic companies export to both China and U.S., and Philippine exports to China become inputs in Chinese exports to the U.S. According to SEIPI, China and the U.S. are the second and third largest export markets, respectively, of the electronics industry, making up around half of all outbound goods, with each country accounting for 12% of market share. For example, based on 2016 data, estimates of Philippine exposure to the trade war in terms of total shipments to China varies from 11% (Philippine Statistics Authority) to 16.9% (Bloomberg).

While there are risks, there are also strategic opportunities for the Philippines in terms of emerging industrial markets, trade (and investment) diversion, and trade policy adjustments. First, China, being one of the biggest markets for the automotive industry owing to its growing numbers of young professionals, provides an opening for the Philippine semi-conductors industry to supply sensors and electronics for modern cars. Second, the Philippines can benefit as businesses decide to look for new markets and shift their production bases to circumvent the heavy tariffs enforced in China and the U.S. In particular, the Philippines can gain from the potential slump in the price of Chinese steel exports as China seeks to divert its export markets, which in turn aligns with the Philippine government's **Build Build Build Program**.

Currently, the Philippines enjoys the General System of Preference (GSP) privilege with the U.S. where 3,500 product lines (70% of Philippine exports) can enter the American market without duties. The Philippines also has seven existing **Free Trade Agreements** (**FTAs**) with other countries, including one with China through **ASEAN**, where 90% of product categories that goes into China either have low or zero duty. Interestingly, as Trump is turning illiberal and unilateralist toward China, the U.S. seems to be more receptive to negotiating an FTA with the Philippines.24 The **Asian Development Bank (ADB)** suggests that the Philippines could secure more competitive export opportunities if it becomes a producer of goods that the U.S. and China have placed tariffs on vis-à-vis the other.

Anticipating Broader Risks and Conflict Escalation

The current Sino-U.S. economic conflict shows that the state of economic interdependence and international institutionalism can be reversed by the occurrence of political or power struggle. Furthermore, it cannot be discounted that the trade war may escalate as economic belligerents, with competing political systems, use more of their visible hand on each other. Potential scenarios include more goods subjected to tariffs, drastic reduction in China-US two-way investment, and unilateral suspension of high-level bilateral mechanisms and exchanges, among others. All these, in one way or another, would cause a closer international market or production network and render less credible extant international regimes. Notwithstanding this, it remains yet to be seen whether China will dump its U.S. treasury bills, hit American companies in China, and/or use its alleged economic "nuclear option" of withholding rare earth mineral exports (e.g., europium and tungsten, of which 90% of global supply is controlled by China).

It is worth recalling that in the prelude to World War II, low practical interaction caused by U.S. economic sanctions on Japan contributed to the rise in strategic tensions between the two industrial powers. While the current trade war may not cause an actual "hot" war, Sino-U.S. relations may nevertheless become more adverse and hostile, similar to the Cold War. But to weather and mitigate the impacts of the trade war, apart from seeking tariff exemptions, the World Bank's suggestion is to bolster regional trade through the **ASEAN Economic Community (AEC)**, **Comprehensive and Progressive Agreement for Trans-Pacific Partnership (CPTPP)**, and the **Regional Comprehensive and Economic Partnership (RCEP).**

Intra-ASEAN trade, given its considerable potential, is important as it can shield the Philippines from great power dynamics. Similarly, the **CPTPP** and **RCEP** are crucial for the Philippines as they can serve as alternative markets, especially in the event of economic slowdowns or economic power struggles involving the U.S. and China. To date, the Philippines has an active commitment in **AEC** and **RCEP**, but remains ambivalent on the **CPTPP**. Deepened inter-regional trade and commercial partnership between the European Union and **ASEAN** would also make a good hedging strategy.

To this end, the policy recommendations of certain Philippine economists are also worth considering in terms of attitude towards the region at large and not just in dealing with the U.S. and China. For example, for the Philippines to be an investment haven and attract more foreign capital, it needs to ensure a better investment climate and regulatory environment for investors. And to better weather externalities, including the emergence of the Fourth Industrial Revolution, the country needs to move up the value chain to achieve a more sustainable economy. Other potential internal development measures consist of enhancing human capital skills (to increase domestic employment) and the rapid expansion of rural development throughout the country.

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This paper has been edited. You may access the full paper at: https://appfi.ph/images//2018/APPFI-PP-Sino-US-Trade-War.pdf

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IMO's Gender Program: New Logo to increase Visibility for Women in Maritime

by IMO News

The **International Maritime Organization (IMO)** has launched a new logo for its **Women in Maritime** program, as part of its mission to support the **United Nations Sustainable Development Goal 5: Achieve gender equality and empower all women and girls.**

Program lead Helen Buni said: *"The IMO Women in Maritime program supports the participation of women in both shore-based and sea-going posts, under the slogan Training-Visibility-Recognition', through a wide range of gender-specific activities. The new logo is just one visible part of the program and will help women in maritime gain more visibility and exposure throughout the maritime sector and beyond."*

The primary objective of the **IMO Women in Maritime** program is to encourage **IMO Member States** to open the doors of their maritime institutes to enable women to train alongside men and acquire the high-level of competence that the maritime industry demands.

Since the program was established 31 years ago, its portfolio of activities has grown extensively. **IMO** has facilitated the establishment of 7 regional associations for women in the maritime sector across Africa, Asia, the Caribbean, Latin America, the Middle East and the Pacific Islands, some 152 countries and dependent territories and 490 participants.

The program provides gender-specific fellowships, giving access to high-level technical training for women in the maritime sector in developing countries. A good example is the long-running **"Women in Port Management"** course, hosted in Le Havre, France, in partnership with the **Port Institute for Education and Research (IPER)** and the **Le Havre Port Authority**, where, in 2018, 48 women from 32 countries received training on port management. A total of 308 women have received training under this activity alone.

At IMO's **World Maritime University (WMU)** in Sweden, the proportion of women graduates has increased steadily over the years. The number of female graduates has increased steadily over the years - from four in 1985 to 79 in 2018. By the end of the academic year 2017-2018, there were 1,029 females that graduated from the University, out of a total 4,919 graduates.

At **IMO's International Maritime Law Institute (IMLI)**, 361 women had graduated by the end of the 2017-2018 academic year, out of a total of 837 graduates.

IMO also facilitates the identification and selection of women by their respective authorities for career development opportunities in maritime administrations, ports and maritime training institutes.

During 2019, some 10 activities are planned under the umbrella of the **IMO Women in Maritime** program, including conferences, courses, workshops and regional meetings.

*"We are inviting **IMO Member States** and particularly the regional associations for women in the maritime sector to use the new logo as they see fit, to show that they are part of a strong, global **IMO Women in Maritime family**,"* Helen Buni said.

The launch of the new logo for the Women in Maritime program comes as IMO focuses on women in maritime during 2019, under the **"Empowering Women in the Maritime Community" World Maritime Day** theme.

The **Women in Maritime** program is largely funded through IMO's Technical Cooperation Fund, with a great deal of in-kind and financial support from a number of donors. **IMO** continues to seek new sources of funding in order to support the program into the future.

IMO's Women in Maritime program was formerly known as the program for the **Integration of Women in the Maritime Sector (IWMS).** ⚓

In Depth: Court Gives Nod to HHIC-Phil's Rehabilitation Process

by World Maritime News

The Regional Trial Court in Olongapo City, Philippines, has approved the petition for rehabilitation filed by **Hanjin Heavy Industries and Construction Philippines (HHIC-Phil)**, a Philippine-based shipbuilding brand of South Korea's **Hyundai Heavy Industries Corporation.**

The decision to commence the rehabilitation process was received by both **Hyundai Corporation** and its debt-ridden subsidiary, a regulatory filing said. The relief in rehabilitation was sought after the cash-strapped shipbuilder defaulted on a loan worth USD 400 million provided by 5 Philippine banks. In total, **Hanjin** has accrued a total of USD 1.3 billion outstanding loans from Philippine and South Korean lenders.

Impacted lenders. According to **Moody's**, the banks' exposure to the troubled **Hanjin** will attract higher provisions as well as negative rating of their overall loan-portfolio. **Rizal Commercial Banking Corp (RCBC)** reportedly has the largest exposure of around USD145 million, equivalent to 2.0% of its gross loans, followed by the country's 3 largest banks – BPI, BDO and Metrobank, whose exposure is more manageable relative to their loan books and pre-provision profits, Fitch Ratings explains.

*"The parent company's latest financial results show **HHIC-Phil** in a net asset position and there is reported interest in its shipyard from Chinese companies. Nevertheless, recoverability is uncertain. The parent company failed in an attempt to sell **HHIC-Phil** in 2018, and the amount and timing of any recoveries will depend on the rehabilitation plan, which may take time to negotiate and execute. We expect affected banks to incur additional provisioning on their exposures in the interim," Fitch added. "The sector-specific and company-specific causes suggest this case is unlikely to indicate broader stress across banks' loan books, even if we expect some knock-on effects for HHIC-Phil's employees and local service industries."*

Overall the bankruptcy case is not believed to be systemic and is unlikely to threaten financial stability in the country in the near-term, according to the rating agency.

Potential solutions. As World Maritime News reported earlier, two Chinese investors are said to be interested in taking over HHIC-Phil. The unnamed investors include a private and a state-owned company, whose identity remained secret.

However, Defense Secretary Delfin Lorenzana believes the shipyard should be acquired by a Filipino company as a way of supporting the country's naval modernization efforts. The country's economic team should, nevertheless, make a final decision on the proposal, said Lorenzana, as cited by the Philippine News Agency (PNA).

The argument is further supported by the yard's proximity to the Philippine Navy's major docking and anchorage area.

As a result, the country's Department of National Defense plans to keep a close eye on the potential investors into the bankrupt shipbuilder.

Affected workers. The Philippines' largest shipbuilder was considerably impacted by the weakness of the global shipbuilding industry and financial troubles of its Korean parent that started back in 2016. As a result, HHIC-Phil had to deal with dwindling orders and resorted to massive workforce cuts, laying-off over 7,000 people back in December 2018.

Around 3,800 workers remain at the shipyard and could face loosing their jobs in case of the yard's closure. Hence, the country's government has been asked to provide assistance to the impacted workers.

The **Department of Labor and Employment (DOLE)** promised to help thousands of impacted workers, **PNA** informed.

The likely measures aimed at cushioning the impact of the bankruptcy on HHIC-Phil shipyard's workers include severance pay as well as potential re-employment of the affected workers in various projects of the government. ⚓

Design for World's First Pure-Electric Tanker Completed

by Asahi Tanker Press

Photo Credit: Asahi-Tanker.com

Asahi Tanker and partner **Exeno-Yamamizu Corporation Tokyo** have developed the new domestic shipping tanker design, which incorporates "zero emission electric propulsion." In anticipation of future adaptations to regulatory conformity, **ClassNK** has been appointed to provide technical advice on ship design and electric propulsion.

Commercial model development of **e^5** design is underway for all bunker supply vessels trading in Tokyo Bay. The target of the first vessel launching is set for quarter four 2020. The project is also working for creating **e^5** coastal vessels, which would require longer cruising range.

The **e^5** concept creates solutions to issues such as shortage of crews, vessel demand balance and environmental regulation thus contributing to the sustainability of the domestic shipping industry. The project is confident that by utilizing the e5 concept of ocean transport that a stable energy supply will be achieved enriching people's lives and adding value to each client.

The new vessel design and related project infrastructure development will be known as **e^5**, which captures the 5 core elements of:

1. **Electrification:** The ships core energy source will be electricity, achieved through lithium ion batteries;
2. **Environment:** Emission controls along with minimizing noise and vibration along with improvements in vessel operation environmental controls at sea and in port;
3. **Economics:** Achieving economic efficiency through IoT and digital tools coupled with better propulsion performance from electricity;
4. **Efficiency:** Simple hull construction and automated equipment can reduce workload for the crew; and
5. **Evolution:** Digitalization and technological advancement leading to innovative design concept for the future of domestic shipping.

e^5 vessel outline:

- Total length: 60.00 m
- Overall width: 10.30 m
- Propulsion machinery: 2 x 350 kW azimuth thruster, 1 x 130 kW bow thruster
- Gross tonnage: 499 tons
- Cargo tank capacity: Approximately 1,300 cubic meters
- Vessel registration: Japan
- Concept designer: Groot Ship Design (Hull)

Asahi Tanker Co., Ltd. is a shipping company mainly involved in the transportation of oil related products. In dealing with such products, which are indispensable for daily living and dangerous goods, it provides both foreign and domestic services by considering the global environment and safety measures as a top priority. **Asahi Tanker Co., Ltd.** will be in charge of the operation and management of the e5vessels.

Exeno-Yamamizu Corporation is a shipbroking and cargo broking agent in Japan. In recent years, it has expanded its focus into green business sectors such as LNG chartering and clean energy marine equipment sales. **Exeno-Yamamizu Corporation** is acting as project manager, shipbuilding development consultant, ship equipment sales consultant, and infrastructure development coordinator for the e5 vessels project. ⚓

An impression of how the 'Hagland Captain' will look after the retrofit of a Wärtsilä hybrid propulsion solution. The conversion will create fuel savings and environmentally sustainable operations. Image copyright: Hagland Shipping AS / Wärtsilä.

Wärtsilä to deliver World's first Hybrid Retrofit for short-sea Shipping Vessel

by Wärtsilä Press

The technology group Wärtsilä has signed an agreement with the international shipping company Hagland Shipping AS for a hybrid retrofit installation. The project will take place onboard the 'Hagland Captain', a general cargo vessel owned by Hagland Shipping. It will be the first project of its kind ever in short-sea shipping applications. The agreement was signed in December 2018.

The installation of a Wärtsilä battery hybrid propulsion solution will significantly enhance the ship's environmental performance by reducing its emissions, fuel consumption, and noise. Included in the solution are a shore power connection to provide power for loading/unloading operations and for battery charging, a new reduction gear with power take-off (PTO) and power take-in (PTI) technology, and a Wärtsilä NOx Reducer (NOR). It is estimated that the total reduction in nitrogen oxide (NOx) emissions after the retrofit could be as much as 80-90%, while overall fuel cost savings are expected to be in the range of 5-10%. The battery capacity will be sufficient to sail in and out of harbor on electric power for approximately 30 minutes, which will effectively reduce noise and pollution levels in the vicinity of the harbor.

The project is in response to a collaborative agreement between Hagland Shipping and NOAH AS, the Norwegian environment and resource company, whereby the shipping of materials to the island of Langøya in Norway is required to be via environmentally sound vessels. Wärtsilä's solutions will play a crucial role in enabling the 'Hagland Captain' to meet this requirement. Valuable input to the project concept has been given by the non-profit NGO, Bellona.

"Wärtsilä has been chosen as a partner due to their significant experience in providing environmentally sound solutions such as hybrid systems," says Oivind Wendelboe Aanensen, COO, Hagland Shipping AS. "Wärtsilä's forward-leaning and supportive approach has enabled Hagland and NOAH to arrive at an optimal solution. We believe our mutual project will have a considerable impact in the market and will further the environmental drive towards sustainable solutions in short-sea shipping."

"Environmental considerations are increasingly important for fleet owners around the world. The need for the latest smart marine technologies has been seen for some time already in deep sea shipping, and this project is evidence that the need also exists in short-sea transportation. Wärtsilä is responding to these developments with its Smart Marine Ecosystem approach, which through the use of high levels of digitalization and connectivity, is creating greater efficiencies, increased safety, and more sustainable solutions," says Paul Kohle, Director, Sales & Sales Support, Asset Management Services, Wärtsilä Marine.

Wärtsilä's hybrid solutions are based on a 'first-of-its-kind' fully integrated hybrid power module. This combines engines, an energy storage system using batteries, and power electronics optimized to work together through a newly developed energy management system (EMS). It marks a new frontier in marine hybrid propulsion.

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Deaths in Confined Spaces Are Still Happening

by Martek Marine

Modern ships are capable of carrying larger and larger loads while the number of crew aboard remains approximately the same. This means that **Seafarers** are more exposed to the dangers of confined space entries than ever before.

What is a Confined Space?

The **International Maritime Organization (IMO)** defines enclosed spaces as having limited openings for entry and exit, inadequate ventilation or a design not intended for continuous worker occupancy.

This includes: cargo spaces; double bottoms; fuel tanks, ballast tanks; cargo pump-rooms, compressor rooms; chain lockers; and any other area that may be oxygen deficient.

These spaces are often used for installing new machinery or for storage and, on a modern vessel that has a complex matrix of pipelines running through each of its parts, there will be even more of them.

Toxic gases generated by storage or leakage will accumulate in confined spaces because of the lack of ventilation.

Thus, if a crew member enters to carry out repairs or cleaning without taking adequate precautions, results are usually fatal.

Recent Incidents

In the last few years there have been numerous deaths caused by confined spaces in the UK, Denmark, Belgium, and Malaysia. In the last 4 months alone, there have been 6 deaths.

Two incidents on **RMI** flagged ships occurred within 24 hours of each other and resulted in the deaths of three crew members, and two others losing consciousness.

As recently as November 2018, three more seafarers died of asphyxiation on board the timber carrier **Apollo Kita** as they were working in the vessel's hold.

These are just the latest in a long line of similar incidents.

Regulations

Deaths in confined keep happening despite the **IMO's** attempts to prevent them with new regulations. The latest – Regulation XI-1/7 – requires all **SOLAS** applicable vessels to carry portable gas detectors for monitoring enclosed spaces:

"Every ship to which Chapter 1 applies shall carry an appropriate portable atmosphere testing instrument or instruments. As a minimum, these shall be capable to measuring concentrations of oxygen, flammable gases or vapors, hydrogen sulphide and carbon monoxide. Instruments carried under other requirements may satisfy this regulation. Suitable means shall be provided for the calibration of all such instruments."

Effective gas detectors and calibration instruments are essential on all cargo vessels. This equipment should also be as versatile and easy to use as possible so that all crew members are protected.

Equipment

Martek has a range of fixed and portable gas detection equipment designed to be as simple and safe to use as possible.

The **MGC Simple+** doesn't require calibration or charging, due to cutting edge sensor technology, so crew members can carry it at all times to make sure that that the environment they're working in is safe.

The MGC Simple+ is lightweight and convenient to carry. It's simple and easy to use, with one-button operation and large screen that's readable in low light or changeable conditions.

The **MGC Simple+** is rated **IP68** so it's waterproof up to 1.5m for 30 minutes, durable and uses infrared technology that's immune to sensor poisoning, which means no calibration is necessary. Because it doesn't need oxygen to operate, it will reliably test for **hydrogen sulphide** (H_2S), **carbon monoxide** (CO), **oxygen** (O_2), and **combustible gases** (LEL) in even the most challenging of confined spaces. ⚓

PHILIPPINE LIFE SAVING EQUIPMENT INCORPORATED

PLSE At Its Best

PLSE traces its roots way back to 2012 when it was founded in Carayman, Calbalyog, Western Samar with a passion and dedication to engage in boat building. Thereafter, the company entered into a co-manufacturing agreement with Aqualand Boatyard, and Jiangyin Xenjiang FRP Company Jao Yan (Jianjin Xingjiang FRP Company), a leading lifeboat and davit factory in China with networks all over the world. **PLSE**'s fast growth and development backed up by professional, technical and caring staff, and coupled with an energetic, trustworthy sales force, the company bravely faced all the challenges and opportunities in the maritime industry, thus becoming the country's premier one-stop-shop for life-saving and safety equipments, as well as rescue and passenger boats.

Since then, **PLSE** has continuously provided its clients/customers with the most advanced, high quality marine and life-saving equipment available in the industry. **PLSE** has set standards in terms of product quality, and technical solutions that lead to customer satisfaction. **PLSE** continues to provide current and prospective customers with the right product information, such as product specification and application. Clients' need is addressed accordingly. Moreso, **PLSE** has provided its clients with adequate supply of parts and other resources. Prompt delivery of orders and required services are adequately complied without set-up.

PLSE's main supplier of products is **VIKING**, a privately-owned family company with leaders in maritime and fire safety, with head office in Denmark. It's a truly global provider offering effective, convenient, excellent services that are needed in the following segments:

Passenger, Cargo, Offshore, Evacuation, and crew transfer systems particularly: Life rafts; Lifejackets; Immersion Suits; and Fire Suits.

PLSE offers the following:

GREAT PRODUCTS:

- State of the art simulators
- Bridge
- Engine
- Crane
- Cargo Handling VTS/VMS
- High Voltage Circuit
- Radar

Likewise, the following state-of-the-art BOATS:

- Rescue Boat
- Aluminum Hulled Boat
- Fast Rescue Boat
- MAN OVER BOARD (MOB)
- Rigid Hulled Inflatable Boat
- Rubber Boat
- River Patrol Boat
- Sport Boat
- Boat Console
- RHIB Patrol
- Research and Rescue / Passenger Boat
- Speed Boat
- Life Rafts
- Evaluation System
- Floating Pontoon
- Offshore

Configurations Simulators

- Solo Stand Alone Simulator
- Distance Learning
- Self-Education
- Equipment Familiarization
- Refresher Training

Networked Class

- Several interactive workstations with instructor supervision
- Principles of operation and troubleshooting
- Diagnosis of engineering / educative system

Model Library

We continuously expand our library with detailed realistic models of real prototypes.

- Chemical Tanker
- Product Tanker
- LCC Tanker
- LNG Tanker

- LNG Terminal
- LPG Tanker

The following projects have been undertaken by PLSE:

- Conducted Sea Trial in Mariveles Bataan
- Installated and Commissioned Free Fall Lifeboat – Maritime Academy of Asia and the Pacific (MAAP)
- Conducted a test on Fast Rescue Boat in Corregidor, Bataan.
- Installed Single Arm Davit – MAAP
- Installed Gravity Arm Davit
- Constructed Free Fall Davit Gravity Davit and Single Arm Davit – Philcamsat Training Center, Maragondon, Cavite
- Constructed Free Fall Davit and Gravity Type Davit
- Conducted Sea Trial – Maragondon River, Cavite
- Installed Single Arm Davit for Rescue Boat and Man Over Board (MOB)
- Supply and Delivery of 126 Rescue Boats for Office of Civil Defense (DND)

Product Quality

- Provide existing and prospective customers the right product information, such as product specification, application, and address their need accordingly so that we are their first call when searching for equipment.
- Ensure that we provide our customers with an adequate supply of parts, after sales services, and local support.
- Ensure on-time delivery of orders and services.
- Provide direct contact with the customer and maintain regular customer audience. This effectively addresses their need immediately.

Factory Acceptance Test

A Factory Acceptance Test of the equipment ia carried out on a testing platform under our own quality system supervision, and witnessed by qualified surveyors. This platform is able to simulate all trims as well as list conditions in accordance to SOLAS Regulations.

Expertise:

- On-Shore Engineering
- Boat Building
- Lifeboat Installation
- Davit Installation
- Lifting Studies
- Construction Design, Simulator Room, Fire Fighting House, Pier, Davit Platform
- Method Statements
- Risk Analysis
- Dredging
- Marine and Aviation
- Simulators
- Project Execution
- Defense Systems
- Fire Fighting Systems

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PLSE *is headed by an energetic, soft spoken and kind-hearted President/CEO, Mr. Delfin Supapo, who offers quality items and professional services thourgh his technical and caring staff, and a corporate policy that keeps faith in the future — a management commitment to all its present as well as prospective clients.*

Design of the lighthouse with surrounding retaining walls to prevent erosion on the South Atoll of the Tubbataha Reefs Natural Park (TRNP) in Cagayancillo. Photo Credit: TRNP.

PCG to Construct New Lighthouse in Tubbataha

by DOTR

The **Philippine Coast Guard (PCG)** will be constructing a new lighthouse in the **Tubbataha Reefs Natural Park (TRNP)**. The delivery schedule for the PCG lighthouse is 360 calendar days.

The lighthouse is targeted for construction within the year on the South Atoll of the marine natural park. It shall also serve as its protection against possible ship groundings.

"Now that we have been designated by the I**nternational Maritime Organization (IMO)** as a **Particularly Sensitive Sea Area (PSSA)**, we must have adequate aids to navigation equipment, so we welcome this recent development," **TRNP** Protected Area Superintendent (PASu) Angelique Songco said.

With an approved budget of over PhP 150 million, the pre-bid conference will be held on 31-January-2019 at the **Coast Guard Procurement Service (CGPS)** headquarters in Manila. The bid opening is set to take place on 14-February-2019. ⚓

Eight Low-Em Concept

by Vessel Performance O

The shipping industry is ramping up its efforts to decarbonize by exploring the use of alternative fuels and technologies. Last week, a study led by Lloyd's Register reveals that zero-emission vessels need to be entering the world fleet by 2030 if the industry is to come close to achieving the IMO 2050 GHG emissions reduction target. Shipping's decarbonization will not come from one single solution but from a combination of energy sources. This week, VPO Global takes a look at some vessel concept designs that indicate the first steps have been taken towards carbon-free shipping.

1. NYK Super Eco Ship 2050

NYK Super Eco Ship 2050 concept design. Image courtesy of NYK Line

The *NYK Super Eco Ship 2050* is a vessel that will be powered by hydrogen fuel cells, in which the hydrogen is produced by renewable energy sources. The vessel will require only 30% of the energy used on vessels today. The vessel will be capable of recovering waste heat from fuel cells. In addition to this, coal power from the liquefied hydrogen will be used to maximize efficiency and reduce electricity demand. A lower-weighted hull compared with traditional vessels will be achieved by using lightweight materials, bionic design, and topology optimization. Conventional propellers will be replaced with flapping foils that mimic the movement of dolphins to deliver greater efficiency than screw-type propellers. The Super Eco Ship 2050 will use air lubrication technology to reduce the resistance between the vessel's hull and the seawater surface. A hull-cleaning robot will carry out cleaning during port stays to reduce resistance through water. The robots will also collect debris to prevent pollution of ecological systems at port. Digital Twins will be used to give access from shore to optimize planned and corrective maintenance.

Key stats of NYK Super Eco Ship 2050:

- 67% reduction in energy derived from fossil fuels, compared with a 2014-built vessel.
- 70% reduction in energy derived from bunker fuels.
- 100% reduction in CO_2 emissions.
- 1,900 m3 hydrogen capacity to provide 21 days endurance.

nission Vessel Designs

ptimization (VPO) News

2. The GGZEM Water-Go-Round

The GGZEM Water-Go-Round. Image courtesy of GGZEM

The Water-Go-Round is expected to be the first fuel cell vessel in the US and the first commercial fuel cell ferry in the world when it launches later this year. Built by Golden Gate Zero Emission Marine (GGZEM) and partners, the purpose of the vessel is to demonstrate zero-emission operation is possible. In the coming months, the vessel will begin a 3-month pilot testing phase in San Francisco. Sandia National Laboratories will independently measure the vessel's performance. Funding comes from California Climate Investments, a state-wide program that puts billions of Cap-and-Trade dollars to work reducing greenhouse gas emissions, strengthening the economy, and improving public health and the environment.

Key stats of GGZEM Water-Go-Round:

- Speed of 22 knots achieved through two electric motors from BAE Systems with a power of 300 kW each.
- 264 kg hydrogen tank capacity, providing 2 days of operation.

3. SeaShuttle project

Samskip SeaShuttle. Image courtesy of Samskip

The SeaShuttle project is developing autonomous zero-emission containerships that will use hydrogen fuel cells for propulsion. Led by European operator Samskip, the vessels will use a combination of fuels and technologies to make it cost competitive and low emission. The SeaShuttle vessels will connect Poland, Sweden, and the Oslo Fjords. The project was awarded EUR 6 million by the Norwegian government to develop all-electric ships. SeaShuttle is one of six initiatives included in Pilot-E, a EUR 100m+ scheme set up by Norway to make carbon-free shipping possible by bringing market solutions to shipping more quickly.

Key stats of the Samskip SeaShuttle:

fuel cell technology will convert hydrogen into power for propulsion in a process where electrolysis is envisaged as taking place in a Norwegian port. For the moment, the project envisages zero emissions during 20% of a round trip between Poland and the Oslo Fjord – sufficient for all operations in Norwegian waters. That proportion will grow as more stations fill hydrogen along the route.

4. Port-Liner all-electric Tesla ships

Port-Liner electric barge concept design. Image courtesy of Port Liner

Dutch company Port-Liner is building 2 large ell-electric barges expected to be launched this autumn. The vessels will initially be manned but will run autonomously once there is suitable infrastructure in place. Project cost reached EUR 100 million to date, 7 million of which is subsidized by EU. The vessels will transport containers to Antwerp, Rotterdam, and Amsterdam.

Key stats of Port-Liner all-electric Tesla ships:

- 8,000 estimated tons of CO2 reduction per year;
- 20 ft batteries providing 15 hours of continuous operation;
- 280 containers on larger vessels with power for 30 hours;
- 23,000 trucks are expected to be removed from the roads annually as a result of the first 6 barges going into operation.

5. Legacy of the Fjords

Future of The Fjords electric vessel in operation. Image courtesy of the Fjords

The Legacy of the Fjords is all-electric, zero-emission passenger vessel that has passed the concept design phase and is due to join The Fjord's fleet in 2020. Flåm AS and Norway's ferry company Fjord1 own The Fjord. The vessel will deploy a specially constructed Power Dock and an innovative floating charging solution that will allow it to refill its 2.4MWh battery

capacity in 20 minutes. Originally planned to join the fleet in 2019, its launch has been delayed to ensure "everything is in place for this environmentally friendly, energy efficient and breath-taking new craft," explains Vidar Hauståker, Acting CEO, The Fjords. At the current time, there are some issues with listing the required battery-loading infrastructure within the Oslo Harbor area. The vessel is made from carbon fibre sandwich material to reduce energy consumption and classed by DNV GL. Legacy of the Fjords will join Vision of The Fjords and Future of The Fjords, both currently operating with hybrid electric and electric propulsion in the Norwegian fjords. The Legacy of The Fjords is under construction at Brødrene Aa.

Key stats of Legacy of the Fjords:

- 1800 kWh battery pack;
- 2 x 450kWh el-motor;
- 400-passenger capacity.

6. Liquefied hydrogen bunkering vessel

Concept design of the LH2 bunkering vessel. Image courtesy of Wilhelmsen

Last month, Moss Maritime, Equinor, Wilhelmsen, and DNV-GL, announced a design for the first liquefied hydrogen (LH2) bunker vessel indicating that transporting liquid hydrogen by sea is logistically possible. The project, sponsored by Innovation Norway, aims to clarify challenges and find solutions for storage and handling of hydrogen fuel on a vessel.

Key stats of Liquefied hydrogen bunkering vessel:

- 9,000m3 cargo capacity;
- Transportation of LH2 at a temperature of -253 °C will be possible, offering advantages over pressurized hydrogen gas in relation to transportation costs.

7. Race for Water Odyssey

Race for Water Odyssey catamaran. Image courtesy of Raceforwater.com

The Race for Water Odyssey catamaran was developed by Swiss Hydrogen and operates using hydrogen and solar panels, making it 100% self-sufficient. The vessel began its expedition in 2017 with the purpose of raising awareness of plastic pollution in the oceans. During the day, the vessel uses solar energy to propel itself and recharge the batteries. At night, the batteries are used to keep the vessel's power supply going. When the vessel is docked, surplus solar energy is used to produce hydrogen, which is stored in pressure tanks for use at a later point.

Plastic Omnium developed the hydrogen technology for the Race for Water vessel. "The hydrogen chain designed for the Race for Water vessel aims to demonstrate that today's hydrogen technologies are mature, reliable and sustainable, both at sea and on land", says Alexandre Closset, business line director, Plastic Omnium.

Key stats of Race for Water Odyssey:

200kg hydrogen storage on-board, enough to power the vessel for 6-7 days;

30kW fuel cells to convert the hydrogen back to electricity;

8 knots sailing speed possible;

8 tons of lithium-ion batteries provide a 36-hour energy range;

512m2 of solar panel storage.

8. Dual-electric Chinese cargo ship

Guangzhou Shipyard dual-electric cargo ship. Image courtesy of China News

In November 2017, the Guangzhou Shipyard international launched a dual-electric cargo ship to sail in inland waters of the Pearl Delta. Powered by lithium batteries, a super capacitor, and two electric motors, the vessel emits no carbon, SOx or PM2.5 particulates. According to China News, the vessel represents a breakthrough in the design difficulties of large-capacity new electric ships and shore-power connectivity to provide efficient energy recovery as well as strong ship power. The China Classification Society (CCS) certified the vessel.

Key stats Dual-electric Chinese cargo ship:

- Two 160 kW electric propellers;
- Total energy capacity of 2.4 MWh via a 26-ton super-capacitor + ultra-high-power lithium battery;
- Operational time of two hours and up to 80km;
- 7 knots sailing speed. ⚓

Submarine Operations Envelope (Diesel Electric and Nucear)

Design series 5 of 12

by Capt Tomas D Baino PN (Ret), Naval Architect

INTRODUCTION

This article provides summaries of operational limitations of a submarine, as well as basic mechanics about how a submarine operates at the surface, underwater, between the sea surface and bottom of the seabed, and how to float back to the surface. Below are the cycles showing how a submarine operates, as illustrated in Fig. 1.

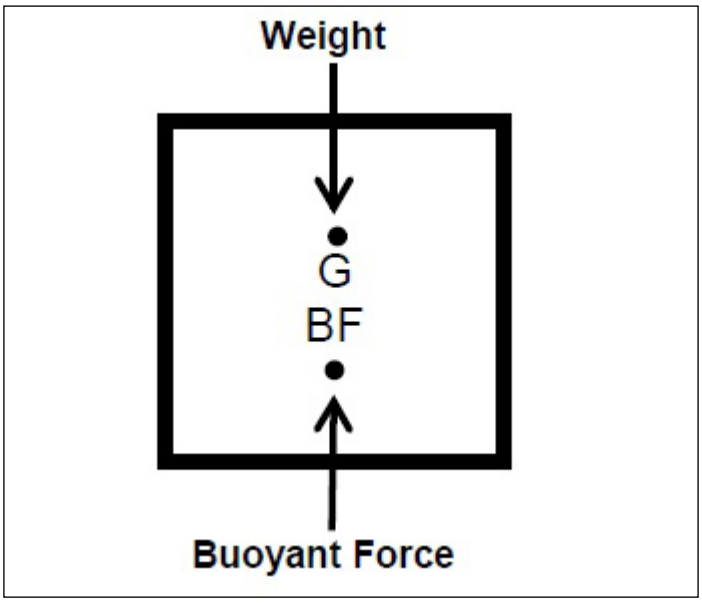

Fig. 1. Simple Buoyancy Calculations

To prove how this principle works, the following are the illustrated arithmetical examples:

If the volume of the hollow box is 1m x 2mm x 1m = 2 cubic meters, when immersed in seawater with a density of 1,025 tons/cubic meters, the buoyant force that pushes the box upward to the surface is equal to (2 cu. meters x 1.025 tons/cu. meters) = 2,250 tons. If the weight of the box (G) is 1.5 tons, the effective buoyant force (BF) is equal to (2,250 tons – 1.50 tons) = 0.750 tons.

Buoyant force – is the uptrust or upward force exerted by the fluid that opposes the weight of an immersed object in a column of fluid. The pressure increases with depth as a result of the weight of overlaying fluid. The pressure at the bottom of the column is greater than at the top of the column.

OPERATIONAL CYCLES

The following are basic summaries of explanation about how a submarine's operational cycles are sequentially conducted supported by the submarine's ship systems (in accordance with a principle of physics, the ***Archimedes Principle*** **(which states that when a matter is immersed in the liquid, it is buoyed by a force equal to the volume of the matter it displaced in the liquid).**

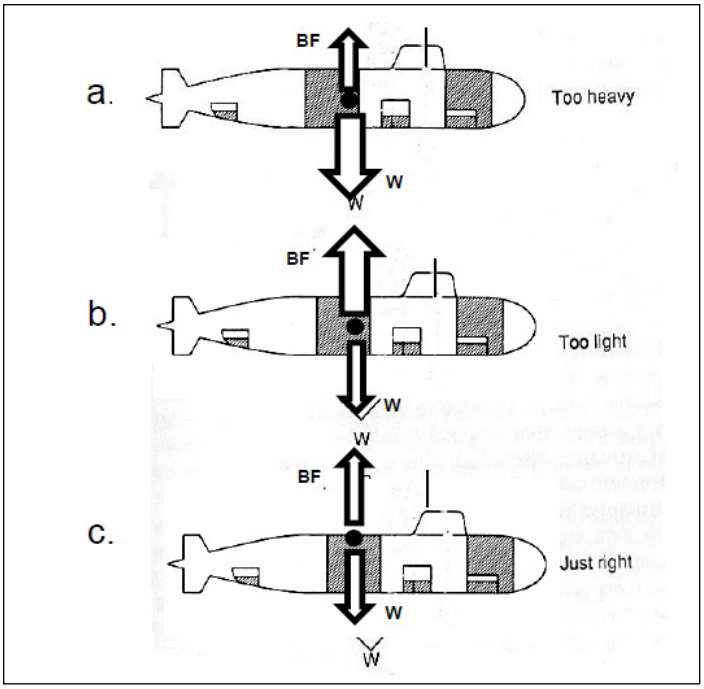

Fig. 2. Basic Sequence of Events Submarine Diving Cycles

Note:

BF = Volume of Submarine x density of seawater
Weight = weight of submarines + ballast and stores

Figure 2a – A submarine ready to dive underwater must increase the weight of seawater and fill up the ballast tank to overcome the force of buoyancy of the pressure hull. In this case, where the buoyant force (BF) is smaller and the weight of submarine plus the weight of water (W) at the ballast tank is greater, the submarine will dive underwater.

Figure 2b – A submarine ready to surface at sea must increase the buoyant force (BF) by blowing high-pressure air to displace seawater out of the ballast tank. The buoyant force of the pressure hull and the empty ballast tank will increase buoyant force (BF) and overcome the weight of the submarine (W).

Figure C – A submarine ready to maintain neutral buoyancy to navigate between the surface of the sea and the bottom of the sea, the force of buoyancy (BF) and the weight of water in the submarine ballast tank (W) are equal in magnitude.

BALLAST TANK ARRANGEMENT

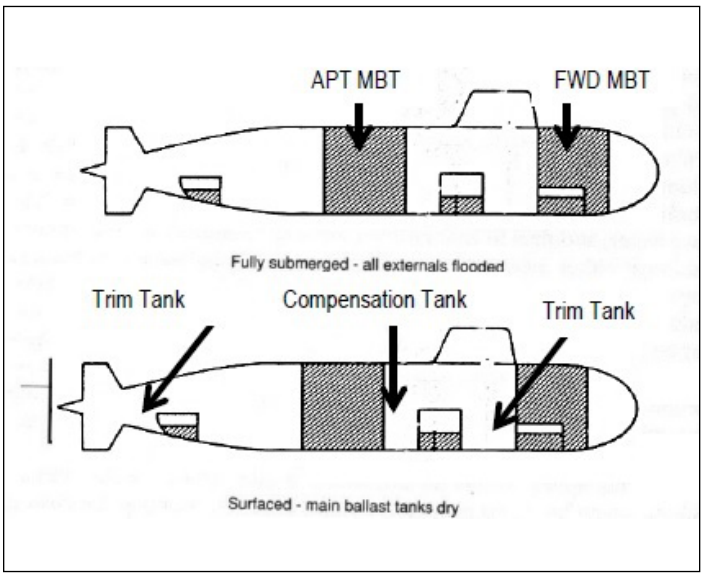

Fig. 3. General Arrangement of Ballast Tank of Diesel Electric Submarine

Main Ballast Tank (MBT)

The MBT is Located at the external section of the pressure hull, which free floods when the submarine is submerged. The purpose of the MBT is to allow major adjustments by the submarine to enable it to operate while submerged vertically, both upward and downward.

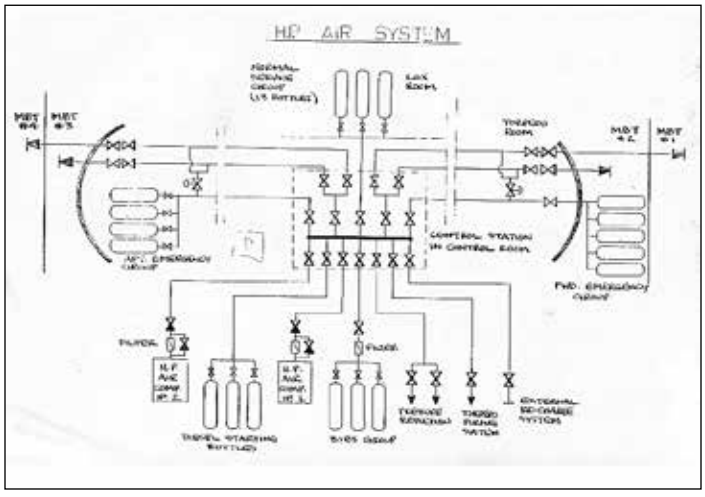

Fig. 4. High Pressure Air System for MBT

The high-pressure air system diagram is a very important component of the ballast tank that sustains the diving and surfacing of the submarine in all stages of operation.

TRIM AND COMPENSATION

When a positive and negative buoyant force (BF) is required, an action must be taken to maintain a condition of neutral buoyancy by adjusting the weight. This is achieved by the use of a compensating tank, which is located almost at the longitudinal center of gravity (LCG) of the submarine. The weight will cause a significant distance to the LCG to create a trimming moment (distance x weight), to trim aft on forward and the bow. A trim is the difference between the angle forward and angle aft of tilt with respect to the horizontal axis of the submarine.

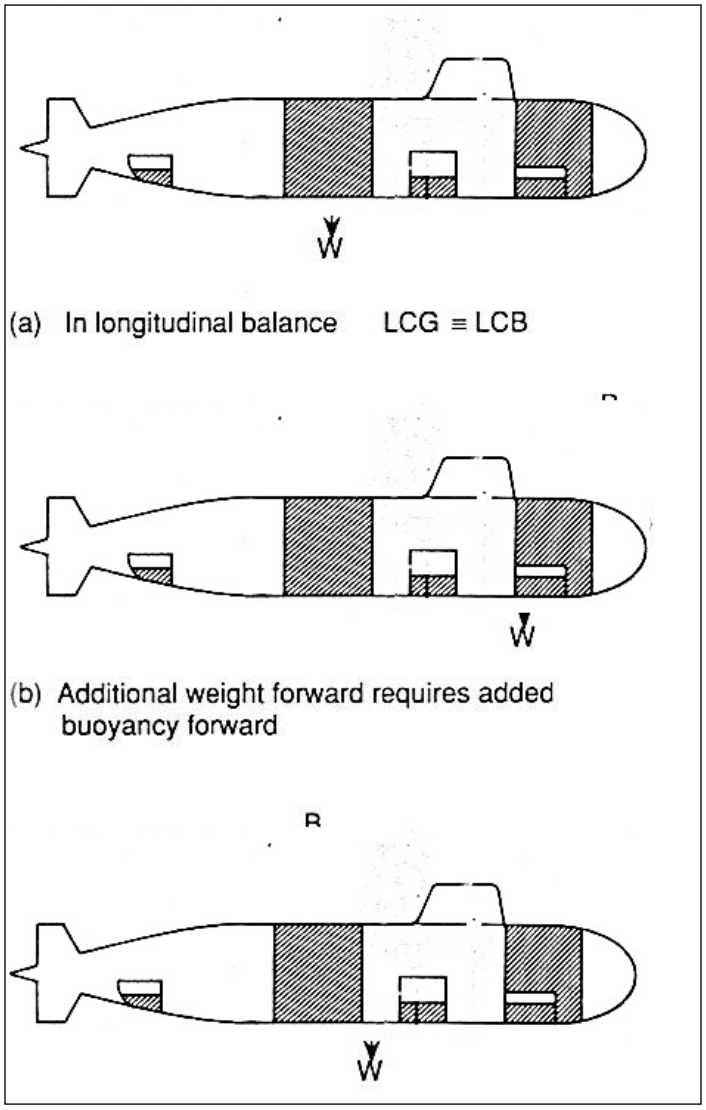

Fig. 5. Trim and Compensation Tank of a Submarine

A submarine operating below the surface of the sea compensates for variations in longitudinal moments (tons-meters) and weight by a compensation tank due to a change in density of seawater and distribution; and reduction due to fuel, water, stores, delivery of weapons systems, etc.

As shown in the trim polygon diagram in Fig. 6 as a graphical representation, the horizontal scale represents the variable ballast and moment about the trim axis of the submerged submarine, which is designated O (Aft moment and Forward moment).

The vertical scale represents the weight of the compensation tank. Each side of the polygon represents the weight and effect to the compensation tank. These tanks are identified in each side of the polygon.

The submarine trim and compensation polygon is a closed circuit that illustrates how a submarine will dive, surface and navigate underwater by adding or deducting the weight of water in the trim and compensation tank.

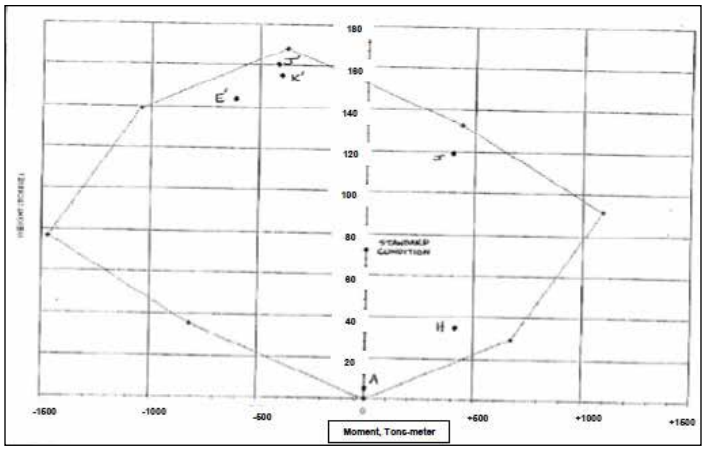

Fig. 6. Model of Trim Polygon Critical Data Points X-Y axis Comprising Coordinates in the Trim Polygon

TRIMMING POLYGON DATA POINTS		
CONDITION	**Moment (T*m)**	**Weight (Tonne)**
Fill: Fwd Trim Tank	674.4	29.7
Fill: Main Comp. Tank	1095.5	91.4
Fill: LOX Comp. Tank	440.4	132.9
Fill: Aft Trim Tank	-372.2	168.3
Empty: Fwd Trim Tank	-1046.2	138.6
Empty: Main Comp. Tank	-1467.7	76.87
Empty: LOX Comp. Tank	-812.6	35.36
Empty: Aft Trim Tank	0	0
A	3.4	5.8
E	-610.7	143.5
J	396.5	119.3
J'	-413.1	160.5
K'	-396.8	155.8
Standard Condition	0	72
B	-0.7	85.2
C	203	22.1
C'	-606.4	63.7
D	210.5	20.3
D'	-599.1	61.4
E	199	102
F	206.1	99.7
F'	-603.5	140.8
G	400.7	39.9
G'	408.9	81.05
H'	-393.3	75.8
K	412.6	114.14

Table 1. Example of Tim Polygon Data Sheet

The submarine will encounter some buoyancy problem if the weight of water slightly changes due to variations in density that could not be compensated. The buoyancy lines from the x-y coordinates are the limits of the trim and compensation tank effectiveness.

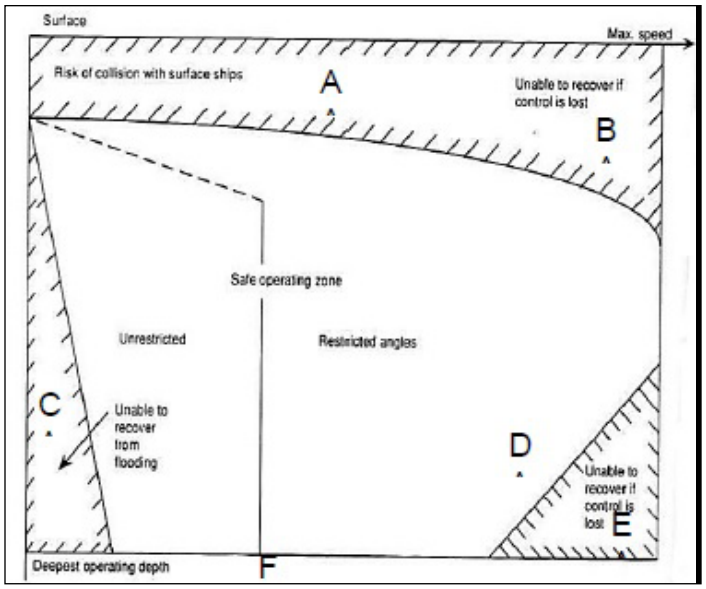

Fig. 7. Diving Safety Envelope

DIVING SAFETY ENVELOPE (Fig. 7) is an illustration of a submarine when operating under the surface of the sea.

- Critical parameter – this shows that when the submarine is operating at periscope or snorkel depth, it can encounter collision with deep draft surface ship.
- Submarine hydroplane pitch angle stabilizer or uneven ballasting of trim tank exceeds aft, with bow starting to dive deeper, loosing control and doing a crash dive.
- Submarine is unable to recover excessive flooding inside the pressure hull where the weight of water flooding the compartment is greater than the volume of the ballast tank.
- Submarine is gradually descending with the angle of hydroplane not greater than 30o and gaining depth with effective submarine propulsion motion control.
- Submarine is unable to recover and is totally lost at the bottom of the sea.
- Submarine is operating parallel to the surface of the sea at maximum pressure depth approaching the hull-collapsed depth.

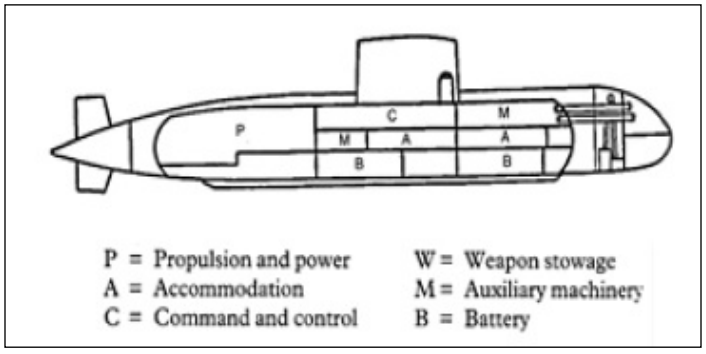

Fig. 8. Cross-Section of Double Hull Submarine

Legend:

P–Propulsion system, generators, control, switchboard, etc.

A–Accommodation, Crew billeting, habitability and life support system, etc.

C–Command, Control, bridge, conning tower, etc.

W–Weapon Stowage, torpedo tubes, torpedoes, etc.

M–Auxiliary Machineries, high and low pressure air, etc.

B–Battery, storage, charging system, etc.

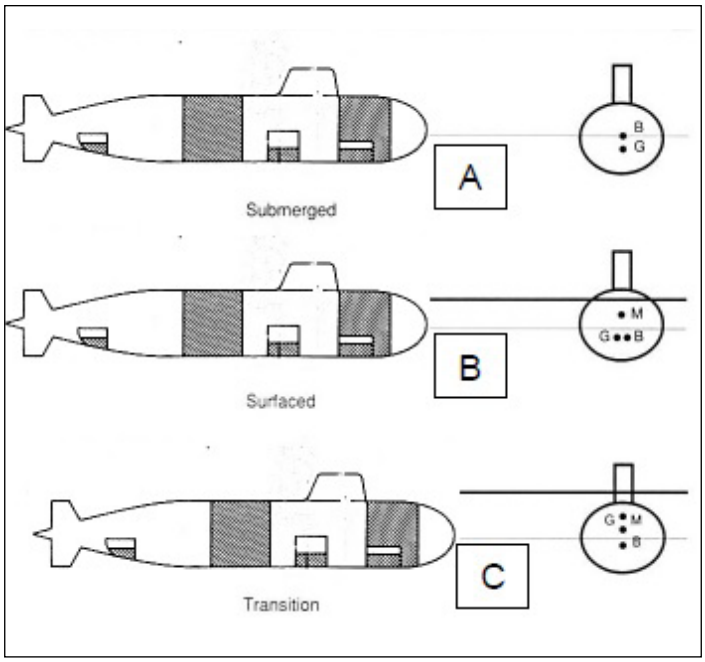

Fig. 9. Relationship of Center of Gravity, Center of Buoyancy and Metacenter of the Submarine Diving Operation

Fig. 9-a; the center of gravity (CG) is above the center of buoyancy (CB); the submarine will cause to submerge in upright position and navigate freely underwater.

Fig. 9-b: the metacenter of the submarine is above the center of gravity (CG) and coincides with the center of buoyancy; the submarine is floating at the surface of the water. Only 10% of the reserve buoyancy of the hull is above the surface of the water.

Fig. 9-c: when the metacenter and the center of gravity (CG) coincide with each other above the center of buoyancy, the submarine will cause to dive underwater.

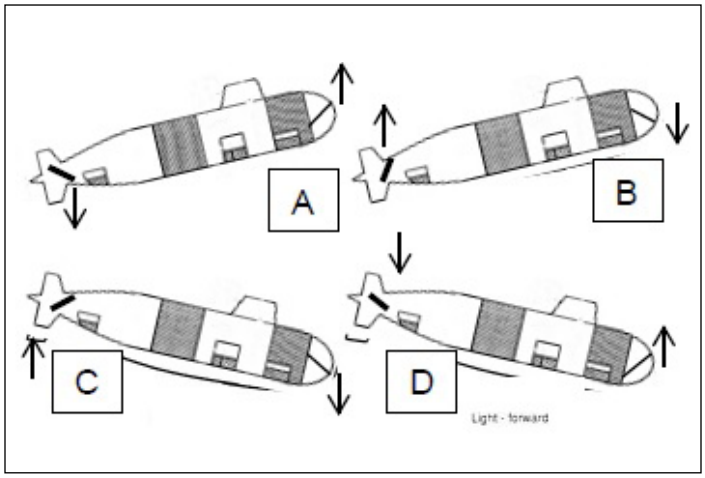

Fig. 10. Motion Sequence of A Submarine Under Motive Power of Propulsion System

Submarine under speed and power underwater is controlled by pitch angle of the forward and aft hydroplane in the following underwater cruising and vertical maneuvering situations of the hydroplane's pitch angle (up and down) depth controlled setting.

Fig 10-a: Submarine is heading to the surface of the sea, the hydroplane pitch angle is forward up and hydroplane pitch angle is aft down.

Fig. 10-b: Submarine is heading to the surface but changes direction from surfacing to diving direction, hydroplane of pitch angle is forward down and hydroplane pitch angle is aft up.

Fig. 10-c: Submarine is heading for deeper dive but changes direction to surface, hydroplane angle of pitch is forward up and hydroplane angle of pitch is aft down.

Fig. 10-d: Submarine is heading for deeper dive, hydroplane angle of pitch is forward down and hydroplane angle of pitch is aft up.

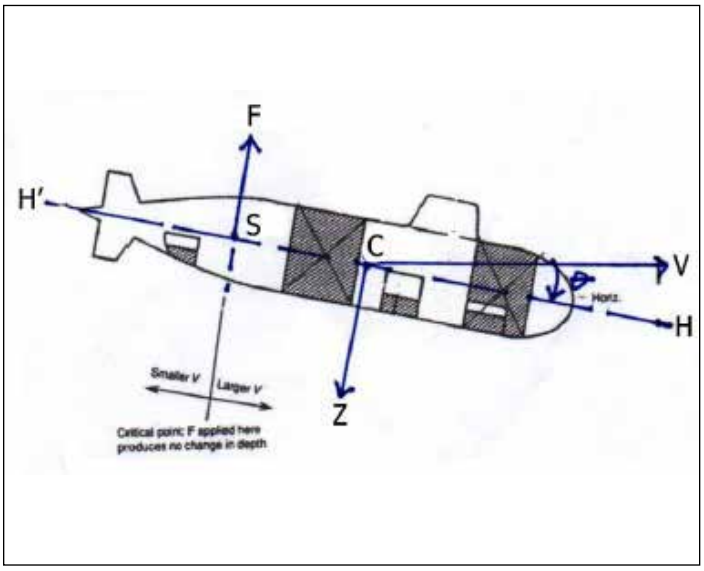

Fig. 11. Submarine Diving Trim Chinese Effect Phenomena

SUBMARINE DIVING TRIM CHINESE EFFECT

A phenomenon related to accurate measurement and concentration of weight inside the submarine – the CHINESE EFFECT – occurs when the effect of hydroplane control effectiveness at critical speed underwater of less than 2 knots, and the effectiveness of the aft hydroplane gliding underwater is progressively reduced.

The aft hydroplane's vertical direction of control of force by pitch angle is in the opposite direction of the pitch angle of the forward hydroplane. That creates a moment of force, which tends to make it rotate at the neutral point or fulcrum at the center of buoyancy "C". The forward hydroplane is near to the neutral point, and the effectiveness in the control of force at pitch angle causes heave velocity "V" with respect to the center of buoyancy "C" that creates the angle O from the horizontal axis of the submarine "H". "Z" is the direction of the center of gravity from point "C". Heave velocity "V" forward is larger; opposite aft is smaller, and presumed to intersect from the horizontal axis of the submarine "H" to "S" where "F" tends to maintain depth from the surface of the sea, while the submarine is maintaining the momentum speed of advance.

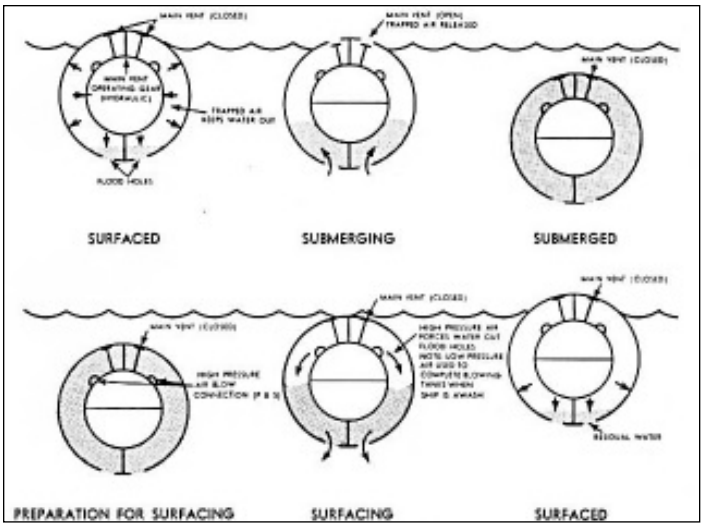

Fig. 12. Sequence of Events in Submarine Diving and Surfacing Operation

SEQUENCE OF EVENTS IN SUBMARINE DIVING AND SURFACING OPERATIONS

Submarine at the surface of the sea: air vents are closed to keep high-pressure air trapped inside the ballast tank; submarine maintains positive buoyancy (ballast tank and pressure hull)

Submarine submerging: air vents are open to release high-pressure air from the ballast tank; submarine gradually or quickly loses buoyancy due to flooding in the ballast tank (remaining positive buoyancy is inside the pressure hull)

Submarine submerged: air is replaced by seawater inside the ballast tank. Buoyancy is replaced by the weight of water in ballast tank (remaining buoyancy inside the pressure hull) is equivalent to the weight of water in the ballast tank; submarine is in neutral condition.

Submarine preparing to surface: air vents are closed, high pressure is blown inside the ballast tank to displace the water, gaining positive buoyancy.

Submarine surfacing: air vents are closed and high-pressure is increasing inside the ballast tank, and gradually or quickly releasing water inside ballast tank, thus, gaining positive buoyancy to the surface of the water.

Submarine at the surface: air vents are closed, high-pressure air is sealed and trapped inside the ballast tank with low pressure air maintaining the pressure to keep submarine's positive buoyancy to 10% reserve of buoyancy (difference between the weight of the water inside the ballast tank and the total buoyancy of the submarine (ballast tank and pressure hull).

SUBMARINE SNORKELING AT PERISCOPE DEPTH WHEN CHARGING BATTERIES.

Submarine snorkeling takes place when the generators are in operation to charge the series of batteries that takes an estimated 5-8 hours to fully charge the battery banks. The submarine can operate underwater using batteries, depending on the load/speed, and battery-draining period of approximately 6-10 days. The battery charging time versus duration before batteries are drained of energy is called **Indiscretion Ratio**, normally equivalent to 10%.

At snorkeling depth, the submarine can launch buoy to connect to the atmosphere with fresh air and supply to the internal combustion engine (ICE) to complete the ignition-combustion cycle of the generators for operation, by charging batteries or by using AIP Engine.

The submarine, when operating at battery mode, can remain ultra-quiet and emit minimal acoustic signatures.

Note: The vent holes (Kingston valves) at the bottom of the MBT are always left open to keep seawater in and out. In order to gain negative and positive buoyancy, the water needs to escape from MBT by controlling low and high-pressure air.

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South Korea Regains Top Spot in 2018 Shipbuilding Orders

by Vicky Viray Mendoza

The world's shipbuilding companies are concentrated in three East Asian countries – **China, South Korea**, and **Japan** – that when combined control 90% of global market share.

But finally, after seven years, **South Korean** shipyards have recaptured the lead in annual shipbuilding orders secured, according to newly released data from **Clarkson Research institute**. **South Korea** lost its No. 1 rank to China in 2012, and remained in second place up to 2017.

The data reveals that South Korean shipyards received new orders in 2018 for a combined 12.63 million compensated gross tons (CGTs), which accounts for nearly 45% of the 28.6 million CGTs for all orders placed globally.

China, at second place, received orders for 9.15 million CGTs, while **Japan**, at third place, received orders for 3.6 million CGTs.

In December 2018 alone, **South Korean** shipbuilders garnered orders totaling 1.5 million CGTs, followed by **China** shipbuilders with 340,000 CGTs.

Increased orders for **LNG Carriers** played a major role in helping **South Korean** shipbuilders leapfrog over **China** and retake the top rank in the global shipbuilding hierarchy.

South Korea's **Samsung Heavy Industries (SHI)** announced on December 31 that it had received an **LNG Carrie**r order worth about $190 million, plus 4 **LNG Carrier** orders in December for a total of 6 **LNG Carriers**.

The **South Korean** shipyard's orders for 2018 reached 49 vessels - comprising 18 **LNG Carriers**, 13 container ships, 15 tankers and 3 special purpose ships. The South Korean shipbuilder aims to secure $8.2 billion worth of orders in 2019.

South Korean shipyards received over 80% of **LNG Carrier** orders in 2018. Yonhap News Agency reports that South Korea's top 3 biggest shipbuilders: **Hyundai Heavy Industries (HHI)**, **Samsung Heavy Industries (SHI),** and **Daewoo Shipbuilding & Marine Engineering (DSME)** met their order targets for 2018 as a result of these **LNG Carrier** orders. **HHI** received orders valued at $13.3 billion, **SHI** at $5.7 billion, and **DSME** at $6.81 billion.

The **Clarkson Research** data shows that by end-December 2018, a total of 1.87 million CGTs of new orders were placed globally.

According to **Clarkson Research, LNG Carrier** orders globally are likely to total 69 in 2019, up from 65 in 2018, and 17 in 2017. Ironically, it is mainly **China's** growing use of **LNG**, together with the adoption of **LNG** globally as a more environmentally friendly fuel that is driving the demand. An annual average total of 63 **LNG Carriers** are likely to be ordered between 2020 and 2027.

Backlog Orders. The **Clarkson Research's** latest data shows that **China** holds the largest backlog order of 29.14 million CGTs, followed by **South Korea** with 20.9 million CGTs, and **Japan** with 13.91 million CGTs.

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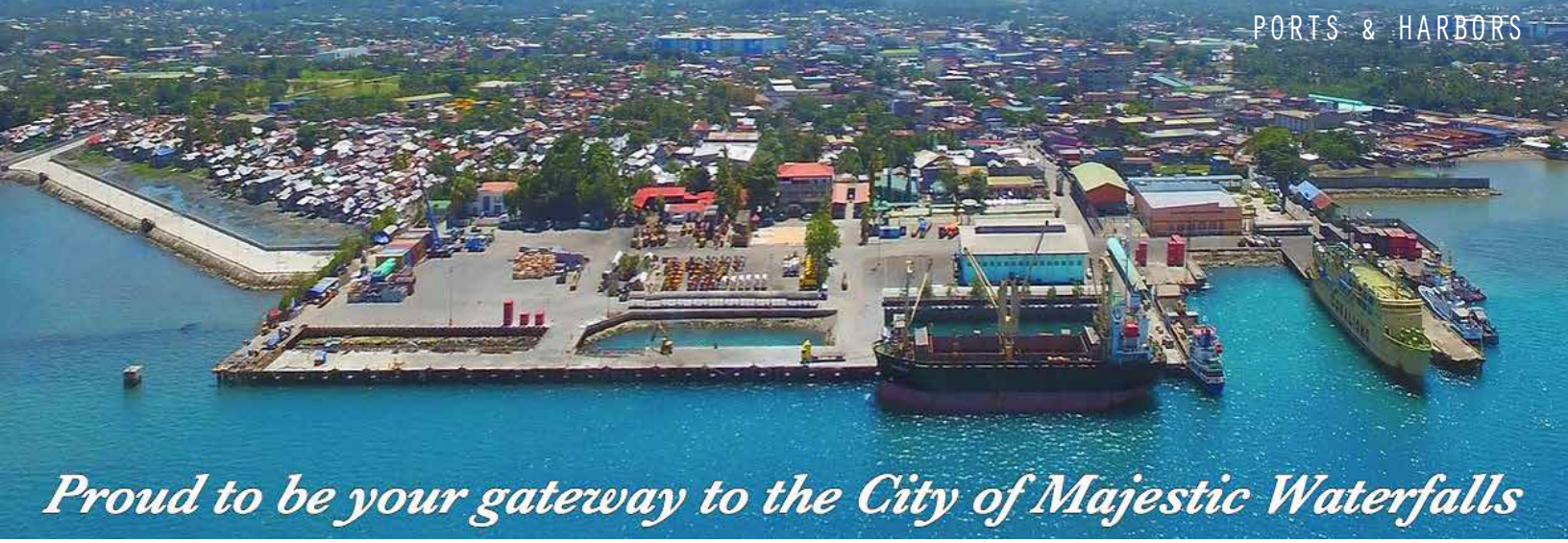

The Port Management Office of Lanao del Norte/Iligan (PMO LNI)

by PPA

The **Port Management Office of Lanao del Norte/Iligan** is one of the **Philippine Ports Authority (PPA)** ports located along the northern central coastal areas of Mindanao facing the Iligan Bay. The **Port of Iligan** is its baseport.

History of Iligan Baseport. The Spanish Colonial Government started to develop the seaport of **Iligan** in the early 18th century. The earliest structure was constructed at Nonocan, adjacent to the present site of Marcelo Fertilizer Corporation. However, it remained unfinished. In 1899, the Spaniards abandoned **Iligan**. The then Gobernadorcillo, **Hilarion Ramiro**, received the Americans under the Command of Capt. Smith who landed in 1900 with seven gunboats anchored at **Iligan Bay**. The Americans constructed the first wooden pier at Camp Overton. In 1933, under the U.S. Government, the **Bureau of Public Works** constructed the first concrete pier at the south end of the present port area. The earliest customers of Pier 1 were Bapor Lalok, Escaño, and Isidoropons, plying between **Iligan** and **Cebu**.

Another port improvement carried on during the American regime was the construction of Pier 2, on the north side. It was constructed in 1939 together with the Old Hinaplanon Bridge. But to discourage Japanese colonizers from landing in Iligan, the two pier structures were blasted in 1942 by the USAFFE. Both pier structures (Piers 1 & 2) underwent a major repair in 1947 under the American rehabilitation project. The **Bureau of Public Works** constructed the reinforced concrete (R.C.) wharf in 1963.

PPA-Port Management Unit of Iligan (PPA-PMU Iligan) formally took over the management and supervision of its ports on 1-August-1977. Since then, **PPA** has implemented several port improvement projects in the **Port of Iligan** such as: concrete paving of the open storage areas, construction of perimeter fence; rehabilitation of the R.C. pier and wharf; installation of rubber dock fenders, southward expansion of the R.C. Wharf to connect it to R.C. Pier 2, increasing its length from 240m to 360m; and the reclamation of its back-up area covering about 4,000 sqm. The latest improvement is the alternate access road.

On 1-February-1988, **PPA** underwent reorganization renaming **PMUs** to **Port Management Offices (PMOs)** including **PMO Iligan**. In 2014, **PPA** had undergone **Rationalization Plan (RATPLAN)** renaming **PMO Iligan** to **PMO Lanao del Norte/Iligan (PMO LNI)**.

The **PMO LNI** serves the port users from the hinterlands of the provinces of Lanao del Norte, Lanao del Sur, and parts of Misamis Oriental, Misamis Occidental and Zamboanga del Sur.

Moreover, **PMO LNI** is an ISO 9001:2015 certified for **Quality Management System (QMS)** for vessel entrance clearance process and International Code for the Security of Ships and Port Facilities (ISPS) compliant valid from 6-July-2018 until 5-July-2023.

PMO-LNI has 11 private ports: **PHOENIX LPG PHILIPPINES, INC.** (liquefied petroleum gas); **PILMICO FOODS CORP** (flour and feeds); **REPUBLIC CEMENT ILIGAN, INC.** (cement); **GRANEXPORT MANUFACTURING CORP** (coconut crude oil, copra pellets, and cochin); **SAN MIGUEL CORP OIL MILL** (coconut crude oil, copra pellets, and cochin); **PETRON CORP** (petroleum); **PILIPINAS SHELL PETROLEUM CORP** (Petroleum); **GLOBAL STEEL PHILIPPINES INC.** (hot rolled coils, and cold rolled coils); **MABUHAY VINYL CORP** (caustic soda, chlorine, hydrogen chloric acid, sodium hypo chloride); **AC ENERGY HOLDINGS, INC./GN POWER KAUSWAGAN, INC.** (power) and **DAIMA SHIPPING CORP** (RORO vehicles).

Under **PMO LNI,** is the T**erminal Management Office of Tubod (TMO-Tubod)**. **TMO-Tubod** is about 69 kilometers from **Iligan City** and about 12 nautical miles from the Port of Ozamiz across Panguil Bay. Under TMO Tubod is Kolambugan Port. Between 1977 and 1996, the port had active port traffic. Vessels of **Tamula Shipping** used to ferry cargoes and passengers from the **Port of Kolambugan** to the Port of Ozamiz and vice versa. However, the ferry services of T**amula Shipping** halted in late 1996 because of the introduction of more modern, more convenient and faster **RoRo ferry** services by **Daima Shipping Corp** and **Millenium Shipping**, which operated their own private ports and **ferry** services in Mukas, and Tabigue, Kolambugan, Lanao del Norte, respectively. However, **Millennium Shipping** also halted its shipping services in 2003.

"The enhanced port facilities will be of great help to bring much needed materials and equipment to hasten the rehabilitation of Marawi City. In the 2008 pacification campaign in areas around Lanao Lake, I initiated the deployment of 2 patrol boats (PBLs) from Zamboanga City via the Iligan Port as Commander, Naval Forces Western Mindanao. Those boats deterred the movements of unauthorized armed groups in that waterway for the duration of the campaign," retired Vadm Emilio C. Marayag Jr. said.

By 2020, **PPA-PMO LNI's** vision is to provide port services of global standards. **PMO LNI** is led by **Engr. Salvador L. Delina** as the new Port Manager starting 11-January-2019. ⚓

GloFouling Project launched to protect Marine Biodiversity

by UNDP

GloFouling Partnerships: A collaboration of GEF, UNDP and IMO to address bioinvasions on ships' hulls and other marine structures

IMO Launches Biofouling Initiative. A new international effort to combat the negative environmental impacts of the transfer of aquatic species through ships has been launched in November 2018. The **GloFouling Partnerships Project,** a collaboration between the **Global Environment Facility (GEF)**, the **United Nations Development Programme (UNDP)** and the **International Maritime Organization (IMO)**, will address the build-up of aquatic organisms on a ship's underwater hull and on other marine mobile infrastructure.

The introduction of invasive aquatic organisms into new marine environments not only affects biodiversity and ecosystem health, but also has measurable impacts on a number of economic sectors such as fisheries, aquaculture and ocean energy. Therefore, addressing invasive aquatic species is not only a matter of ensuring the health and integrity of marine ecosystems, but ultimately about safeguarding ecosystem services that sustain the livelihoods of coastal communities across the globe.

Hull fouling on a tall ship. Photo Credit: Propulsion Dynamics Inc./Marine Photobank

The **GloFouling Project** will drive actions to implement the I**MO Guidelines** for the control and management of ships' **biofouling**, which provide a globally consistent approach on how **biofouling** should be controlled and managed to minimize the transfer of invasive aquatic species through ships' hulls. The project will also spur the development of best practices and standards for improved **biofouling** management in other ocean industries.

12 countries, representing a mix of developing nations and **Small Island Developing States**, have been selected to spearhead the work of the **GloFouling** project: **Brazil, Ecuador, Fiji, Indonesia, Jordan, Madagascar, Mauritius, Mexico, Peru, Philippines, Sri Lanka, and Tonga**.

The **GEF** is providing a US$6.9 million grant to deliver a range of governance reforms at the national level, through numerous capacity-building activities, training workshops and opportunities for technology adoption to help address the issue of invasive species. Strong participation from private sector stakeholders is also expected, replicating the successful public-private sector partnership model used by **IMO** in previous projects.

While **IMO** will focus on shipping, the **Intergovernmental Oceanographic Commission of UNESCO (IOC)** will join the three main partners **(GEF, UNDP, IMO)** to lead the approach to other marine sectors with a view to developing best practices that may address the transfer of invasive aquatic species through improved biofouling management. **IOC-UNESCO** will work hand in hand with the GloFouling project to increase awareness of this environmental challenge among key stakeholders.

Contributing to the efforts of **IOC-UNESCO,** the **World Ocean Council (WOC)** has been selected to engage and channel the participation of private sector companies for the development of best industry practices in non-shipping sectors such as aquaculture and oil and gas extraction. **WOC** will be working with the private sector to spur business action and encourage investment in **biofouling** solutions through dedicated sessions of the **WOC Ocean Investment Platform.**

Hiroyuki Yamada, Director of the **Marine Environment Division, IMO**, praised the commitment of the 12 developing countries that have taken the global lead towards the achievement of the project objectives. He stated, *"This joint effort to implement the **IMO Biofouling Guidelines** and best practices for other marine industries will help nations to deliver essential contributions to the **2030 Agenda for Sustainable Development Goals.**"*

Yamada further highlighted the additional contribution of **biofouling** management to the reduction of greenhouse gas emissions from shipping through energy-efficiency gains resulting from clean hulls.

The **GloFouling Project** has already received endorsement from over 40 major stakeholders, representing academia, industry associations, technology developers and private sector companies covering a broad spectrum of the blue economy.

Andrew Hudson, Head, **UNDP Water & Ocean Governance Programme,** said, *"We know with high certainty that **biofouling** of ships and other mobile marine infrastructure is a serious environmental issue that can lead to the introduction of invasive species around the world. **UNDP** is very pleased to collaborate once more with the **GEF** and **IMO** to take steps to address this important issue through a project that brings numerous environmental benefits."*

Chris Severin, Senior Environmental Specialist from the **GEF**, said, *"The implementation of the **GloFouling** Partnerships will be instrumental in battling aquatic invasive species, and will not only lead to healthier more robust marine ecosystems, but also offer an opportunity to unlock blue economy potentials through the stimulation of public-private sector investments."* ⚓


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Michael Factora
From Engineering to Farming


Marvie Fernando Mesa of Alabat, Quezon
From Vision to Transformation


Cynthia and Carl Dean Litigio
From Overseas Workers to Farm Business Employers


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Mt. Iriga/Asog behind Lake Buhi, Camarines Sur. Photo Credit: FroyAgta

Lake Buhi

by Josephine M Viray

The **Bicol Peninsula** is rich in natural resources and is a region known for its scenic destinations. The most famous lake in the Bicol region is Lake Buhi for its serene panorama. It is a 1,800 hectare freshwater lake, 8 meters deep, created out of volcanic activity, and is located in the town of Buhi, Camarines Sur. The lake derived its name from the local dialect *"Naka-Buhi"* meaning the town settlers were able to flee from the eruption of Mayon Volcano hundreds of years ago. Fresh water **Lake Buhi** is located between two old volcanos, **Mount Iriga**, which is also known as **Mount Asog**, and **Mount Malinao**.

Mount Iriga is an active volcano located about one kilometer from **Lake Buhi**, and its peak is forested with pine trees. It erupted in 1628 and in 1642, and is known for its Phreatic Explosions, which occurs when magma heats ground or surface water. **Mount Malinao**, located in Alinao, Albay is now probably an extinct volcano. It has no recorded eruption but exhibits intense Fumarolic Activity which is controlled and used for generating electricity. A Fumarole is defined as a hole in a volcanic region from which hot gasses and vapors issue.

Mount Malinao ranks second of the three most famous mountains of Albay, known as the "Magayon Trio." **Mount Malinao** is famous for its beautiful Vera Waterfalls found at its slopes. **Mount Masaraga** is famous for being adjacent and closest to the perfect cone of **Mount Mayon**.

On 11-July-2018 Philippine's Insider Magazine cited two theories of how **Lake Buhi** was formed. The first is when **Mount Iriga's** side collapsed due to an earthquake in 1641. A landslide resulted creating a natural dam in which **Lake Buhi** came about. The second theory is when Mount Iriga erupted which created the beautiful **Lake Buhi.**

Lake Buhi is rich in marine life. **Sinarapan** (*Mistichthys luzonensis*) is one of 7 fish species endemic to Lake Buhi. It is the world's smallest commercial fish. The other endemic fish: **Irin-Irin** (*Redigobius Bikolanus*), Dalag (*Snakehead murrel*; *Chanda Striata*), **Puyo** (*Climbing perch; Anaya's Testudineus*), **Kotnag** (*Hemiramphus*), and **Burirawan** (*Strophidon Sathete*).

The surrounding forest of **Lake Buhi** is home to no less than 25 bird species, 5 of which are endemic to **Lake Buhi**: Black-Naped Monarch, Philippine Pygmy Woodpecker, White-Eared Brown Dove, Elegant Tit, Philippine Hanging Parrot. Other fauna living in the forest: Philippine Cynomolgus Monkey (*Macaca fasicularis*), Flying Lizards (*Draco*), Skinks, Monitor Lizards (*Varanus marmoratus*), Civets, and Bats.

Tabyos (*Dwarf Goby; Pandaka Pgymea*), world's smallest fish, can be found in the Philippines. It is inedible, and toxic. This species is not to be confused with the ***Sinarapan*** (*Black-spotted Goby; Mistichthys luzonensis*) fish of **Lake Buhi**.

The fishing industry thrives in the town of Buhi due to the endemic fish of **Lake Buhi** and its surrounding lakelets. And there are 14 tributaries that converge into **Lake Buhi**. The most important lakelet is **Manapao** where a small sanctuary and repopulation project for Sinarapan is being undertaken. Due to the declining population of this endemic fish, the municipality has banned fishing of ***Sinarapan*** until its population stabilizes.

On 11-July-2018 Philippine's Guide Magazine reports that **Lake Buhi** is the main source of livelihood for the residents of Buhi, Camarines Sur. Apart from the fishing industry, a hydroelectric plant of the **National Power Corporation** gets its water supply from **Lake Buhi**, and generates about 2.8 megawatts of power. The **National Irrigation Administration** also uses water from **Lake Buhi** to irrigate farms and rice fields in the Rinconada towns including Irriga City, and the Municipality of Pili, altogether covering over 12,000 hectares.

Four main fish species have been introduced into the lake to boost Inland Fisheries volume and value: **Nile Tilapia** (Oreochromis niloticus), **Mozambique Tilapia** (Oreochromis mossambicus), **Karpa** (Cyprinus carpio), and **Bangkok Hito** (Catfish). **Freshwater fish cages of Tilapia** surround **Lake Buhi**.

Marlowe Aquino, PhD, states in the Bureau of Agricultural Research (2018) that **Lake Buhi** is a source for raw materials for a new community livelihood. The Water Hyacinth, commonly called "Water Lily," can be processed into handicrafts and is now a source of livelihood for people living along the lake's adjacent barangays. The Water Lily has been transformed into a material source for a profitable enterprise through people's initiative.

Lake Buhi at the bottom of Mount Iriga. Photo: Pauzflickz

Majestic **Lake Buhi** is one of the most famous lakes in the Philippines. Government representatives of the Bicol Region should aim at protecting the waters of **Lake Buhi** from fish feeds that only add to the polluted water; conserving its surrounding forest; and developing a sustainable tourist destination. ⚓

A Cuvier's Beaked Whale on the Navy sonar range off California. Photo Credit: A. Friedlaender; NMFS permit #14534

Why do Beaked Whales return to a Navy sonar range despite frequent disturbance? Scientists say it's the food

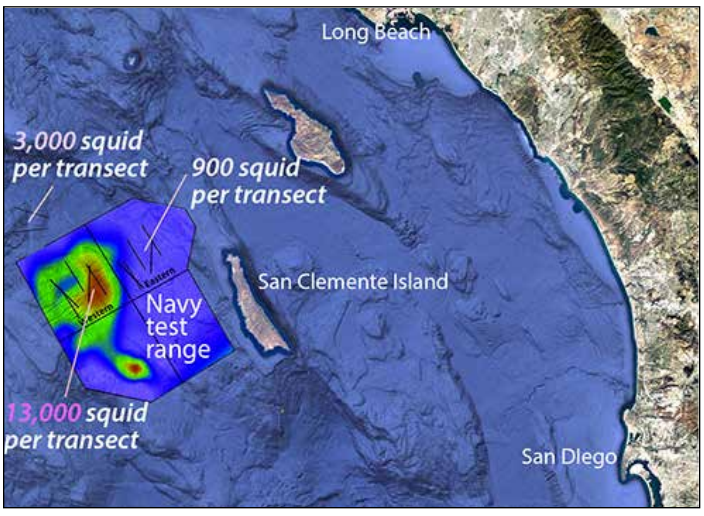
by Science Daily

Using data from underwater robots, scientists discovered that **Beaked Whales** prefer to feed within a **Navy** sonar test range off Southern California that have dense patches of deep-sea squid. A new study published in the *Journal of Applied Ecology* shows that **Beaked Whales** need these prey hotspots to survive, and that similar patches do not exist in nearby "sonar-free" areas.

For decades, the **U.S. Navy** has used high-powered sonar during anti-submarine training and testing exercises in various ocean habitats, including the **San Nicolas Basin** off Southern California. **Beaked Whales** are particularly sensitive to these kinds of military sonars, which sometimes result in mass stranding events. Following legal action from environmental activists related to these risks, the **Navy** modified some training activities, created "sonar-free" areas, and spent more than a decade and tens of millions of dollars trying to find ways to reduce the harm to **Beaked Whales** and other mammals.

The new research, led by **Brandon Southall** at the **University of California, Santa Cruz,** and **Kelly Benoit-Bird** at the **Monterey Bay Aquarium Research Institute**, aimed to better understand why whales keep returning to the test range despite the risks.

The researchers equipped an underwater robot with echo sounders to measure the abundance, density, and sizes of deep-sea squids in different parts of the **Navy** test range, as well as in nearby waters. They also developed an "energy budget" for beaked whales, showcasing the costs -- in time and calories -- of hunting for squid. This helped the researchers estimate how many dives the whales needed to make in order to get enough food to survive in different areas.



"***Beaked Whales*** *work very hard to obtain their food. They are essentially living paycheck to paycheck,*" said **Benoit-Bird.** Unlike many baleen whales with significant energy reserves, **Beaked Whales** can't afford to expend too much energy on a dive that doesn't result in capturing many squid. In areas where the concentration of prey is low, the **Beaked Whales** must work harder and expend more calories, making reproduction and raising young much more challenging. Some of the areas under study were so poor in terms of prey that whales likely could not meet their basic energetic requirements if they only fed there.

"Despite how things might look from the surface, the deep sea is not uniform," **Benoit-Bird** added. *"There are pockets of wealth where squid are abundant, and Beaked Whales know exactly how to find those hot spots."* It turns out that a portion of the Navy test range off Southern California encompasses one of these hot spots –an area rich in squid.

In fact, squid were 10 times more abundant higher in the area preferred by the whales. In this preferred area, the whales could get enough food by making just one dive a day. In a nearby sonar-free area (established with the idea that Beaked Whales could shelter in these areas while the sonar tests were underway) the whales would need to make between 22 and 100 dives per day to get enough food -- something that would be difficult or impossible to do.

"Our findings, based on a novel integration of active sonar imaging and passive listening technologies, have multiple management implications," explained **Southall**. *"They provide direct information to the* ***Navy*** *and federal regulators to better manage important and impacted habitat areas off California. And they give us new data on foraging ecology for population-level models of disturbance that have been at the heart of recent debate and litigation over spatial management and proposed sonar exclusion zones."*

This study is the first to link habitat quality with **Beaked Whales** behavior in such fine spatial scales. It also demonstrates that scientists can't assess the quality of deep-sea habitats by simply making measurements at the ocean surface, or even by measuring the physical and chemical properties of the deep ocean. Direct measurements of the prey environment at the depths where animals are feeding, coupled with observations of when and where animals are foraging, are critical.

Until now, collecting such detailed data, even over small time and space scales, was virtually impossible. The researchers are now working on tools that will help them study predators and prey over longer time periods, and in other areas where the **Navy** operates high-powered sonar. Similar field-research and modeling techniques could also be used to assess the potential impacts of other human activities that may disturb ocean animals, like shipping traffic or offshore oil and gas development.

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Story Source: Monterey Bay Aquarium Research Institute.

Journal Reference: Brandon L. Southall, Kelly J. Benoit-Bird, Mark A. Moline, David Moretti. "Quantifying deep-sea predator-prey dynamics: Implications of biological heterogeneity for beaked whale conservation." Journal of Applied Ecology, 2019.

Washington, D.C. U.S. Navy Yard. Photo Credit: NSA Washington

U.S. Navy May Build Wall to Defend HQ from Climate Change

by Vicky Viray Mendoza

The **U.S. Navy** is contemplating on building a high 14-foot seawall to protect the **Navy Yard** in Southeast Washington, D.C. from rising sea levels, an effect of climate change.

The **Navy Yard** is the Navy's oldest installation. It was established in 1799 as a shipbuilding facility and port, and later used for making ordnance, and then turned into an administrative centre after World War II. The Navy Yard now houses the **Chief of Naval Operations (CNO),** the Navy's highest-ranking officer, as well as the **Naval Facilities Engineering Command,** the **Judge Advocate Genera**l, and the **DoD Navy Inspector General**. By proximity, the **Navy Yard** is less than 2 miles southeast of the U.S. Capitol.

"Military engineers proposed the wall in a study, obtained through a public-records request, that describes a structure as long as 1.5 miles, to protect three dozen buildings at a cost of as much as $20 million. It's the latest example of a federal agency getting ready for climate change, despite the Trump administration's public dismissal of the threat," Christopher Flavelle stated on TaskandPurpose.com.

Bloomberg reports that "The Naval Facilities Engineering Command document, dated 27-February-2018, and based on a flood risk management study prepared for the Navy by the U.S. Army Corps of Engineers, found that a so-called 10-year storm — one with a 10% chance of happening in any given year — would cause 7 feet of flooding at the **Navy Yard**. A 100-year storm would bring 10.5 feet, and a 500-year storm 14 feet of flooding. Those flood risks will only get worse. The study points out that sea levels are expected to increase 1.3 feet by 2035, and as much as 2.6 feet by 2065. It proposes 5 options to protect the **Navy Yard**. Four of those options entail surrounding most of site with a permanent wall, as well as pump stations to move whatever water makes it over or around the wall. It proposes a wall with two parts: a permanent 9.5-foot section, topped by removable panels that would rise to 14 feet."

According to the **Union of Concerned Scientists**, water levels in the Washington D.C. area will rise much more quickly. With rising sea levels and natural subsidence, water levels along the Anacostia River will rise by 4-6 feet by 2100. This would render parts of the Navy Yard to frequent flooding, and storm surges could lead to more serious damage. The **Joint Base Anacostia-Bolling** could lose up to 50% of its land.

The water level rise of 4-6 feet would inundate about half of Naval Support Facility Anacostia, which is located just down the Anacostia River. Since the NSF Anacostia is in a Low-lying area, it already experiences close to 40 floods per year. By mid-century, the estimate could rise between 450 and 600 per year, under a worst-case scenario.

It is hoped that the 14-foot wall would address near term everyday flooding and provide adequate capacity to hold back storm surges during extreme weather events. The proposed wall would extend along the site's waterfront and wrap around along shore to the west. It would separate the Navy Yard from adjoining neighborhoods. However, by separating the Yard, it will put more risk on the nearby structures and make them more vulnerable to flooding. The Navy needs to address this scenario.

"If preventive measures are not taken, the Navy Yard will see more frequent and damaging tidal floods, an increase in the severity of storm-driven floods and a loss of land that is currently being used," Reem Nadeem reports on WTOP.

The floods would also potentially affect some of the Navy's most important facilities such as the **Navy Military Sealift Command** and the **Marine Corps helicopters** that transport the President of the United States.

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The Associated Marine Officers' and Seamen's Union of the Philippines (AMOSUP) founded by the late Capt. Gregorio S Oca, capitalized and developed the Academy. The new AMOSUP President,Dr. Conrado F. Oca, heads the Academy's board of governors. The board is comprised of representatives from the private sector, the International Transport Workers Federation, the Filipino Association of Maritime Employers, the International Transport Workers Federation, the All Japan Seamen's Union, the International Mariners Management Association of Japan, the Norwegian Seafarers' Union, the International Maritime Employers' Committee, the Danish Shipowners' Association, the Norweigan Shipowners' Association, and the Japanese Shipowners' Association.

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MAAP students are all scholars who are entitled to free tuition, board and lodging. They receive a comprehensive, up-to-date and well-rounded education that fully complies with the requirements of STCW 95 and the Commision on Higher Education (CHED). To ensure the highest standards of quality, MAAP adheres to a Quality Standards System that has been certified to comply with ISO 9001 version 2008, the Det Norske Veritas (DNV) Rules for Maritime Academies, and the Productivity and Standard Board (PSB) of Singapore.

The Academy offers three main programs: the Bachelor of Science in Marine Transportation (BSMT), Bachelor of Science in Marine Engineering (BSMarE) and the Bachelor of Science in Marine Transportation and Engineering (BSMTE). The curricula for the three courses were designed with the help of the United States Merchant Marine Academy at Kings Point, New York. Courses are four-year courses with sea phases scheduled in the third year. The BSMT curriculum requires a total of 192 units: 152 at MAAP, 40 practicum/shipboard units on board T/S Kapitan Felix Oca and/or a shipping company sponsorship. The BSMarE curriculum requires a total of 193 units: 153 at MAAP, 40 practicum/shipboard units on board T/S Kapitan Felix Oca and/or a shipping company sponsorship.

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