**TURN THE TIDE : THE CHANGING CHARACTER OF NAVAL WARFARE
AND ITS IMPLICATIONS TO
MARITIME CAPABILITIES OF THE PERUVIAN NAVY**

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1.   **AIM**

This service Paper will examine a prospective view on naval warfare, and the existing maritime capabilities of the Peruvian Navy (PN) in order to define gaps and propose solutions for future challenges that will affect the PN.

2.   **INTRODUCTION**

Almost 96% of the world's trade is transported by sea[1]. That is why countries considered as economic superpowers have developed in time navies with efficient and effective maritime capabilities, as well as competitive maritime industries and infrastructure.

3.   Globalization has not only opened opportunities for the economic development of countries but also has increased the breadth of unconventional threats. The PN has developed its capabilities to meet those challenges best. This paper will first address how the international and Peruvian maritime security environment is and will continue to be affected by different threats. Then, changes and trends that will mold the future naval warfare character will be discussed. Subsequently, current PN capabilities and future projects will be pointed out in order to identify future PN capability gaps, and finally, a recommendation for possible ways to mitigate these breaches will be presented.

DISCUSSION

Threats to international and Peruvian Maritime Security Environment

4. Transnational criminal networks (TCN) operate all over the world, taking "root in supply areas and transportation nodes"[2] and profit from one or more coordinated illegal activities like drug trafficking, weapons and human smuggling, money laundry among others. In Peru, the main area of coca leaf growing and cocaine production is located in a remote region between the mountains and the jungle known as the Valley of the rivers Apurimac, Ene and Mantaro (VRAEM)[3]. The estimated annual production of cocaine is 320 tons, from which 80% is smuggled and shipped by sea through the ports of Callao and Paita.[4]

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[1] Ben Lombardi, "The Future Maritime Operating Environment and the Role of Naval Power," n.d., 126.
[2] Counter network Angel Rabasa, Christopher M. Schnaubelt, Peter Chalk, Douglas Farah, Gregory Midgette, Howard J. Shatz
[3] VRAEM is military and police controlled area declared in state of emergency because of drug traffic and terrorist activity.
[4] Infodefensa.com, "Perú: El Callao y cómo las mafias internacionales del narcotráfico utilizan las rutas náuticas (1) - Opinión Infodefensa América," Infodefensa.com, May 30, 2016, http://www.infodefensa.com/latam/2016/05/30/opinion-callao-mafias-internacionales-narcotrafico-utilizan-rutas-nauticas.php.

4.   Terrorist groups have demonstrated their international reach. Terrorist attacks within the maritime domain like the frustrated attempt by a jihadist group to a Pakistani naval dockyard in Karachi in 2014; the bombing of the USS *Cole* by Al-Qaeda suicide bombers in a small boat in Yemen in 2000; and the Islamic State associate that launched a missile from the Sinai Peninsula to an Egyptian naval vessel[5]; prove these groups will take advantage of the strategic effects of disrupting the ocean commons' freedom[6] could achieve. Today the VRAEM holds a remnant of members of *Sendero Luminoso*. These terrorists have betrayed their ideology and are now allied with the drug cartels in order to get funds and weapons. Therefore, the partnership between terrorism and transnational organized crime configures the hybrid threat nature expected to challenge the maritime security environment.[7]

5.   Piracy has a significant cost-benefit ratio as it is proved by Somali pirates that take advantage of their fail state's inability to repress the conception of this illegal activity within its jurisdiction. Piracy repression is considered today an international responsibility[8] because its negative effects to shipborne trade, international navigation, security and economic stability[9]. Although the most dangerous maritime area in regards to piracy activity is located in Southeast Asia "especially the waters around the Indonesian archipelago (including stretches of the Malacca Straits that fall under the territorial jurisdiction of the Jakarta government)"[10], Peru is also considered to be located in a high risk zone among other six areas that are jointly accounted for half of the year 2006 pirate attacks. For the same year, reported attacks of this nature perpetrated in Peru represented 4% of the world's annual assaults[11]. Although currently that percentage has decreased to 1.9 %[12] piracy will continue to represent a threat to Peru because of its maritime nature and interests.

6.   Another source of future conflict that will influence the maritime security environment is competition for undersea resources[13] which are being over exploited and in some cases deprecated, in countries where the latter case should be presented this will create a necessity to reach out to other jurisdictions and will create international conflicts regarding maritime interests. The *Humboldt Large Marine Ecosystem* is the richest fish production area amongst the main eastern regional upwelling ecosystems[14]. Peru holds the most important sub-system within the latter because "often generates the major

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[5] Lombardi, "The Future Maritime Operating Environment and the Role of Naval Power."
[6] Ibid.
[7] Lombardi, "The Future Maritime Operating Environment and the Role of Naval Power."
[8] "Piracy and Armed Robbery against Ships," accessed October 28, 2019, http://www.imo.org/en/OurWork/Security/PiracyArmedRobbery/Pages/Default.aspx.
[9] "UN Documents for Piracy," accessed October 28, 2019, https://www.securitycouncilreport.org/un-documents/piracy/.
[10] Peter Chalk, *The Maritime Dimension of International Security: Terrorism, Piracy, and Challenges for the United States*, MG AF 697 (Santa Monica, Calif.: Rand, 2008).
[11] Ibid.
[12] Ibid.
[13] Andrew Bakun and Scarla J. Weeks, "The Marine Ecosystem off Peru: What Are the Secrets of Its Fishery Productivity and What Might Its Future Hold?," *Progress in Oceanography* 79, no. 2–4 (October 2008): 290–99, https://doi.org/10.1016/j.pocean.2008.10.027.
[14] Ibid.

portion of the entire Humboldt's fish production."[15] This creates future needs to protect it from "illegal, unregulated and unreported fishing"[16].

7.   Climate change is a global threat and particularly to coastal countries. The rise of sea levels, more frequent and harsher natural disasters, shortages of vital resources, extreme weather all caused by global warming effects[17] will impose security challenges in the future. Peru as a seaside country with 3,080 km. of coastline and 55,9% of its population concentrated in the coastal region[18] will face problems regarding the effects of climate change. *El Niño Southern Oscillation* (ENSO)[19] is expected to have devastating consequences. The population will be affected by the disruption of food and water stocks and resources, destruction of vital infrastructure like hospitals and houses, as well as the disruption of inland lines of communication. This will require a thorough civic education of the population and a government capability to provide security, preserve life, deliver humanitarian assistance and disaster relief.

Changing character of Naval Warfare

8.   Threats to the maritime security environment generate change to the character of naval warfare. The conjunction of the use of computers, the internet and its functionalities have resulted in the establishment of a cyber domain defined as "All infrastructure, entities, users and activities related to, or affecting, cyberspace"[20]. Naval warfare is not exempt to the reach of this domain as combat management systems are now computerized and networked to function better collectively. Although these systems have improved and accelerated the way of making decisions and fight, threats to information security and possibilities of naval assets' vital systems being hacked, have imposed a challenge.

9.   Improvement of technology has brought with it a new type of weapons systems that are inhabited[21] which means that they can be remotely operated in air, land, surface and subsurface environments. This new platforms bring positive characteristics to the fight like less risk to human lives, grater reach, cost efficiency by the use of commercial off the shelf (COTS) parts and longer endurance within the area of operations. In the other hand, these systems could be vulnerable to cyberattacks in order to neutralize them or to transform them into revenge weapons by getting them to attack their home base. Another important consideration is that asymmetric threats could take advantage of their relatively cheap construction or acquisition price to use them against us by adding

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[15] Bakun and Weeks, "The Marine Ecosystem off Peru."
[16] Lombardi, "The Future Maritime Operating Environment and the Role of Naval Power."
[17] Umair Shahzad, "Global Warming: Causes, Effects and Solutions" 1, no. 4 (2015): 8.
[18] "Instituto Nacional de Estadistica e Informatica," accessed October 23, 2019, http://m.inei.gob.pe/prensa/noticias/el-peru-tiene-una-poblacion-de-31-millones-488-mil-625-habitantes-9196/.
[19] It's a cyclical natural phenomenon originated by the abnormal rise of sea temperature in the Pacific Ocean.
[20] "JDN 2017-01, Cyber Operations," n.d., 120.
[21] Also referred to as unmanned

improvised explosive devices (IED's) and using them in a covert fashion because of their small size.

10.   Future naval warfare areas of operations will mostly be located in the littorals because of the asymmetric and hybrid natures of probable adversaries. The special set of capabilities needed to operate in a complex environment that asymmetric engagements will levy, will surely demand precise and coordinated joint or combined operations to counter Anti-Access/ Area Denial (A2/AD) strategies[22] and, small boats swarming (use of an overwhelming force of manned small boats or drones to attack a bigger and more capable ship) and shouldering (use of aggressive maneuvers including ramming) tactics.[23]

11.   In summary, taking in to account the expected threats to the maritime security environment and the future character of naval warfare, navies will have to be capable of carrying out joint (definitely) and combined (if required) operations in order to fight and win against conventional (less probable but not impossible), asymmetrical and hybrid threats, with potential capabilities to attack through air, land, sea and cyber domains.

Peruvian Navy Current Capabilities

12.   The PN has within its organization structure the General Direction of Captaincy and Coast Guard (DICAPI) which is the state entity responsible for exercising the functions of the National Maritime Authority[24]. In according with this responsibility the PN has inaugurated and started operations on June 2019 at the Naval Base of Callao, of the new Maritime Information Fusion Center for the Latin America region that was approved in accordance with the agreement of the Operational Network of Regional Cooperation of Maritime Authorities of the Americas. This Center allows:

> … the exchange of maritime domain awareness information with other nations' information centers to help combat illicit trafficking, facilitate search-and-rescue operations, control pollution, and respond to maritime incidents and natural disasters.[25]

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[22]National Interest Magazine December 8, 2013. A2/AD and Wars of Necessity: Why we need to focus our defense planning on beating anti-access/area-denial strategies, and why they aren't new by Sam J. Tangredi the terms anti-access and area denial—as currently used—are specifically meant to denote a strategic approach intended to defend against an opponent that is judged to be of superior strength or skill in overall combat operations. If the opponent is allowed to use this superior strength or skill, it is feared that the defender would likely be defeated at the point of contact. Therefore, the objective of an anti-access or area denial strategy is to prevent the attacked from bringing its operationally superior force into the contested region, or to prevent the attacker from freely operating within the region and maximizing its combat power". https://nationalinterest.org/commentary/a2-ad-wars-necessity-9524
[23] Rand Corporation Gaining Competitive advantage in the grey Zone Lyle J. Morris, Michael J. Mazarr, Jeffrey W. Hornung, Stephanie Pezard, Anika Binnendijk, Marta Kepe
[24] Legislative decree 1147regulating the strengthening of the armed forces in the powers of the national maritime authority - General Directorate of Captaincy and Coast GuardArticulo 4. 11 de diciembre 2012 http://www.leyes.congreso.gob.pe/Documentos/DecretosLegislativos/01147.pdf
[25] "The Commanders Respond | Proceedings - March 2018 144/3/1,381," accessed October 27, 2019, https://www.usni.org/magazines/proceedings/2018/march/commanders-respond.

To complement this capability, the PN's Coast Guard Corps counts with almost 153 vessels. In addition, Peruvian law allows the use of any other PN asset if required. These ships enable the PN to conduct Maritime Security Operations (MSO) against criminal organization. Search and Rescue (SAR) operations are also conducted within the *NAVAREA XVI* which is the SAR area assigned to Peru by the World Wide Navigational Warning Service (WWNWS).

13.   To fight terrorism and transnational crime organizations through joint operations with the support of the Peruvian National Police (PNP), the PN dispatches assets to compose the Naval Component (NC) as part of the Special Command VRAEM (CE-VRAEM) which falls under the Joint Chief of Staff Command's orders. The NC:

> . . . performs among many functions, operational tasks with modern river units for interdiction and river combat of the type "Hovercraft", giving greater flexibility for the transport of combat platoons and allowing better river interdictions aboard these units with specialized personnel of Peruvian Marine Corps and Coast Guard with the purpose of repressing illicit activities, such as Illicit trafficking of drugs, illegal traffic in timber, trafficking of people and arms, among others, including the registration of vessels and/or river boats throughout the jurisdiction of the VRAEM region.

14.   Regarding the cyber domain, the PN through its Cyber Defence Command (CDC) is capable to conduct operations in the cyberspace in order to defend its assets and information, exploit information of interest and, prevent and respond to threats in according with Peruvian law.[26] As an example of its importance and effectiveness the PN's CDC was selected to lead the cybersecurity aspects of the Pan-American Games hosted in the city of Lima this year.[27]

15.   In regards to Command and Control capabilities, all the PN's assets have been equipped with the *WIRACOCHA* Joint Command and Control System (WJC2S) which facilitates the decision making process and enables secure communications between the strategic, operational and tactical level of war in Joint Operations. At the tactical level, the *VARAYOC* Combat Management System (VCMS) allows ships and aircrafts of the PN to share combat information obtained from their sensors and create a Common Operational Picture (COP) through a link. Both systems were developed by the PN through its Research, Development and Innovation Programme (RDIP).[28]

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[26]Ciber Defence Law Nº 30999 27 de octubre de 2019 https://busquedas.elperuano.pe/normaslegales/ley-de-ciberdefensa-ley-n-30999-1801519-5/

[27] "Marina de Guerra Del Perú | FIGHT AGAINST TERRORISM AND ILLICIT DRUG TRAFFIC," accessed October 28, 2019, https://www.marina.mil.pe/en/contribucion/acciones/lucha-contra-el-terrorismo-y-el-trafico-ilicito-de-drogas/.

[28] "Marina de Guerra Del Perú | ACTIVIDADES DE INVESTIGACIÓN, DESARROLLO E INNOVACIÓN," accessed October 27, 2019, https://www.marina.mil.pe/es/contribucion/al_desarrollo_detalle/actividades-de-investigacion-desarrollo-e-innovacion/.

16.   In regards to conventional naval warfare the PN is comprised by 5 Main Operating Forces. The Surface Force counts with almost 118 naval assets, nine Marine Corps battalions and four Special Operations groups [29]

17.   The new LPD *PISCO* is capable of transporting 450 infantry troops, two Landing Craft Utility (LCU) and up to 24 *LAV-II*. This ship is also suited with "a helicopter deck and hangar for three medium weight helicopters, medical area with operations, x ray, triage and odontology rooms, pharmacy, laboratory and three recovery rooms"[30] This ship enables an amphibious capability to the PN but in conjunction with other naval assets, it has been proven to be effective for Humanitarian Assistance and Disaster Response (HA/DR) operations. As was commented by the former PN's Chief of Naval Operations (CNO) Admiral Gonzalo Rios Polastri:

> The Peruvian Navy plays a significant role in humanitarian assistance and disaster response operations, both domestically and internationally. The most recent operation was carried out during the first months of 2017, as a consequence of the floods and mudslides produced by the El Niño phenomenon. The northern mountainous regions of Peru were affected and required naval and air forces to respond. The Navy provided logistical transport and established maritime and air bridges to reach victims in a timely manner. Six naval units, seven naval aircraft, and several rapid intervention companies for natural disasters participated.[31]

18.   The modernization programme of four of a total of six multi-purpose frigates has added a Strike capability to the PN as these ships were equipped with the Exocet Block III missile. This could be evidenced by the manufacturer's (MBDA missile systems) remarks:

> The flexibility of the Exocet MM40 Block 3 weapon is further enhanced by the accuracy of the new navigation package, allowing optimised 3D approach trajectories and terminal attacks from different azimuths, at very low sea skimming altitude with simultaneous time on target. The terminal guidance relies

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[29] Six multi-purpose Lupo type missile frigates, five PR-72P class missile corvettes, one Pohan class corvette, two Terrebonne Parrish class Landing Ship Tank (LST), one Makassar type Landing Platform Dock (LPD), one Amsterdam class Auxiliary Logistical Replenishment (ALR), one Polar PC7 class Polar Oceanic Ship. The Submarine Force counts with: six 209 type diesel-electric submarines. The Naval Aviation Force counts with: Four Fokker 60 Maritime Patrol Aircraft (MPA), two Fokker50 Utility Aircraft (UA), three Fokker F27 MPA, two Antonov AN-32B UA, five Beechcraft B-200T MPA, four Sikorsky SH-3D Sea King Anti-submarine Warfare (ASW), two Sikorsky UH-3H Sea King Utility/ Search and Rescue (U/SAR) helicopter, two Kaman SH-2G Super Seasprite (ASW) helicopter, three Mi-8T Utility helicopter, three Agusta-Bell 412 U/ SAR, five Augusta Bell 212 ASW. The Naval Infantry counts with: 32 LAV-II light armoured vehicles, 25 BMR-600 light armoured vehicles, three Infantry Battalions, one Commando Battalion, one Artillery Battalion, one Engineering Battalion and two Jungle Battalions. The Special Operations Force counts with: three Special Operations Groups and one Underwater Rescue Group.
[30] Direccion de Informacion de la Marina, "BAP PISCO Buque Multiproposito SIMA Construye y El Peru Crece," *El Monitor*, 2018.
[31] "The Commanders Respond- Proceedings - March 2018 144/3/1,381," accessed October 24, 2019, https://www.usni.org/magazines/proceedings/2018/march/commanders-respond.

on a sophisticated J-band active seeker to discriminate and select targets at sea and on the GPS accuracy for land targets.[32]

In addition to the weapons upgrade only two of the four frigates were equipped with the 3D Radar Kronos NV, the manufacturer (Selex ES) highlights some of the benefits of this Active Electronic Scanning Array (AESA) radar:

> . . . It is able to perform surveillance, tracking, threat evaluation and fire control against multiple threats, simultaneously and automatically, at all altitudes. The radars provide particularly outstanding performance in detection range, initialisation time and tracking continuity, including at low and very low levels.[33]

As well only both of the frigates that were fitted with the aforementioned radar were also equipped with MASS chaff launcher system which:

> . . . has been designed to provide multi-spectral protection against guided weapons in all relevant wavelengths of the electromagnetic spectrum (including radar, infrared and electro- optical). Suitable for installation on a wide range of platforms, it can be integrated into an existing command and weapon control system, or operated as a standalone system.[34]

19.   As part of the Electronic Warfare capabilities all PN's ships have been equipped with the *QHAWAX* Mk-1 Electronic Support Measures (QESM) system, another sensor fully developed by the PN. On the other hand, only one of the six corvettes is equipped with chaff launchers and none of them have jamming equipment hence the Electronic Attack (EA) capability is diminished.

20.   The maximum range of Air Defence (AD) of the PN's fleet is 19 km. provided by the *SEASPARROW* and *ASPIDE* missiles, only the ALR *Tacna* has a Close-in Weapon System (CIWS).

Future Projects of the Peruvian Navy

21.   The first of four submarines considered in the modernization programme which started last year is a sign of strategic will of the Peruvian government and the PN as well. This programme is being developed by the Industrial Services of the Navy (SIMA-PERU) with the technical assistance and technological transfer of the German shipyard

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[32] "EXOCET MM40 BLOCK 3," MBDA, accessed October 27, 2019, https://www.mbda-systems.com/product/exocet-mm40-block3/.

[33] "Selex ES Unveils Latest Versions of Its KRONOS Multi-Functional AESA Radar," accessed October 28, 2019, https://www.leonardocompany.com/en/press-release-detail/-/detail/kronos-family.

[34] "MASS Effect for Ship Protection [IDEX17D2] | Jane's 360," accessed October 28, 2019, https://www.janes.com/article/67918/mass-effect-for-ship-protection-idex17d2.

Thyssenkrupp Marine System GmbH. The operating life of these submarines will be extended by 15 years.[35]

22.   Two *Fokker* F-50 fixed wing aircraft from the Naval Aviation Force are scheduled for a refit to enable them as Signal Intelligence (SIGNIT) platforms. This project will be in charge of the "Israel Aerospace Industries (IAI) through its subsidiary unit Elta Systems."[36]

23.   One additional *Makassar* type LPD is being built in the SIMA's shipyard. "The second ship's keel was laid in December 2017."[37] This will allow to decommission the two old *Terrebonne Parrish* class LST's.

24.   Three additional *Kaman* SH-2G Super Seasprite are already in the contracted refit process to modernize all the electronic systems of the helicopter, these helicopters will complement the Sea King SH-3D dipping Sonar ASW capabilities with Directional Frequency Analysis and Recording (DIFAR) and Directional Command Activated Sonobuoy System (DICASS) sonobuoys. For Anti-Surface Warfare (ASuW) the Super Seasprite will complement the Sea King's capability to launch *Exocet* AM-39 missiles with the AGM-65D missile.[38]These increases in ASW and ASuW capabilities will positively enhance the Surface Force's capacity those two areas.

Identified Capability Gaps

25.   Considering that there is no approved procurement programme for the acquisition of new surface combatant ships nor any kind of unmanned vehicle, therefore the most notable capability gaps are in defence in-depth for AD by the lack of a coherent range capacity of Surface to Air missiles (SAM's), EA because of most of the corvettes are not equipped with chaff or jammers and in ISR by not having less risky, more covert and cost-efficient unmanned vehicles to carry out this task.

26.   Although there will be a decrease in the capacity of submarine warfare caused by the refit of only four of the six submarines and in amphibious warfare and HA/DR, because of the consideration of building only two LPD instead of four, it cannot be

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[35] "Modernización de Submarinos Peruanos Marcará Un Hito En La Industria Naval," accessed October 24, 2019, http://www.marina.mil.pe/es/noticia/modernizacion-de-submarinos-peruanos-marcara-un-hito-en-la-industria-naval/.

[36] Revista Defensa Infodefensa.com, "IAI modificará dos Fokker 50 peruanos a plataformas Sigint - Noticias Infodefensa América," Infodefensa.com, May 17, 2019, https://www.infodefensa.com/latam/2019/05/17/noticia-modificara-fokker-peruanos-plataformas-sigint.html.

[37] "Video: Peruvian Navy Commissioned Its First LPD - BAP Pisco," Navy Recognition, accessed October 25, 2019, https://www.navyrecognition.com/index.php/news/defence-news/2018/june-2018-navy-naval-defense-news/6281-video-peruvian-navy-commissioned-its-first-lpd-bap-pisco.html.

[38] Defensa.com, "La Marina de Guerra del Perú incorpora su primer helicóptero SH-2G Super Seasprite-noticia defensa.com - Noticias Defensa defensa.com Perú," Defensa.com, May 10, 2018, https://www.defensa.com/peru/marina-guerra-peru-incorpora-primer-helicoptero-sh-2g-super.

considered as a capability gap but a decrease in capacity to have in mind in future procurement programmes.

27.   Possible solutions are to prioritize subsequent budget assignment to address these gaps, establish an effective information plan to raise awareness at the political level in order to get the procurement programme for new combatant ships approved, keep a high level of readiness for joint operations in order to mitigate the threats of having these gaps (e.g. reinforce frequency of training Combat Air Patrols (CAP's) vectored by MPA and in the future SIGINT aircraft to conduct defence in-depth) and finally potentiate RDIP.

CONCLUSION

28.   The threats to the international and Peruvian maritime security environment affect the character of naval warfare. An asymmetric and hybrid threat environment, highly influenced by the raising power that non-state actors gain through access to inexpensive but effective technology which enables them to increase the reach and effects of their illegal activities and ultimately influence the character of naval warfare. Although the PN has adapted its maritime capabilities to meet the challenges of today and the future, capability gaps in AD, EA and ISR through unmanned vehicles exist and must be kept in mind in order effectively address them by budget prioritization, promotion of political awareness and most likely conservation of a high level of readiness for joint operations.

RECOMMENDATION

29.   Further research on the effects of decreasing the PN's capacity for submarine, amphibious and HA/DR operation is required.

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