

JOINT MARITIME AIR OPERATIONS IN SRI LANKA ; Raison d'être

Strategy Proposal by Sri Lanka Navy



'Deterrence through Detection'



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FOREWORD



The maritime domain surrounding Sri Lanka holds immense strategic importance, both for national security and economic prosperity. However, the vastness of this environment poses significant challenges, particularly in ensuring comprehensive surveillance and maritime domain awareness. Recognizing the need for an integrated and innovative approach, I am pleased to present the Joint Maritime Air Operations Strategy, a collaborative proposal between the Sri Lanka Navy and the Sri Lanka Air Force. This strategy is designed to address surveillance shortcomings and establish a robust framework for safeguarding our maritime interests.

Central to this strategy is the incorporation of shipborne helicopters and the pivotal role of naval aviators. These assets are indispensable for extending the Navy's operational reach, delivering rapid response capabilities, and enhancing real-time situational awareness. Furthermore, with advancements in mechanization and automation, the use of Unmanned Aerial Vehicles (UAVs) has become increasingly vital. The integration of shipborne and land-based UAVs operated by the Navy will further strengthen our surveillance capabilities, offering unmatched versatility for monitoring diverse maritime scenarios. This joint effort, leveraging the Air Force's leadership in naval aviation and the Navy's operational expertise, underscores the importance of collaboration in achieving a secure and well-monitored maritime environment.

I am confident that this strategy will serve as a foundation for enhancing maritime security through innovation, shared resources, and unified action. It is a testament to our collective commitment to ensuring the safety, sovereignty, and prosperity of Sri Lanka's maritime domain.

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Vice Admiral
The Commander of the Navy

30 December 2024



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JOINT MARITIME AIR OPERATIONS IN SRI LANKA ; *Raison d'être*

(Strategy Proposal by Sri Lanka Navy)

*"Contiguous nature of the sky bestows upon those able to utilize it
certain distinctive advantages"*

Introduction

1. War fighting is becoming extremely lethal, super expensive and technologically intensive. Factoring the advent and inclusion of AI into this calculus triggers an exponential drift between advanced developed nations and rest of the world where we are inherently part off. In this regard small states of today are more inclined in the best of their interests to pursue a normative path. Thus, there is a need for an urgent and honest appraisal of what we seriously want from our defence/security forces and in particular the Navy in the coming decade. The Sri Lanka Navy (SLN) has clearly inscribed its future aspirations in the '*Proposal for Sri Lanka Navy's Strategy 2030 & Beyond*' (NAVSTRAT -2030) document in which Sri Lanka's maritime obligations within the IOR is among the concerns.

2. Though there are no apparent or significant military aggressions or threats from the sea to Sri Lanka, there is a high probability of the island's waters being exploited and exhausted for unjust ends. Moreover, our seas are today congested and contested. In order to respond to these persisting maritime threats and challenges in our domain and the evolving strategic environment, the SLN must seek a new seaward-operational orientation. Thus, acquiring capabilities to meet future demands is not a choice but a necessity. Overall, the entire SLN fleet is severely short of credible surface, subsurface or anti-air capabilities. However, our indomitable belief in our abilities and global commitments steered us in becoming a member of the Combined Maritime Force(CMF)¹. As we prepare to assume leadership of Task Force -154², lest this be an enduring reminder towards upgrading our defensive capabilities. The Navy acutely lacks versatility and flexibility that are essential for a balanced maritime force to achieve desired results in an object area/area of interest.

¹ On 20th November, 2023 Sri Lanka Navy became the 39th member of the world's largest maritime coalition force, which has now grown into a 46 nation naval partnership.

² TF-154 under the CMF provides for multinational maritime training on 05 pillars; maritime awareness, law of the sea, maritime interdiction, maritime rescue and assistance and leadership and development.

3. Clearly, Sri Lanka as a state lacks an ambitious maritime orientation, which is very much evident in the existing inward heavy security outlook³. However, the island's prosperity, progress and security is interwoven with the stability of the international system, economies of scales and net external trade. A focus into our trade statistics would illuminate the trade dependency ratio of this island nation, and appraising the necessity of securing our Sea Lines of Communications (SLOCs) are fundamental to the survival as a sovereign state.

4. Meanwhile, it is essential that we astutely comprehend what is central to the 'NAVSTRAT-2030' document. In this regard, none aggression, deterrence and self-preservation are integral and are at the core of our envisioned force structure and postures. The SLN aspires for *"a balanced Navy with credible defence and deterrence"*. A pragmatic and viable option in this pursuit would be the inclusion and integration of an organic air or an unmanned vehicle component or a combination of both for optimum results. Indeed, there is enough justification and rationale for this ambitious endeavour under the *'Focal Areas of Interests'* mentioned at Chapter 11, of the NAVSTRAT-2030, which highlights the need for 'Force Multipliers'. SLN is determined at generating future readiness and realization of naval aviation through jointness is an enduring vision.

5. The actualization of this vision would be a watershed moment in the organization's history of 74 years and our security outlook as a sovereign state. However, we should be aware of the impending competition and conflict that this path would draw from interested entities who may perceive it as an existential threat. It shall be our responsibility to formulate a viable, feasible and acceptable solution(s) guaranteeing unity of effort, cooperation and continued collaboration towards common ends.

Strategic Evaluation of the Maritime Environment

6. Sovereignty means nothing if not defended and we are well aware that our motherland has a critical role in championing an international rules-based order to safe guard global commons and governance. We are believers of the norm that by safe guarding our interests and interests of small states alike, serves not only a few but the world at large.

7. Sri Lanka is a coastal island state. Some also may view as a small island developing state. However, being an island nation void of a hinterland there is no space for strategic depth. Sri Lanka has a coastline of 1,340km approximately and our coastal region comprises 24% of land extent and accommodates 25% of total population. The EEZ is 08 times the land area, whilst the SAR is approximately 27 times larger. Our strategic calculus is unique, where geography and more precisely location has a

³ According to Dr. Clark G. Reynold's Naval Topology, navies of 'Maritime Nations' are the principal strategic arm for defence. In contrast, for continental powers, navies defensive role is in support of land forces.

profound impact how we need to assess our strategic context and approach. Unlike Singapore and United Kingdom the island state lacks considerable narrow maritime spaces (with an exception of the Palk Strait), where a small force can have a significant and decisive impact. This has a considerable impact on resourcing⁴ of our maritime forces. Neither do we have the remoteness of space as in the case of New Zealand and Iceland for defence nor are we part of a strategic defence/security umbrella. Over the course of the post-independence history, our territorial integrity and defence was defined and dependent on the goodwill of other power players. Hence, it is important that we consider the adjacent vast expanse of maritime space as a 'hinterland', from Gulf of Aden to Malacca Strait. It is not too ambitious to think of solutions governed by different ideas.

8. Moreover, the island is also located athwart major shipping lanes connecting the East and the West; Asia to Arabia to Europe. Considering these facts, Sri Lanka should be considered a 'maritime nation'; essentially realize the need for an assertive maritime orientation. It is no exaggeration, that we need to identify ourselves more than a 'coastal state' with restrained ambitions that does not go beyond a 'sea power' state. As a state we remain committed to multilateralism. We are dependent on a rules based international system for our security, defence and development. Ironically, throughout our post-independence history to date the island's strategic outlook, especially defence and security were skewed; inward oriented. This approach needs to be recalibrated with the realities of our time and context.

9. We are in a decade that is defined by incalculable outcomes, chaos and unpredictability. As we bear witness to a string of disruptive innovations and creative disruptions sweeping across the globe, there is also an apparent shift of world order to the East. This has given way for more political and economic assertiveness resulting in regional militarization and alliances building. We live in a world that is ideologically more polarized and geopolitically more fragmented. Already the cyber space is being weaponized and the space remains the final frontier. Our fears of perpetual wars are becoming present realities as the multilateral order that defined the past decades is disintegrating to an abyss. Contentions have preceded cooperation and dialogues. Already, the Indian Ocean Region (IOR) has become the theatre of this phenomena. As this unfolds, small states are dragged and drawn into spheres of contending ideologies and interests of existing and revisionist powers and Sri Lanka in particular is not immune from the evolving strategic context.

10. Meanwhile, the best estimates suggest that there is an apparent global economic slowdown in the coming years. Indeed, the 'COVID-19' pandemic had a considerable impact in disrupting supply chains. However, what is transpiring in the Red Sea and Eastern Europe provides a glimpse of this stark reality, with intensifying attacks and

⁴ A particular force posture provides the overall disposition, strength (quantity & quality) and state of readiness of armed forces. This could be further depicted through the Defence Resources Triangle: 'Force Structure'; 'Modernization'; 'Readiness'.

threats on global commons. Our darkest fear is the possible precipitation of these events across geographic spaces into our shores.

11. Whilst the threats of traditional and non-traditional security persist, 'proxy interventions', 'hybrid warfare' and 'grey zone tactics' have surged as common transnational challenges to global security, particular in the maritime domain. Available data suggest that our oceans are witnessing a proliferation of 'dark shipping' that are taking refuge among the ungoverned spaces in the vast ocean expanses. In addition, there is the high possibility of small states being strategically coerced by bigger states and proxy Multi-National Corporations (MNCs) into compromising sovereign rights on the governance and management of respective Exclusive Economic Zone (EEZ) and Continental Shelf.

12. Amidst the competing strategic interests of global power players, the subcontinent is to take centre stage in the Indian Ocean theatre. The subcontinent, especially the South Asian nation states are a peculiar formation. Despite the geographical proximities and the enduring cultural and identity commonalities these modern democracies have lesser integration among themselves in comparison to other regional constructs. However, India has asserted itself as the regional net security provider, and undoubtedly the vital factor in the region's collective advancement and progress.

13. Meanwhile, a few of its neighbours dispute this assertion. Further, India has out rightly expressed its concerns over China's increasing presence in the Indian Ocean, which has already added into its basket of strategic concerns complicating the existing 'Himalayan Conundrum'. Hence, India's self-preservationist means and methods shall precede and define its outreach and relations with its neighbouring countries. Already the South Asian region is in turmoil, with the status of Pakistan, Maldives and Bangladesh recently. We had a near escape, but things are far from over.

14. The island state's progress and future prosperity lies with leveraging the maritime frontier. Unhindered passage of global commerce, security of its sea and virtual lines of communication and a rules based good order at sea are essential and integral in the realization of such aspirations. Abject denial, neglect and confusion in strategically appraising the maritime frontier would be catastrophic for our survival as a nation state. It is always in the best of our interest to deter opportunistic intrusions and denying a situation of 'faith accompli' that would be hard to undo. Lest 1987 remind us of this bitter reality.

15. Already we have witnessed one of the largest marine environmental disasters in known history flagged under 'MV X-Press Pearl' off Colombo in May 2021. The incident alone exposed and illuminated our institutional, legal and resource incapacities to respond and manage such eventualities. We were inadequately equipped as a first responder despite understanding consequences of maritime accidents, through more recent events in our maritime zones, international waters and global sea lanes.

16. Illegal, Unreported and Unregulated (IUU) fishing by foreign vessels in our maritime zones is an enduring challenge. There is an exponential presence of foreign fishing vessels in our waters. The exploitation and exhaustion of our marine resources is a serious threat to the livelihoods, marine eco-systems and food security of the island. Meanwhile, Sri Lanka's proximity to the subcontinent is being exploited for illicit activities creating a paradox of threats and challenges to national security. Further, our sea lanes and shores are being used for narcotics trafficking emanating from the Arabian Sea. There are surmounting evidences into Sri Lankan, Bay of Bengal and Maldivian Maritime zones being exploited for illicit transshipments.

17. Meanwhile, our most recent experiences underscore the very presence of covert and proxy measures at diluting Sri Lanka's significance athwart global shipping lanes. This is a very imminent threat that may even present itself under the façade of 'environmental conservatism'. Our claims to delimitation of the continental shelf persists and presents once actualized a reservoir of opportunities in our 'Blue Economic' aspirations.

18. The 'Nord Stream' gas pipeline explosions in 2022, and the more recent severing of two undersea communication cables (C-Lion 1) on 19th November 2024 in the Baltic Sea makes evident the need at ensuring safety and security of critical maritime infrastructure. The advent of unmanned and autonomous aerial, surface and subsurface vehicles have made this even more arduous. Failure to appraise such possibilities shall be catastrophic for Sri Lanka given her inherent vulnerabilities.

19. Thus, our approach to these volatile strategic realities, future contexts and persisting challenges in the maritime domain have to be dealt with innovative, pragmatic and collective efforts. Surely, there are many observables and non-observables in the maritime frontier and we should create the ways, means and effects in appraising and responding to such during our watch.

Purpose

20. This is a declarative strategy⁵. The goal is to provide a coherent blueprint, a capstone document for Joint Maritime Air Operations to bridge the gap between the realities of today and the desired future. Strategic direction is essential to inspire doctrinal guidance for a realistic judgment of application of available and desired capabilities. Our inherent limitations prompt us to make compromises in pursuit of seamless maritime air operations to create desired effects in the maritime domain.

⁵ Approach in which the desired outcomes or goals are specified, without detailing the exact steps or processes required to achieve those outcomes. In essence, it focuses on defining *what* should be done (the goals) rather than *how* to do it (the specific procedures). Intention is to foster greater flexibility, adaptability and scalability.

21. Hence, a strategy based approach is well conceived and must be pursued with vigour. It is best understood that small states are handicapped with the luxury of force structure and size to conceal organizational inefficiencies and flaws.

22. We believe that the efficacy of the Naval Strategy is the foundation of which our survival, security, safety and defence depends. Fundamentally, we need to ascertain the 'critical mass'⁶ required for optimum deployment and employment of our armed forces, in particular the maritime forces. Thus, the efficacy of the Naval Strategy is directly proportionate to the ability of the Sri Lanka Armed Forces (SAF) and Sri Lanka Coast Guard (SLCG) to control the surface, adjacent air space and sub-surface to a certain degree in the defence and advancement of the national interests.

23. The SAF and SLCG in concert are instruments of national power that shall ensure our National Security Objectives (NSOs) are pursued without undue interference from external, internal, actual or potential adversaries. In order to execute respective primary roles of the SAF and SLCG effectively and efficiently, our ability to function in the maritime domain with a required degree of sea and air control is not an option but a necessity. In this regard our tasks would be to detect, deter, deny and defeat any form of aggression and violation of maritime / air jurisdiction or international laws in our Sea Area of Interest (SAOI).

24. The purpose of this endeavour is to articulate a viable operational concept for Joint Maritime Air Operations in order to maximize the utility and management of available air assets and resources in the pursuit of National Security, particularly in the maritime domain. This shall provide the basis where in which the employment of air power in the maritime environment will be governed in our unique context also providing for foundation in the construct of relevant tactics, techniques and procedures.

25. In addition, realization of an integrated Maritime Air Component as a force multiplier complementing Maritime Security Operations (MARSEC), Search and Rescue (SAR) and Humanitarian Assistance and Disaster Relief (HA/DR) is a desired future state. Fundamentally, this shall guide force deployment, employment optimally with judgement in application of air power in the maritime environment.

⁶ SAF have reached the limits of quantitative expansion. This is very evident with the existing turnover and difficulties experienced in the recruitment processes. Thus, focus should be towards a 'Force Posture' where a minimum level (Critical Mass) of personnel, assets, systems, weaponry, and infrastructure below which no qualitative edge would compensate for the lack of numerical strength. Requirement is to appraise a 'Baseline Strength'.

Note: Any attempt in decreasing the quantitative elements (personnel) should not be the priority but investment in capital expenditure.

Maritime-Air Operations Conducted with the SLAF

26. The SLN has fostered a longstanding partnership with the Sri Lanka Air Force (SLAF) to enhance national security within and beyond Sri Lankan territorial waters. Most significant highlight of this partnership was the establishment of the 'Joint Maritime Surveillance Command Operations Room (JMSCOR) at Dockyard, Trincomalee. This was critical in providing Close Air Support (CAIRS) for SLN fleet units during littoral skirmishes with the LTTE and conduct of sea convoys along the North-East maritime supply route until end of the Humanitarian Operation in 2009.

27. With the emergence of evolving maritime threats such as illegal fishing, smuggling, piracy, search and rescue (SAR) and other regional security challenges the SLN identified the critical need for aerial surveillance to complement its naval operations. This collaboration laid the foundation for coordinated maritime patrols, combining SLAF's aerial reconnaissance capabilities with SLN's maritime resources.

28. A pivotal milestone in advancing SLN's surveillance capabilities occurred in 2009 with the introduction of Naval Air Observers. To support this initiative, the Indian Navy extended its expertise by training SLN officers at the Naval Aviation Training Establishment in Kochi. These officers undergo specialized training in aerial surveillance, navigation, reconnaissance, and threat assessment. As Naval Observers aboard aircraft, they bring critical expertise to analyse real-time data, identify potential threats, and coordinate with naval units for rapid response. So far, a considerable number of Naval Officers have successfully completed this training with Indian Navy assistance, marking a significant step toward seamless inter-force operational integration. SLN and SLAF surveillance capacity received a substantial boost in 2022 with the induction of the Dornier 228 maritime patrol aircraft, provided by India to SLAF. This state-of-the-art aircraft is equipped with advanced surveillance radar, AIS, and day/night cameras, enabling effective monitoring of vast maritime areas, detecting suspicious vessels, and conducting SAR missions. These capabilities have significantly expanded SLN's operational reach, allowing comprehensive coverage of Sri Lanka's Exclusive Economic Zone (EEZ).

Figure 1

Dornier 228 handing over to Sri Lanka on 15th August, 2022



29. The Dornier 228 was delivered to Sri Lanka under an agreement signed on 15th March 2022 during a bilateral Defence Dialogue. India provided one Dornier 228 aircraft free of charge for two years to support maritime surveillance and SAR operations within Sri Lanka's EEZ and Search and Rescue Region. The aircraft was officially handed over to Sri Lanka on 15th August 2022, signifying a milestone in the defence cooperation between the two nations.

30. Following the induction of the Dornier 228 into SLAF operations, the SLN began deploying its Naval Air Observers on the aircraft for maritime patrol missions within Sri Lanka's SAOI. By working as part of joint SLAF-SLN crews, the observers provide critical maritime expertise during aerial missions, enabling them to interpret real-time intelligence and relay actionable information to naval assets. This coordination ensures efficient threat identification and rapid response, reinforcing the continuous flow of intelligence necessary for safeguarding Sri Lanka's maritime interests.

31. Today, SLN and SLAF conduct routine, sector-based coordinated maritime patrols. The surveillance area is divided into demarcated sectors to ensure streamlined operations and efficient resource allocation. SLAF aircraft conduct reconnaissance missions, monitor maritime activities, and communicate vital intelligence to SLN operation centres via radio communication within range. This sectoral approach facilitates real-time coordination between the two forces, optimizing their combined operational effectiveness. Meanwhile, SLAF version of surveillance and reconnaissance contains seven (07) large scale sectors including the littoral and contiguous zones. These are further sub-divided into 31 sub-sectors.

Figure 2

Co-ordinated Air Surveillance Sectors



32. Sri Lanka's maritime surveillance capabilities were recently strengthened with the induction of two long-range maritime patrol aircraft to SLAF. On 10 Oct 24, the United States provided a Beechcraft King Air 350, followed by another Beechcraft King Air 350 donated by Australia in 12 Dec 24. These newly acquired aircraft are equipped with advanced surveillance and communication systems, offering significant potential to enhance Sri Lanka's ability to monitor and secure its vast maritime zones. While no operations have been carried out with these aircraft yet, their long-range capabilities are expected to provide strategic advantages, allowing the SLAF and SLN to extend operational reach and improve real-time intelligence gathering in the future.

Figure 3

Handing over of the B-350 MPA by U.S.A on 10th October, 2024



Figure 4

Handing over the B-350 MPA by Australia on 12th December, 2024



33. A major constraint on the SLAF and SLN joint maritime effort is the mission incompatibility of available helicopters (Bell 212, Bell 412, Mi-17). Not only are these limited by respective radius of action (ROA), endurance, stability in adverse weather, night vision functions, but also tests and trails have confirmed incompatibility of landing onboard SLN OPVs due to concerns over 'D and T values'⁷.

34. However, the partnership between SLN and SLAF exemplifies an appreciation in a joint approach at addressing contemporary maritime security challenges. Through the introduction of advanced aerial surveillance platforms, specialized training, and joint operational frameworks, the two forces have bolstered Sri Lanka's ability to monitor and protect its maritime domain. While challenges such as resource limitations persist, the collaborative efforts between SLN and SLAF continue to strengthen Sri Lanka's maritime security infrastructure, ensuring a resilient and adaptive defence posture in the region.

⁷ 'D & T' (Diameter and Tonnage) values provide an approximation into integration of helos onboard. For integration of helos onboard surface vessels: ***D & T value of helicopter < D & T value of landing deck.***

Operational Requirement of Air Power in the Maritime Environment

(This describes what air power means; how it is employed, perception of air power in the maritime environment; basis of maritime operations; and its applicability in our context)

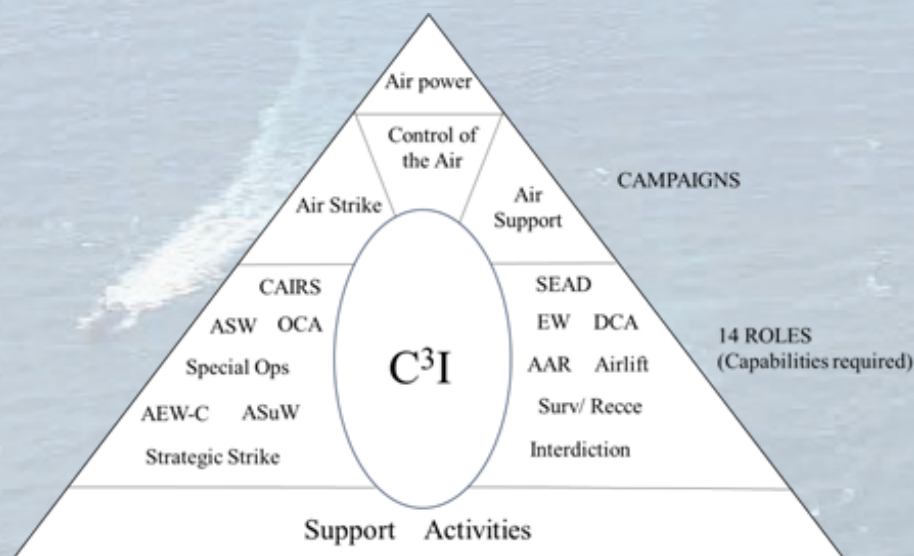
What is Air Power?

35. Briefly, it is the "ability to project power from the air and space to influence the behaviour of people of the course of the events"⁸. Speed, range, elevation, potency and flexibility are traditional attributes of air power. This constitutes four (04) basic roles of Air Power; control of the air space, air mobility, intelligence and situational awareness and interdiction/attrition. Meanwhile, the traditional air power structure dwells upon air superiority, air supremacy and air parity. Given our inherent context, the application of air superiority, air supremacy and air parity are distant concepts of the air power structure.

36. **Air Power Structure.** The below air power structure is a classical representation of the utility of air assets and capabilities through the full spectrum of conflict. In order to achieve air supremacy/superiority (freedom of action), the ultimate object in the demonstration of air power, it is necessary to gain a degree of control over the air space. This demonstration of air power could be in isolation or in support of maritime and land based friendly forces. These efforts are attributed as campaigns in which the remaining 'air strike' and 'air support' efforts could only be achieved once 'control of the air' is established undisputedly. It is worthwhile to mention that 'Air Strike' campaigns are more strategic in nature and politically sensitive comparatively. In the context of small states application of air power, 'air support' seems more realistic given its possible utility as an integral component of maritime and land forces for peacekeeping, HA/DR and MARSEC.

Figure 5

Air Power Structure



⁸ AP 3000(4th Edition, 2013).

37. Air power demonstration campaigns ('Control of Air', 'Air Strike', 'Air Support') are made possible through the application of fourteen (14) capabilities as illustrated in above Figure 5. The application of these capabilities are more relevant during times of war, but would be counterproductive to undermine its utility at times of peace for credible defence and deterrence. An elaboration of these air power capabilities is avoided in this document to maintain focus on the object. However, further referencing is advised for an informed mind.

38. Air power has significant attributes or characteristics; Positive, Conditional and Negative.

- a. **Positive** – Elevation, Speed, Reach, Flexibility, Versatility, Pervasiveness.
- b. **Conditional** – Sensitivity to technology, cost effectiveness, political responsiveness.
- c. **Negative** – Impermanence, vulnerability, cost, base dependency, payload.

39. The above attributes/characteristics of air power exemplify the need for robust 'Support Activities' which ensures that a particular air force is well equipped, resourced and coordinated to deliver desired capabilities to achieve desired effects.

Evolution of Air Power in the Maritime Environment

40. The use of air power first appeared in maritime doctrines during WWI. First, these air assets were used as 'spotters' which later expanded into acquiring information of enemy positions and dispositions. During WWII, air power was developed into delivering ordnance in support of land forces. In the Pacific theatre, the application of air power was more revolutionized with its utility onboard carrier platforms.

41. These applications of air power were governed with the assumption that air power is an extension of land and maritime powers. With the advances in technology and operational concepts this presumption stands contested. 'Operations Iraqi Freedom' and the 1997 Kosovo air campaigns are classical case studies in this regard. In the present context the application of unmanned systems has compounded its application even more.

42. The war in Ukraine, Houthi attacks on merchant commerce in the Gulf of Aden and the frenzy for weaponizing unmanned systems in an age of AI has left us a lot to contemplate. Indeed, space has become the final frontier for the time being and we need to be astute and pragmatic to evolve in an age of technological advances. Definitely no one wishes to be left behind on a crumb trail.

Advantages of Air Power in the Maritime Environment

43. Following could be highlighted as core advantages in the application of air power in the maritime environment;

- a. Rapid response.
- b. Wide area coverage.
- c. Persistence.
- d. Passive and active detection, classification, and identification.
- e. Real-time target tracking and reporting.
- f. Targeting and strike support, including over the horizon targeting.
- g. Timely and relevant indications and warnings.
- h. Rapid and accurate battle damage assessment.

Maritime Operations

44. Maritime operations encompass actions conducted by forces on, under or above the sea to secure or utilize control over the sea, deny access, or project power from the sea. Maritime power is characterized by qualities such as flexibility, reach, and persistence. In a joint environment, maritime operations can impact land-based activities by deterring adversaries, ensuring sustained access to the operational area, contributing to dominance in the battlespace, projecting power onto land, and providing sealift capabilities. Land-based support such as surveillance, logistics, and air assistance can enhance maritime operations. The following terms describe the essential components of maritime operations.

- a. **Command of the Sea** - Command of the sea provides the ability to freely use the sea for one's own objectives while preventing an adversary from doing the same. Complete command of the sea, where one's own or allied maritime forces face no opposition and an adversary is unable to conduct any maritime operations, can only be attained through the destruction or neutralization of the enemy's maritime forces.
- b. **Sea Control** – Sea Control enables the use of the sea in designated areas and for specific periods of time. Achieving and maintaining a certain level of sea control is typically necessary across the full spectrum of military operations. The required level of sea control balances the desired freedom of action with an acceptable level of risk. Effective sea control demands capabilities in all aspects of the maritime domain, including space and cyberspace. It is primarily achieved through the actual use or credible threat of force. Sea control involves overseeing the surface, subsurface, and airspace, relying on naval forces to maintain

superior capabilities in all operations. It is established through naval, joint, or combined operations aimed at securing the use of oceanic and coastal areas for one's forces while denying their use to the enemy.

c. **Sea Denial** – Sea Denial occurs when one party, unable to fully control a maritime area, prevents the other party from gaining control over it. While not entirely separate from sea control, sea denial is a component of sea control, as it involves restricting an adversary's freedom of action. The concept is relevant when full sea control is either not possible or not desired. At the operational level, a sea denial zone can be used as part of a broader defence strategy or to contain opposing forces. In warfare, sea denial is often achieved through continuous attacks on an adversary's sea lines of communication (SLOCs).

d. **Maritime Power Projection** – Maritime power projection refers to the use, or the threat of using, maritime power to directly impact events on land. It leverages sea control to gain access to coastal areas and deliver power ashore through amphibious forces, carrier strike operations, organic aircraft, land-attack weapons, and special operations forces (SOF). This concept is widely applicable in both crisis management and during active hostilities.

45. These core principles of maritime operations shape the use of air power in the maritime environment, leading to distinct mission types. In this context, Anti-Surface Warfare (ASuW) and Anti-Submarine Warfare (ASW) are the two primary areas of focus. The goal is to detect, monitor, neutralize, or destroy enemy forces, establish defence in depth, and maintain the initiative. This task can be carried out by land-based and sea-based aircraft, submarines, or surface vessels, ideally through coordinated action.

Air Power Contribution to Maritime Operations

46. Air power operations aim to deny enemy the military capability required to occupy territory or control sea space by neutralizing, delaying, or destroying surface forces. In the maritime environment, these operations are conducted by both land-based and sea-based aircraft, supporting anti-surface and anti-submarine warfare efforts. It is essential that air power contributions are closely coordinated with the supported commander and integrated with the supporting commander's own air operations. This ensures unity of effort and minimizes the risk of friendly fire.

47. **Anti-Surface Warfare.** Anti-Surface Warfare (ASUW) encompasses a broad range of operations, including surveillance and reconnaissance missions that may ultimately lead to the attack of enemy vessels. An ASUW mission consists of four key elements, as outlined below:

- a. **Surveillance.** Surveillance of a particular area is used to locate maritime forces and contribute to maritime situational awareness so the relevant agencies could coordinate further action.
- b. **Identification and Recognition.** Identification and recognition is part of the process of establishing a datum and determines the identity of detected contacts.
- c. **Shadowing.** Shadowing is the continual observation of a ship or force for the purpose of reporting its location, movement, composition and other relevant information.
- d. **Attack.** Attack can be carried out autonomously by a platform or the platform can act as a target designator for attack by other assets.

48. Surveillance, identification, recognition and shadowing require sensors that can provide accurate target discrimination, position and identification, together with secure and robust communications. MPA, maritime helicopters or ship-borne unmanned aircraft (UA) can provide this capability, but so too can Air Early Warning (AEW) aircraft and other suitably equipped air component assets. In this scenario, aircraft equipped with advanced maritime radar and maritime automatic identification system receivers operate at height to extend on station time and increase radar coverage.

49. **Anti-Submarine Warfare.** The aim of ASW is to deny the adversary effective use of submarines. Countering the submarine threat demands an extensive range of specialized capabilities to search, locate, classify, track and attack. This may involve the use of MPA, helicopters, friendly submarines, surface ships or other aircraft. There are two overall strategies that are available to the maritime commander when conducting ASW operations:

- a. **Offensive ASW.** The purpose of offensive ASW is to deny the submarine access to the environment where it can operate with tactical freedom. It could involve the blockade of ports or an attack before the submarines can manoeuvre into the open ocean. Though a maritime mission, joint force strike assets could be requested to conduct offensive ASW tasks.
- b. **Defensive ASW.** Defensive ASW is conducted in areas where the submarine can operate with tactical freedom. The reactive speed and endurance of MPA often means that they are the primary assets available to counter the submarine threat.

Good coordination between maritime and air assets, as well as sound water and airspace management are essential to enhance the probability of detection.

50. In addition to above primary mission types, following are key subsets of the utility of air power in the maritime environment;

- a. **Defensive Counter-Air (DCA):** DCA involves the destruction, degradation or disruption of adversary forces near to, or over, friendly territory and is generally reactive to the initiative of the adversary. DCA includes the employment of active air defence weapon systems, such as fighters, and surface based air defence systems, complemented by electronic counter-measures and other self-protection measures. It also includes passive measures such as camouflage, concealment, deception, hardening and dispersion, which are part of overall force protection measures to protect against air and missile attacks. DCA in the maritime environment is a component of anti-air warfare (AAW).
- b. **Reconnaissance and Surveillance:** The primary objective of reconnaissance and surveillance operations is to provide timely collection from sensors and other collectors. This information is used to derive intelligence and targeting data on the activities and resources of an adversary or potential adversary. Air reconnaissance and surveillance operations can be categorized as strategic, operational or tactical depending on the purpose and level of operations for which the information is being gathered.
- c. **Electronic Warfare (EW):** EW is defined as military action that exploits electromagnetic energy to provide situational awareness and achieve offensive and defensive effects. Air assets provide valuable support to EW operations, whether through EW support measures or electronic countermeasures (ECM). The overall objective of EW in air operations is to enhance mission effectiveness and increase the survivability of friendly aircraft and other assets.
- d. **Search and Rescue (SAR):** SAR is defined as the use of aircraft, surface craft, submarines, specialized rescue teams and equipment to search for and rescue personnel in distress on land or at sea. According to the provisions of the International Civil Aviation Organization and the International Maritime Organization, SAR is a national responsibility that is often delegated to its Armed Forces for peacetime operations. The boundaries for SAR responsibility are normally defined by Search and Rescue Regions. Control and coordination of SAR operations in peacetime is normally the responsibility of the Rescue Coordination Centres. In our context the Maritime Rescue Coordinating Centre (MRCC), Colombo. Naval SAR assets may be made available to assist civil authorities when the task does not interfere with military requirements.
- e. **Aerial Mining.** Maritime mining operations can be classified as strategic or tactical; offensive, defensive or protective; and embrace all methods whereby damage may be inflicted or adversary sea operations hindered by the use of naval mines. Aircraft by their nature may be the most suitable vehicles for offensive mine laying operations and for replenishing existing fields. The speed of a mine laying aircraft is a great advantage during mining operations that must

be executed quickly. Also aircraft can penetrate areas that are denied to surface vessels and submarines, and are not endangered by previously laid mines when replenishing a minefield.

f. **Hydrographic and Oceanographic Research.** This too is to be regarded strategic in nature and vital given our location and in the realization of our blue economic aspirations. In addition, capability and capacity to conduct and assist hydrographic and oceanographic research through air assets is an enduring need or neglect would be detrimental to the state's security, progress and prosperity.

g. **Littoral and High Seas Medical Evacuations/ Assistance.** Though the Naval assets have the reach, time sensitiveness regarding medical evacuation(s) is a constant reminder that mobility is most effective with speed. This should not be misunderstood with SAR missions. The 'COVID-19 pandemic' period made us realise the necessity in gearing and building capacity and capabilities for such eventualities where urgency takes precedence in life or death situations. This is to be viewed as an extension of our commitment towards ensuring safety of the global seafaring community when needed. Given our maritime space the need for provisions for medical evacuations and assistance is imperative and an area that heeds serious attention.

Navy's Perspective on Maritime Air Operations

Maritime Security Objectives Envisioned

51. Over the next five years' action will be taken in the pursuit of following Maritime Security Objectives envisioned to further develop our approach to maritime safety, security, prosperity and international cooperation while upholding laws, regulations, and norms to deliver a free, fair, and open maritime domain. These Maritime Security Objectives shall inform at focusing on core functional areas for our maritime forces.

- a. **Protecting Our Homeland and Population.** Achieve the most effective maritime security framework for our maritime domain, ports and infrastructure while deterring the external aggressions from sea and ensuring the protection of Population including nationals deployed overseas during hostilities and disasters.
- b. **Responding to Threats.** Acquire capabilities and expertise in responding to new and emerging maritime threats in order to achieve maritime safety and security.
- c. **Ensuring Prosperity.** Ensuring the security of international shipping, the unimpeded transmission of goods, information and energy to support continued global development and our economic prosperity.
- d. **Compliance to Our Values.** Championing the United Nations Convention on the Law of the Sea (UNCLOS) and national laws as the legal framework within which all activities in the ocean and seas are carried out whilst ensuring rule based good order at sea.
- e. **Supporting a Secure, Resilient Ocean.** Foster stability in the Indian Ocean to work towards an ocean that is effectively governed, clean, healthy, safe, productive, and biologically diverse while achieving United Nations Sustainable Development Goals (UNSDGs).

Core Functions of our Maritime Forces

52. Deducted through the above mentioned envisioned Maritime Security Objectives in order to operate effectively in our maritime domain and unique context, the Sri Lanka Navy primarily focuses on Maritime Domain Awareness(MDA), Defence, Deterrence, Maritime Security and Sealift as core functions. These core functions provide the rationale to plan, organize, task and control our limited assets and resources to achieve the desired strategic effects in our Focal Areas of Interests envisioned in the 'NAVSTRAT-2030'. In order to execute the core functions with efficacy the SLN aspire for an optimum level of readiness, flexibility, sustainability and mobility integrated to the fleet, basin structure and people. In this regard mobility is an enduring concern

given the limitations of platforms and associated budgeting for a considerable force structure to operate in our maritime domain. Thus, integration of air power including unmanned systems into fleet operations and missions are cost effective and force-multipliers.

a. **MDA** - Capability and capacity for real time MDA is critical for the execution and realization of desired effects in our Sea Area of Interests (SAOI). Capabilities include surveillance, detection and classification for deterrence, defence and interdiction. This could also be attributed as central to other functions efficacy and actualization of optimum results. MDA as per the IMO definition is, "the effective understanding of anything associated with the maritime domain that could impact the security, safety, economy or environment". SLN understands the need for a comprehensive Maritime Operational Picture (MOPP) which includes but not limited to the surface, sub-surface and air dimensions. A more holistic approach would be the inclusion of safety and security into this matrix. In a sense, this elucidates having credible MDA improves safety, which in turn supports safe navigation by monitoring weather conditions, vessel traffic and potential hazards at sea. It also helps prevent collisions and accidents ensuring safety of vessels, crew and cargo. Establishing a clear and precise maritime picture in our maritime jurisdiction and in the SAOI provides for the effective and efficient utility of available assets, resources especially considering our inherent limitations.

b. **Defence** – Defence of critical infrastructure / resources, strategic and operational centers of gravity (COG) that are vital to the sustenance, survival, security and safety of the state, without which would be perilous to our way of life, societal progress and prosperity.

c. **Deterrence** – Deterrence is the ability of demonstrating a credible threat to adversaries in appraising risk and costs associated with any form of aggression or actions in our domain and against our state. In addition, considering lower levels of conflict, visible presence deters lawless behaviours. This is effective with actual and potential adversaries and unlawful elements when made aware of risks, costs of any course of action (COA) would outweigh any potential benefit(s). In this regard forward presence is also a key attribute of deterrence in our maritime domain.

d. **Maritime Security** – Maritime security operations are conducted to create desired effects and conditions for security and protection of sovereignty in our maritime domain/ area of interest. This incorporates actions to prevent and respond to transnational crimes, piracy, maritime terrorism, arms smuggling including proliferation of radio-active hazardous materials/WMDs, illegal migration, human trafficking, protect living and non-living marine resources, environmental hazards and events. Further, maritime security also involves participation in joint and combined security cooperation operations with local, regional and international allies and partners. The onus of these operations are

in demonstration of our commitment towards collective security efforts in maintaining and advancing an international rules based good order at sea from sharing situational awareness to conducting maritime interdiction and law enforcement operations.

e. **Sealift** - Sealift in our unique context consists of the afloat pre-positioning for replenishments to sustain maritime security operations and to support civil authorities and regional states for Humanitarian Assistance and Disaster Relief(HA/DR) missions during natural and man-made disasters. This ensures that the SLN is capable to sustain and deliver specialized maritime services in support of national security objectives and regional commitments or projection of stability operations (POSO) at times of war and peace. Sealift is a unique function that provides the capabilities for an optimum force posture, reinforcement and logistics.

53. The SLN prioritizes 'order of effect' over 'order of battle'. This in length is described through our 'ENDS', 'WAYS' and 'MEANS' approach in the 'NAVSTRAT-2030' document, in delivering desired effects in the below mentioned 'Focal Areas of Interests';

- a. Achieving maritime domain awareness (MDA).
- b. Ensuring maritime safety and security including secure SLOCs.
- c. Maritime law enforcement ensuring 'Rules Based Good Order at Sea'.
- d. Protection of living and non-Living, surface and subsurface resources in the Territorial Sea, EEZ and Continental Shelf under Sri Lanka's Jurisdiction.
- e. Conducting maritime search and rescue (MSAR).
- f. Responding to humanitarian assistance and disaster relief (HADR) including assist nationals deployed overseas during hostilities and disasters.
- g. Ensuring sustained port operations and critical infrastructure security and development.
- h. Improving defence and deterrence.
- i. Nurturing enduring partnerships with local, regional and global entities for collective challenges.
- j. Ensure technological inclusion via cyber space, AI and cognitive domains.
- k. Assuring preparedness and effective response for chemical, biological, radiological and nuclear (CBRN) threats.

- l. Providing better healthcare, nourishment, welfare facilities for our men and women.
- m. Providing high quality training and talent retention.
- n. Facilitating public awareness and support on maritime affairs.

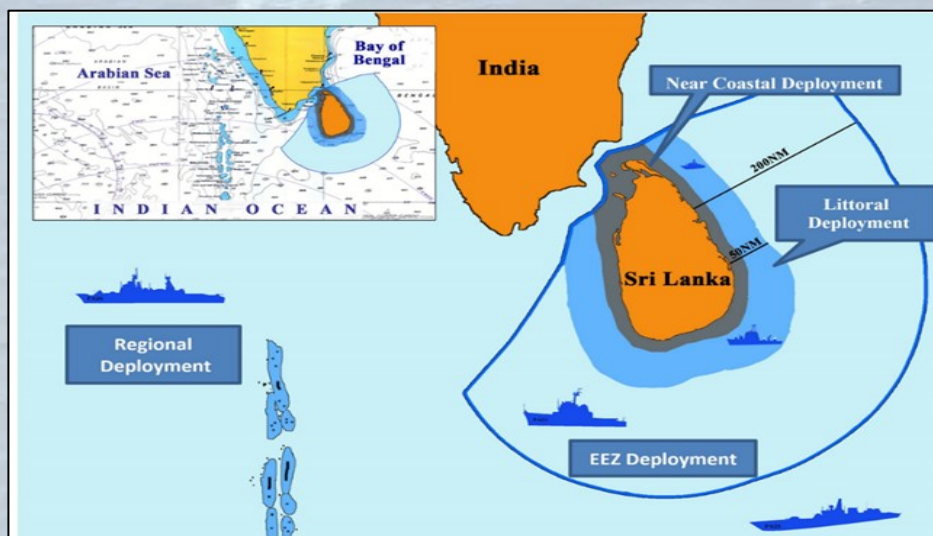
Force Posture

54. The basic structure of SLN's (including SLCG) force posture is based on a layered deployment considering our maritime jurisdiction and maritime area of interests creating credible defence and deterrence, deterring and denying possible aggressions, crimes, acts of terror, sabotage also responding to natural disasters and maritime incidents in our maritime and air domain. The key elements of this force posture;

- a. **Near Coastal Deployment** – Focuses on base distribution, redistribution, automation and mechanization.
- b. **Littoral Deployment** – Deployment of SLN and SLCG assets to an extent of 50nm.
- c. **EEZ Deployment** – In support of maritime security operations deterring criminal acts at sea, exploitation and exhaustion of living and non-living marine resources within our jurisdiction.
- d. **Regional Deployment** – Represents our forward presence securing global commons in support of freedom of navigation and rules based good order at sea whilst advancing our MDA.

Figure 2

Sea Areas of Interest for Naval Deployment



55. Thus, this provides the necessary basis in the force optimization (force structure) process for a versatile, credible and futuristic Navy and Coast Guard. Meanwhile, the profound impact of air power in the maritime environment is convincing enough and in our unique context the application of air power should be regarded integral and not in isolation. This integration should be conceived as a dimensional expansion of our existing maritime orientation. We also believe that maritime air technology should be developed and integrated in unison among SLAF and SLN enabling optimum utility of our assets including human resources.

Joint Maritime Air Operations

56. It needs to be appreciated that the Navy as an element of national power retains the properties of cross environmental operations, particularly in our own context. The basis of Joint Maritime Air Operations in our unique context is to achieve a deterrent effect through real time detection. 'Credible presence deters unlawful acts'; and in order to have a credible presence in our maritime domain, it is essential that SLAF and SLN joint efforts are sustainable. This needs to be created through development of capacity and capabilities necessary to deliver results and desired effects.

57. There is an urgent need to improve upon the existing adhoc utility of our maritime surveillance operations. In this regard the 'Joint Maritime Air Operations Strategy' is to be regarded as the capstone document in envisaging for a seamless integration of our efforts and optimum utility of our resources in order to achieve desired effects in the island's maritime domain. The existing numbers of Maritime Patrol Aircraft (MPA) are due to increase and the Navy is convinced that depending on the availability of sensors and equipment onboard, these platforms can perform a multitude of missions which reflects a true and credible maritime orientation.

58. Meanwhile, the existing rotary wing aircraft with the SLAF have severe limitations in conducting maritime missions. Though the SLAF and SLN have intermittently trailed and tested conduct of helo-operations onboard Advanced Off-shore Patrol Vessels (AOPVs), there is a lack of mission compatibility and continuity due to inherent limitations of suitable maritime versions of the available rotary wing aircraft.

59. The Joint Maritime Air Operations Strategy (JMAOS) sets the guidance to develop necessary operational concepts, capabilities, roles and missions that will be core in the execution of Joint Maritime Air Missions collectively by the SLAF and SLN. This will inform the SLAF and SLN into appraising an optimum force size and structure, required acquisitions and investments, training and management of personnel etc. A combined approach is needed among the two (02) counterparts, which could be initially driven by a Capability-Based-Assessment (CBA) to pursue material and non-material solutions that

supports the overall Maritime-Air Operations concept for the island. This analysis should describe the solutions in terms of doctrine, organization, training, material, leadership/education, personnel and facilities (DOTMLPF)⁹.

60. In order to maximize utility and management of the available air assets and resources there is a need to develop a doctrinal approach at the operational level for Joint Air Operations between the SLAF and SLN. Core to this doctrine should emphasize on the conduct of maritime air surveillance, search, reconnaissance and patrols at least to the furthest limit of our EEZ. Thus, focus would revolve around developing following fundamental capabilities;

- a. **Robust and responsive command** – This shall provide the authority for direction, coordination and control. Mission Command shall be central where mutual trust, understanding of the operational environment, proper deduction of the higher commander's intent and desired outcomes are indispensable.
- b. **ISR** – To facilitate intelligence, surveillance, reconnaissance and acquisition, collation, processing, management and distribution of information in the maritime domain.
- c. **Preparedness** – Readily available forces/assets for employment in the desired SAOI.
- d. **Measure and Resources** – Focus on mission compatibility.
- e. **Protect** – Air assets and infrastructure.
- f. **Sustain** – Achieve necessary capacity and capability to create desired effects in the maritime domain.
- g. **Operate** – Conduct of Maritime Security Operations (MARSEC), Search and Rescue (SAR) and Humanitarian Assistance and Disaster Relief (HA/DR).

61. C2 of maritime forces is shaped by the characteristics and complexity of the maritime domain and the traditions and independent culture of maritime forces. Subordinate commanders execute operations independently with a thorough understanding of the commander's intent. Once assigned missions and functions, the subordinate commander takes required actions without delay, keeping the superior commander informed of the situation. The superior commander retains the authority to deny any particular action or exercise command by negation. As such, joint maritime operations tend to be decentralized, and unity of effort is made possible via mission command.

⁹ The Institute of Security Governance (ISG), DOD U.S.A, provided insights into doctrinal development considering factors mentioned in the acronym 'DOTMLPF-P'. The final 'P' stands for 'policy'.

62. **Utility of Maritime Patrol Aircraft (MPA)** – We are determined and ambitious to extend and expand the utility of our MPAs not just for littoral operations but also to the outer limits of our EEZ. This CONOPS will maximize the utility of our platforms, sensors and equipment in achieving desired effect in the maritime domain/SAOI.

63. However, our ambitions are not limited to a mere expansion of horizons but also in the acquisition of ISR capabilities for credible maritime domain awareness (MDA) including subsurface. Given the evolving strategic dimensions there is an urgent necessity in securing our ports, harbour approaches and undersea critical infrastructure. We are optimistic that our MPAs will be fitted with some form of acoustic suite to allow 'sonobuoys' to be dropped and monitored from the air. Many modern MPAs are also fitted with electro-optical systems capable of stand-off identification of vessels of interest by day or night. It is imperative given our vulnerable context for external shocks, we focus on integrating nuclear hazardous/radio-active material identification capabilities into our MPA suits.

64. MPAs are versatile platforms capable of undertaking much more than just traditional maritime patrol missions. The long range and capable sensor suites of MPA make them ideal intelligence, reconnaissance and surveillance (ISR) platforms if the threat situation allows. Their height and endurance advantages over rotary wing assets allow them to clear search areas well ahead of a force and provide both electronic support and radar warning of potential hostile units well beyond the force's radar horizon. Most MPA will also carry some form of weapon system, be that torpedoes or anti-surface missiles. However, our focus is essentially towards defensive capabilities.

65. **Utility of Maritime Helicopters** - Maritime helicopters are also adaptable and able to support a variety of missions. Many are equipped with capable sensor suites and are also able to conduct ISR missions, albeit they are limited in endurance and altitude in comparison to MPA. An effective way of conducting ASW operations is the use of 'dunking sonars'.

Outline for Joint Maritime Air Operations¹⁰

(What we believe is the best way to do with the judgment of application...)

66. **JMCC:** Establishing a Joint Maritime Component Command (JMCC) for seamless Command, Control and Communications (C3). This shall be the component responsible for tasking of maritime air assets for Joint Maritime Air (JMA) missions. The JMCC shall coordinate missions between SLAF and SLN and with other stakeholders as necessary, ensures unity of effort. The Joint Maritime Air Component Commander (JMAC-C) at the JMCC shall be responsible in taking lead for Joint Maritime Air Operations coordination.

¹⁰ Adaption of basic concepts for Joint Maritime Air Operations was made through referencing of the 'NATO Standard AJP-3.3.3, Allied Joint Doctrine for Air Maritime Coordination, Edition A, version 1, December 2014.

67. **MAOCC:** A Maritime Air Operations Coordinating Centre (MAOCC) is to be established under the JMCC for the planning and execution element for joint maritime air operations. Fundamentally, the MAOCC is responsible for providing Air Tasking Orders (ATOs) and for planning, tasking and controlling of air assets. The MAOCC shall function under the direct supervision of JMAC-C. However, for tasking of SLAF air assets in direct support of Joint Maritime Air Operations (JMAOPS) will have to be coordinated with the SLAF Operations Directorate.

68. **C2:** Underlying tenet for Command and Control shall be mission command. The JMCC and the MAOCC are to establish a clear supported/supporting inter-relationship with the SLN. The supported element which would be the SLN has the responsibility for achieving the primary objectives of a mission or phase(s) of operation. The JMCC and MAOCC in its supporting role shall plan and employ air assets accommodating the SLN's direction and guidance. However, the JMCC and MAOCC as the supporting element will be allowed with considerable latitude in the planning and execution of operations.

69. The JMAC-C shall in coordination with the SLN independently oversee the employment and deployment of maritime air assets for the execution of maritime airborne patrol operations. Maritime Air Operations in our unique context could be primarily categorized into two elements; Maritime Air Patrols and Maritime Helo-support Missions. This categorization is based upon the realized utility of available fixed wing and rotary wing aircraft suitable for the maritime environment.

a. **Maritime Air Patrols** – The existing inventory of Maritime Patrol Aircraft (MPAs) are tasked under this category. The operational control of the MPAs are assigned to the JMCC and sorties conducted will be under the tactical control of the MAOCC. Employment of MPA is the most effective way to conduct maritime security operations (MARSEC).

b. **Maritime Helo-Support Missions** – Until there is a deliberate acquisition of maritime helicopters, the SLN will be contended to utilize the existing inventory of helos for limited missions. Considered an extension of a SLN ship, embarked helicopters are normally OPCON to and tasked by the ship to provide direct support. However, advantage can be taken of capabilities that are beyond the requirements for traditional maritime helicopter support. Land based helicopters would normally be assigned OPCON to the JMCC and tasked in the same manner as MPA. These would be most effective in SAR and HA/DR missions.

Rotary Wings (Helicopters) as an Integrated (Organic) Air Component

70. It is undeniable that the existing and future offshore platforms utility would be maximized with the inclusion of integrated (Organic) helo-operations. 'Organic' in the sense elucidates deployment and conduct of sustained rotary wing/helicopter operations onboard SLN surface vessels. This to be regarded an extension of the existing nature of joint operations between SLAF and SLN. In this unique context JMAC-C would be substituted by the respective Commanding Officer of Naval surface platform tasked with onbaord helicopter. In the long-run this strategic option is conceived to be viable, feasible and acceptable given the nature of the evolving security dimensions and global realities. This initiative corresponds with the ambitions in delivering desired strategic effects considering EEZ and regional deployments.

71. Further, this single line of action is to result in an unprecedented positive transformation from the existing 'aggregate capability curve' of the SLN¹¹ and SLAF. Relevant professional training in this regard could be undertaken in collaboration with likeminded foreign strategic/Naval partners until planned acquisitions are realized.

72. Until realization of an integrated helo component onboard vessels, it is advised to initiate measures for necessary tactics, techniques and procedures including doctrinal development through expert exchange initiatives. An integral helo component onboard offshore vessels surely will complement execution of MASEC, SAR and HA/DR missions as force-multipliers.

73. The inclusion of maritime helicopters would also giveaway for developing subsurface detection capabilities through the deployment of dunking sonars, sonar buoys etc. It is imperative that acquisitions are based on mission compatibility with existing and planned surface assets.

Unmanned Aircraft Systems (UAS) as an Integrated Air Component

74. Realization of an integrated(organic) air component is envisioned as an operational imperative complementing deployment in demonstration of our regional and global commitments towards ensuring safety, security and a rules based good order at sea. The basis is drawn from the CONOPS of our fleet illustrated in the 'NAVSTRAT-2030' document. In addition, under the 'Focal Areas of Interests' mentioned in this

¹¹ SAF and in particular SLN's overall Force Posture is defined by 'quantity over quality'. To go up the existing power/capability curve takes a considerable time period as we have not made or ignored requisite investments and allocation of resources. Thus, to increase the quality of the Navy, without increasing the quantity four options are prescribed; (1) Designing / introducing new and better weapons/systems; (2) Increasing firepower, automation and replacing old systems/equipment; (3) Improving maintenance level of equipment/systems; (4) Improving recruitment, training and retention of officers and sailors.

document, utility of air power is highlighted as a 'force multiplier'. Actualization of this strategic aspiration is sure to elevate Sri Lanka as a credible maritime security provider in the region and beyond. Further, this would catalyse SLN's leap into the air and sub-surface dimensions reinforcing efforts into building credible defence and deterrence.

75. **Unmanned Aircraft System (UAS)** – While the command and control (C2) processes for UAS are similar to those for manned assets, there are several characteristics of UAS that can make C2 particularly challenging:

- a. **Communication Links:** UAS communication links are generally more critical than those for manned systems. In the event of lost communications, a manned aircraft will usually continue the mission or return safely to base. Although UAS can be programmed to return upon communication loss, they rely heavily on continuous communication for both flight control and payload operation. As a result, ensuring communication security and protecting bandwidth from interference and threats is essential.
- b. **Transfer of Control:** UASs can often transfer control of the aircraft or payloads to multiple operators during flight. This requires close coordination among all potential operators to ensure seamless operations.
- c. **Endurance:** Many larger UASs have significantly longer endurance times than comparable manned systems. Commanders and their staffs should leverage this extended endurance when assigning UAS tasks.
- d. **Airspace Compliance:** Compliance with airspace control orders is critical because unmanned aircraft cannot visually detect and avoid other aircraft. They generally have small radar and visual signatures and may lack identification, friend or foe (IFF) capabilities, making strict adherence to airspace regulations essential.

Unmanned Aerial Systems (UAS) Capabilities

76. The United States Department of Defence categorizes UAS into five groups based on size, range, speed, endurance, and general capabilities¹². The following is adapted in order to provide a comprehensive understanding into capabilities of UAS, in order to emphasize on the associated fundamentals;

Group 1: Typically hand-launched, self-contained, portable systems employed to support a small unit or base security. They are capable of providing "over the hill" or "around the corner" reconnaissance and surveillance. They operate within visual range and are analogous to radio-controlled model airplane.

¹²"This section has been adapted from Thomas G. Mahnken, Travis Sharp, Grace B. Kim; 'Deterrence by Detection: A Key Role for Unmanned Aircraft Systems in Great Power Competition', Center for Strategic & Budgetary Assessment, [https://csbaonline.org/uploads/documents/CSBA8209_\(Deterrence_by_Detection_Report\)_FINAL.pdf](https://csbaonline.org/uploads/documents/CSBA8209_(Deterrence_by_Detection_Report)_FINAL.pdf) (2020).

Group 2: Small to medium in size and usually used to support brigade and below intelligence, surveillance, reconnaissance, and target acquisition requirements. They usually operate from unimproved areas and launch via catapult. Payloads may include a sensor ball with electro-optical/infrared (EO/IR) and laser range finder/designator (LRF/D) capability. They typically perform special purpose or routine operations within a specific set of restrictions.

Group 3: Operate at medium altitudes with medium to long range and endurance. Their payloads may include a sensor ball with EO/IR, LRF/D, signal intelligence (SIGINT), communications relay, and chemical biological radiological nuclear explosive (CBRNE) detection. They usually operate from unimproved areas and may not require an improved runway.

Group 4: Relatively large UAS that operate at medium to high altitudes and have extended range and endurance. They normally require improved areas for launch and recovery, beyond line-of-sight (BLOS) communications, and have stringent airspace operations requirements. Payloads may include EO/IR sensors, radars, lasers, communications relay, SIGINT, Automatic Identification System (AIS), and weapons.

Group 5: Include the largest systems, operate at medium to high altitudes, and have the greatest range, endurance, and airspeed capabilities. They require improved areas for launch and recovery, BLOS communications, and the most stringent airspace operations requirements. Group 5 UAS perform specialized missions such as broad area surveillance and penetrating attacks.

Advantages of UAS

77. UAS generally provide longer time-on-station capabilities than satellites or manned aircraft. Unlike satellites in low-Earth orbit, UAS can remain over a specific area for much longer durations. They also enable extended, uninterrupted missions compared to manned aircraft, allowing them to survey a larger area for a longer time. In contrast, U.S. regulations limit Air Force pilots to 12 hours of continuous flying within a 24-hour period (14 hours with a waiver).

78. UAS are typically more cost-effective than manned platforms. Without the need to accommodate a crew, UAS can be smaller and more efficient than manned aircraft. They also offer greater cost savings and flexibility compared to space-based reconnaissance systems. Research has demonstrated that, in many instances, UAS are less expensive to acquire and operate than manned aircraft.

79. Unmanned systems remove the risk to human life associated with manned aircraft. UAS can carry out hazardous missions without concerns about pilot safety or health. In hostile environments, the lack of a human crew eliminates the possibility of hostages or prisoners of war if the aircraft is captured. Although unmanned systems do

not completely eliminate all risks, they offer operators greater flexibility in terms of escalation or de-escalation.

80. UAVs can be outfitted with specialized sensors to detect and identify Chemical, Biological, Radiological and Nuclear (CBRN) threats in maritime environments. These UAVs improve safety by precisely identifying dangerous materials and helping manage potential CBRN incidents. With their capability to swiftly and accurately detect such threats, UAVs have become essential tools for safeguarding critical infrastructure and threats to commons.



Case Study

Sri Lanka-Indian Combined Naval mission nab 500kg narcotics worth nearly SLR 170 billion (19-25 November, 2024)

On 19th November 2024, SLN shared information of a probable mid-sea transfer by Sri Lankan flagged fishing vessels in the Arabian Sea. The Indian Navy (IN) responded swiftly conducting extensive surveillance deploying an Indian Naval Long Range Maritime Patrol Aircraft (LRMP) and a high endurance UAV to localise and intercept the fishing vessels. In addition, an Indian naval ship with Marine Commandos onboard was also deployed into the designated sea area.

Meanwhile, SLN kept providing continuous updates and essential inputs assisting the IN counterparts. Within a matter of hours, two (02) fishing boats resembling characteristics of the suspected craft were identified by the IN aerial surveillance and reconnaissance aircraft. The aerial surveillance/reconnaissance craft continuously shadowed the suspected fishing boats also relaying real time visuals. An additional IN vessel was also sent to the location in assistance of the coordinated effort.

By 24th November, upon approaching the suspected Sri Lankan fishing vessels the Indian Naval ship deployed its integrated aerial drones for more accurate localization of the vessels and situation assisting the boarding teams onboard. Subsequently, Indian Marine Commandos boarded both suspected craft leading to the seizure of approximately 500 kg of narcotics (Crystal Meth) in total. The two Sri Lankan fishing boats, along with crew and seized narcotics were handed over to Sri Lankan Navy ship at sea for further legal action.

This single event not only highlights the depth of close coordination, cooperation and mutual trust between two nations and its Navies but also the efficacy of the utility of integrated maritime patrol aircraft and unmanned systems augmenting mission success. If not for the augmented capabilities to act upon intelligence received, one cannot rule out the possibility of these narcotics reaching our shores undetected.

Security and defence are bounded by time and space. Those who are unwise to realize this when most needed will be damned by generations to come and despised even by their ardent advocates. If we are not present in our SAOI, someone else will surely have their presence established.



Requirement of UAVs to the Sri Lanka Navy¹³

81. UAVs have gained significant attention in enhancing maritime surveillance and reconnaissance capabilities. Their advantages, such as extended flight times, heightened deployment flexibility, and the ability to capture high-resolution imagery and sensor data, make them indispensable for monitoring maritime operations. Across the IOR, countries are increasingly integrating UAVs into their maritime security strategies, enabling efficient coverage of maritime zones and swift responses to emerging threats.

82. UAVs can serve as force multipliers for SLN ships by extending the force sensor horizon and enabling stand-off offensive and defensive capabilities within equipment constraints. Tactical UAVs, can offer opportunities for deploying limited aviation capabilities from a range of minor war vessels, including patrol boats, for tasks such as surveillance, reconnaissance, intelligence collection, and communications.

83. At present there is an inability to afford a huge amount of capital from naval budget for purchasing large seagoing platforms during next few years. Therefore, best utilization of tactical UAVs at available larger platforms would be cost-effective and efficient means to bolster its naval capabilities, despite budgetary constraints. Moreover, it will address the nourishing maritime safety and security issues in the maritime domain of Sri Lanka. Some of the most important maritime aspects compensated from UAVs are listed below;

- a. Wide area surveillance
- b. Provide over the horizon targeting (OTHT) data
- c. Surveillance and reconnaissance
- d. Battle damage assessment
- e. Surveillance of area prior to combat search and rescue operation
- f. Obtain real time imagery of area or objects of interest
- g. Surveillance of EEZ, fishery protection
- h. Maritime patrol in the coastal area
- i. Merchant traffic monitoring
- j. Assistance in SAR operations
- k. Coastal and maritime critical infrastructure protection
- l. Pollution prevention, law enforcement and evidence collection

¹³ 'NAVSTRAT-2030'

Proposed UAS Inventory for Credible Deterrence and Maritime Missions

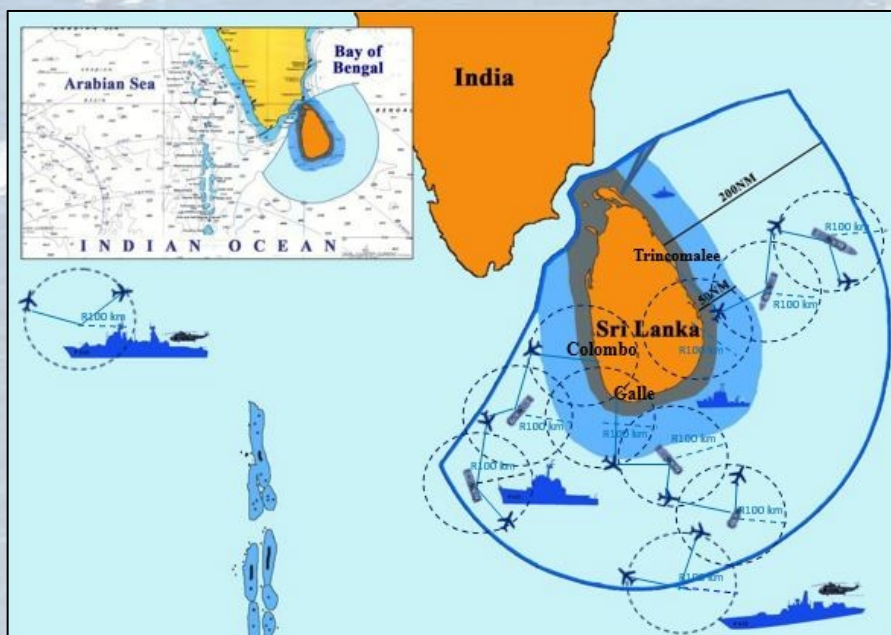
Area of Interest	Orbit Area	Revisit Rate	Search Area (nm ²)	Base	Base to Center (km)	No of Orbits	No of UAS per Orbit	Total UAS
Coastal & Littoral	WNA-NWNA	Persistent	<i>*To be quantified</i>	Kalpitiya	200	1	3	3
	NCNA-NNA	Persistent		KKS	100	1	3	3
	ENA/SENA	Periodic			200	1	3	4
	SNA	Persistent		HBT	300	1	4	4
	Total							14
Regional	EEZ & beyond	Complementing deployment	Mission based	AOPVs	100	Mission based	1	4
	Total							04

Note: This is to be regarded a template towards a proper appraisal in the requirement of UAS. Further scrutiny and assessment in this regard is recommended.

84. Inclusion of long endurance tactical mini UAS which have the capability to operate even in GPS denied areas is a necessary consideration. A CONOPS of UAS launched from land based station and tactically controlled from surface platforms at least up to 100km line of sight (LOS), with hybrid propulsions is an added advantage in our context.

Figure 3

Proposed CONOPS on the utility of Long Endurance Tactical mini UAS



Conclusion

85. 'Sovereignty means nothing if not defended'. It is always in the best of our interest to deter opportunistic intrusions denying a situation of 'faith accompli' that would be hard to undo. In this regard, being assertive in the conduct of Maritime Air Operations is not a choice but an enduring necessity. The success of this strategy depends upon the proper appraisal of a maritime lead for optimum utility and management of air assets and resources in the maritime environment. From a maritime perspective Air Power is a function which allows as a force multiplier to be implemented in the most efficient way. This emphasizes that, Air Power in the maritime domain is more effectively conducted by those with an exposure and a proficient understanding of the maritime environment¹⁴.

86. This capstone document, *'Joint Maritime Air Operations Strategy (JMAOS) in Sri Lanka'* serves a dual purpose, providing direction in the pursuit of jointness between SLAF and SLN and integration (organic function) of air assets in particular rotary wings and unmanned systems onboard surface vessels. The rationale to this approach is based on the realization of prioritizing 'order of effect' over 'order of battle' in our unique context. We believe in enhancing our ability to detect, creating a deterrent effect against unlawful behaviour in the island's sea area of interest (SAOI). Credible presence deters, lawlessness¹⁵. The desired effects in our maritime domain is well elaborated in the *'NAVSTRAT-2030'* strategic document.

87. The strategic guidance is aimed at optimizing utility of resources fundamentally through a joint operational doctrine for air maritime operations informing formulation of tactics, techniques and procedures for mobility, sustainment, training and management to achieve desired effects. Easy said, then done; however, we are hopeful and determined in our collective resolve.

88. Application of this strategy in unison between SLAF and SLN will result in a paradigm shift of our defence, security outlook and architecture. Air power integration into the maritime environment will provide impetus to how MARSEC operations, HA/DR and SAR operations are executed in the island's context. In the long run, we shall have to integrate air defence and subsurface capabilities in the protection of our surface and air units including critical infrastructure. Further, pursuit and implementation of this strategy will add into the advances/ normative efforts in becoming a credible maritime stakeholder in the region and beyond.

"It is not too ambitious to think of solutions governed by different ideas"

.....

¹⁴ In 1923, the Balfour Committee in UK recommended all 'Airborne Observers' to be naval officers with 70% of Carrier Pilots being naval officers. This led to the formation of the British fleet air arm in 1937.

¹⁵ 'Broken-Window Theory'


Key Activities

89. This provides the precedence for action in realization of Joint Maritime Air Operations between SLAF and SLN including integration of rotary wing aircraft and unmanned systems onboard surface vessels, envisioned in this capstone document. It is imperative to comprehend the need for a shared vision, unity of effort to position ourselves to seize opportunities presented in the maritime domain. Thus, following key activities are prioritized and recommended for collective resolve in response to our enduring commitments to the citizens, state, region and beyond;

- Articulation of a Joint Maritime Air doctrine between SLAF and SLN, reinforced through a capability based assessment (CBA). Re-referencing paragraphs 54-66 is advised.
- Establishment of the Joint Maritime Component Command (JMCC) and the Maritime Air Operations Coordinating Center (MAOCC) as the successor to the 'Joint Maritime Surveillance Command Operations Room (JMSCOR).
- Integration (organic function) of SLAF helos onboard surface vessels.
- Development of techniques, tactics and procedures for both Joint Maritime Air Operations and integrated air operations including Unmanned Aerial Systems (UAS). Framework for a maritime air component comprising three (03) main squadrons: Rotary Wing; UAS and EW; Maritime Patrol and Reconnaissance.
- Acquisition of high-endurance Unmanned Systems(US) for independent operations and relevant operational doctrinal development and crew training.
- Acquisition planning for rotary wing air craft preferably 'maritime, twin engine helos' by SLAF.
- Planning for development of subsurface and anti-air defence capabilities if possible through 'modular integration' for specific missions. This should consider quality of equipment, sensors, platforms, weapons and available funding.
- Developing relevant capabilities (e.g., inverse synthetic aperture radar – ISAR, command, control, communications, computers and intelligence - C4I and cyber).
- Capacity building for onboard air control and training of aviation core teams.
- Capacity building in Maritime SAR and air crew rescue teams using organic helos.

Glossary

AAR	-	Air to Air Refuelling
AEW	-	Air Early Warning
AEW-C	-	Air Early Warning - Control
AOPVs	-	Advanced Offshore Patrol Vessels
AAW	-	Anti-Air Warfare
AI	-	Artificial Intelligence
AIS	-	Automatic Identification System
AOI	-	Area of Interest
ASW	-	Anti-Submarine Warfare
ASuW	-	Anti-Surface Warfare
ATOs	-	Air Tasking Orders
BLOS	-	Beyond Line of Sight
CBRNE	-	Chemical, Biological, Radiological Nuclear, and Explosive
CBA	-	Capability-Based Assessment
CAIRS	-	Close Air Support
C3I	-	Command, Control, Communication and Intelligence
C4I	-	Command, Control, Communication, Computers and Intelligence
COA	-	Course of Action
COG	-	Center of Gravity
CONOPS	-	Concept of Operations
DCA	-	Defensive Counter-Air
DOTMLPF	-	Doctrine, Organization, Training, Material, Leadership/Education, Personnel, and Facilities
D&T	-	Diameter and Tonnage
ECM	-	Electronic Counter Measures
EEZ	-	Exclusive Economic Zone
EO/IR	-	Electro-Optical/Infrared
EW	-	Electronic Warfare
IFF	-	Identification, Friend or Foe
IOR	-	Indian Ocean Region
ISR	-	Intelligence, Surveillance, Reconnaissance
ISAR	-	Inverse Synthetic Aperture Radar
IUU	-	Illegal, Unreported, and Unregulated
JMA	-	Joint Maritime Air
JMAOPS	-	Joint Maritime Air Operations
JMAC-C	-	Joint Maritime Air Component Commander
JMAOS	-	Joint Maritime Air Operations Strategy
JMCC	-	Joint Maritime Component Command
KKS	-	Kankesanthurai
LOS	-	Line of Sight
LRF/D	-	Laser Range Finder/Designator
MAOCC	-	Maritime Air Operations Coordinating Centre
MAOS	-	Maritime-Air Operations Strategy
MARSEC	-	Maritime Security Operations
MDA	-	Maritime Domain Awareness
MNCs	-	Multi-National Corporations

An aerial photograph of a ship, likely a naval vessel, moving through the water. The ship is leaving a white wake behind it. The water is a deep blue-grey color. The ship is positioned in the lower right quadrant of the image.

MOPP	-	Maritime Operational Picture
MPA	-	Maritime Patrol Aircraft
MV	-	Merchant Vessel
NATO	-	North Atlantic Treaty Organization
NCNA	-	North Central Naval Area
NNA	-	Northern Naval Area
NSOs	-	National Security Objectives
NAVSTRAT-2030-		Sri Lanka Navy's Strategy for 2030 & Beyond
NWNA	-	North Western Naval Area
OCA	-	Offensive Counter-Air
OPCON	-	Operational Control
OTHT	-	Over the Horizon Targeting
POSO	-	Projection of Stability Operations
ROA	-	Radius of Action
SAF	-	Sri Lanka Armed Forces
SAR	-	Search and Rescue
SEAD	-	Suppression of Enemy Air Defences
SIGINT	-	Signal Intelligence
SLAF	-	Sri Lanka Air Force
SLN	-	Sri Lanka Navy
SLCG	-	Sri Lanka Coast Guard
SLOCs	-	Sea Lines of Communications
SOF	-	Special Operations Forces
SNA	-	Southern Naval Area
TCO	-	Trincomalee
US	-	Unmanned Systems
U.S.	-	United States
UA	-	Unmanned Aircraft
UAS	-	Unmanned Aircraft / Aerial System(s)
UNCLOS	-	United Nations Convention on the Law of the Sea
UNSDGs	-	United Nations Sustainable Development Goals
VHF	-	Very High Frequency
WWI	-	World War I
WWII	-	World War II
WMD	-	Weapons of Mass Destruction
WNA	-	Western Naval Area

Suggested Follow-on Reading

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