CREATING A COASTAL RIVERINE FORCE OPERATIONAL DESIGN FOR MULTI-DOMAIN OPERATIONS

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Coastal riverine operations are a significant part of US military history. From Washington crossing the Delaware to protecting major infrastructure in Iraq, coastal riverine forces (CRF) have had a definitive impact on outcomes of campaigns. This study will look at how the CRF can continue to contribute to US operations as we transition to Multi-Domain Operations. It will examine the current material status and capabilities of CRF, to include US Navy and US Army assets, and qualitatively apply these capabilities to the problem sets of Multi-Domain Operations.

After the analysis of how the CRF can be incorporated into Multi-Domain Operations, this paper will build an operational framework for CRF utilizing the Joint Design Methodology. Once the framework has been established, it will be applied to two scenarios built for operations in the Baltics and Congo River Basin. The conclusion will discuss how effective the CRF was to the overall campaign in the scenario. It will close with recommendations for additional areas of research to further refine structure and utilization of Coastal Riverine Forces.

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ABSTRACT

CREATING A COASTAL RIVERINE FORCE OPERATIONAL DESIGN FOR MULTI-DOMAIN OPERATIONS, by Ryan Law, 103 pages.

Coastal riverine operations are a significant part of US military history. From Washington crossing the Delaware to protecting major infrastructure in Iraq, coastal riverine forces (CRF) have had a definitive impact on outcomes of campaigns. This study will look at how the CRF can continue to contribute to US operations as we transition to Multi-Domain Operations. It will examine the current material status and capabilities of CRF, to include US Navy and US Army assets, and qualitatively apply these capabilities to the problem sets of Multi-Domain Operations.

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ACRONYMS

A2AD	Anti-Access Area Denial
ADA	Air Defense Artillery
AO	Area of Operations
C2	Command and Control
C4I	Command, Control, Communications, Computers, and Intelligence
CA	Civil Affairs
CAS	Close Air Support
CRS	Coastal Riverine Squadron
CRF	Coastal Riverine Force
CRRC	Combat Rubber Raiding Craft
EMS	Electro Magnetic Spectrum
FID	Foreign Internal Defense
ISR	Intelligence, Surveillance, and Reconnaissance
JFC	Joint Force Commander
JLOTS	Joint Logistics Over the Shore
JRF	Joint River Flotilla
JRSOI	Joint Reception, Staging, and Onward Movement
LACV	Light Air-Cushioned Vehicles
LCM	Landing Craft, Mechanized
LCS	Littoral Combat Ship
LCU	Landing Craft, Utility
LOC	Lines of Communication
LOTS	Logistics Over the Shore

LSCO	Large Scale Combat Operations
LSV	Logistics Supply Vessel
MDO	Multi-Domain Operation
MNC	Multi-National Corps
NCW	Naval Coastal Warfare
NSFS	Naval Surface Fire Support
OE	Operating Environment
PSYOP	Psychological Operations
SLOCS	Sea Lines of Communication
ASF	Army Special Forces
UAV	Unmanned Aerial Vehicle

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CHAPTER 1

INTRODUCTION

Problem Statement

Current U.S. Naval focus is solely tactical for Coastal Riverine Forces (CRF); no easily discernible operational level planning is being conducted for CRF. Historical precedent demonstrates that riverine operations, if incorporated into an operational plan, can greatly affect the outcome of a campaign. During the American Civil War, a riverine campaign conducted on the Mississippi River was instrumental in the success of the "Anaconda Plan", and several riverine operations during the Vietnam conflict restricted the ability of the North Vietnamese to transport personnel and supplies. Given the Joint Forces shift to the Multi-Domain Operation (MDO) concept and the historical impact of riverine operations on campaigns, how does the U.S. Navy create an operational framework that incorporates CRF capabilities into answering problems presented by the MDO philosophy (Table 3)?

Research Question

How does the U.S. military create an operational framework that incorporates CRF capabilities into the Joint Force's MDO philosophy? Secondary questions include how the Navy's CRF incorporates into the Navy's philosophy of distributed lethality, how joint doctrine can be expanded to include riverine operations, and how the U.S. military could apply riverine forces in regions such as the Baltic and Congo River Basin.

Assumptions

1. CRF capabilities will not drastically change within the current generation of warfighters. With required lead time on research and development for new capabilities within the U.S. military, it is extremely difficult to predict what future technologies could influence the employment of Coastal Riverine Forces. An example of a development process proceeding quickly is the Navy's Littoral Combat Ship (LCS). It took three years from the initial design of the craft to the christening of LCS-1. An example of a longer development time is the Joint Strike Fighter. Although it was first requested in 1992, full employment did not begin until 2018. This paper will focus on the current capabilities of the CRF and publicly-disclosed research as it is assumed that only these technologies will be available to the CRF warfighter within the time period of the vignettes in chapter 4.

Defining the current state of the CRF and what capabilities are to be expected within this generation of warfighting will be further discussed in Chapter Four: Analysis.

2. Final application of CRF capabilities would be part of a Joint Force (Joint Flotilla). The U.S. military fights with a multi-service, or "Joint," (Army, Navy, Marines, Air Force) construct. The issues facing planners are generally going to be too complex to be solved by one branch of service. This paper, although primarily focused on U.S. Navy capabilities and planning, will discuss the joint force as a whole. The CRF has great potential to become an asset for MDO but will rely on augmentation from sister services to capitalize on this potential. With this in mind, capabilities stemming from different branches of service discussed in this paper will all be assumed to fall under a Joint Force construct. The CRF would be the Navy's primary addition to this construct, but these "River Flotillas" would have capabilities and units from all branches of service. For this

discussion, Joint River Flotillas (JRF) would consist of Coastal/Riverine, Special Forces (SF), and conventional assets under one Joint Commander.

Definitions

Coastal/Riverine Environment

What makes a CRF capability useful is the uniqueness of the coastal riverine environment. Traditional blue water Navy assets, such as cruisers and destroyers, are not designed to operate in the environments that coastal riverine craft call home. Traditionally the environment calls for "… vessels expressly developed to counter the shallows, uneven bottoms, and meanders characteristics of river."[1] Because of the geographical limitations inherent in coastal and inland waterway areas, special thought must be given to developing platforms with the capabilities necessary to operate in these challenging environments. Historical examples of this practice include the development of river monitors in the American Civil War and the creation of Mobile Riverine Force craft during the Vietnam conflict, both of which were designed specifically to move in the riverine environment and adapt to the unique nature of their operational requirements.

Although removed from Joint Publication 1-02, the Department of Defense Dictionary of Military and Associated Terms, the riverine area as defined by a Test Publication for Joint Riverine Operations is that of "an inland or coastal area comprising both land and water, characterized by limited land lines of communication, with extensive water surface and/or inland waterways that provide natural routes for surface transportation and communications"[2]. The Joint definition for this environment draws special attention to the lack of traditional lines of communications for land forces. With

this being the case, the coastal riverine environment offers a unique challenge for analyzing responsibilities. With traditional amphibious (sea to land) operations, the U.S. Navy is responsible up to a certain point in the Area of Operations. Once that point is reached, the land component takes responsibility. As discussed above, the coastal riverine environment has no such delineation. Both the Navy and the Army have specific U.S. Code Title 10 requirements to conduct riverine operations; there is no approved joint doctrine that states who is ultimately responsible for these operations. JP 3-06 (T) would have made the Navy the lead organization for riverine operations. The specific requirements on both the land and maritime components of the U.S. military demonstrates the importance of the riverine environment to operational commanders.

The coastal riverine environment is not limited to inland waterways. The littorals are also an important maneuver space for the CRF. The littorals are defined as the area of the maritime domain approaching shore and the area of land that can be influenced by maritime forces[3]. Essentially anything near a country's coastline is also part of the coastal riverine territory. As population densities grow, these areas are becoming increasingly important; as it stands, approximately half of the world's population lives in littoral areas.[4] Population density presents definite problems for the Joint Force. Having a units that can influence these littorals and transition into inland waterways will be useful in this environment.

Operational Environment

The Operational Environment (OE) is "the composite of the conditions, circumstances, and influences that effect the employment of capabilities and bear on decisions of the commander."[5] The OE is the interaction of all elements within the

specified region. This includes the physical terrain of the region as well as the sociocultural aspects of local populations. Understanding the OE is one of the most important steps in developing an operational design for the employment of forces. Holistic analysis of the OE can be achieved used the PMESII model, which analyzes the people, military, economics, society, information, and infrastructure of the local region. It is then possible to further breakdown these aspects into their respective influencers, or actors, and analyze the relationships between them. Only by going this far in depth can a commander better understand the current situation within the OE and develop a vision for a desired end state.[6] The complexity of the OE influences how a commander can implement his forces. An effective command therefore requires a flexible, adaptable force to deal with a wide variety of situations.

As discussed before, the riverine environment provides some unique OE characteristics. The combination of hydrography and population density creates a complex environment, able to be exploited by conventional and unconventional forces. It is important for a commander to have a force capable of interacting and influencing this environment, lest it be ceded to an outside force acting against the U.S.'s national interests.

Multi-Domain Operations

MDO is the latest operating concept for the U.S. military. With the addition of cyberspace and informational domains to the land, maritime, air, and space domain model, it is difficult for commanders to maintain consistent superiority over potential adversaries across all domains. MDO gives commanders an operating concept of how to create a window of advantage during operations, despite being contested across all

domains. MDO "calls for new concepts to counter adversary adaptations by fighting in a coherent manner across [all] domains".[7].

MDO has three components: creating and exploiting temporary windows of advantage, restoring capability balance, and altering force posture to enhance deterrence. These three elements, if properly conducted, allow for an "advantage in domains that prove the most decisive in rapidly defeating an enemy…" "conduct distributed maneuver with the ability to aggregate and disaggregate…" and "having a ground and maritime combat capability in theater … turning denied areas into contested space," respectively[8].

An important piece of the concept is the ability for commanders to task organize units to conduct "multi-domain" fires, thereby creating temporary windows of superiority. As this action would require pushdown to the lowest unit level, the commander would also need to be able to "rapidly aggregate" his forces and exploit potential decisive points. A commander therefore requires multiple lines of communication to maneuver forces to those decisive points. These multiple lines also prevent an enemy from completely disrupting forces from massing.[9]

MDO Problems

MDO presents a new problem set for commanders to consider. The Army created a MDO Problems table (Table 3) to identify a starting point for planning. The problems are described as follows:

1) How does the Joint Force compete to enable the defeat of an adversary's operations to destabilize the region, deter the escalation of violence, and, should violence escalate, turn denied space into contested spaces?[10]

2) How does the Joint Force penetrate and disintegrate enemy anti-access and area denial systems throughout the depth of the Support Areas to enable strategic and operational maneuver?[11]

3) How does the Joint Force penetrate and disintegrate enemy anti-access area denial systems in the deep area?[12]

4) How does the Joint Force penetrate and disintegrate enemy anti-access area denial systems, then exploit the resulting freedom of maneuver to defeat the enemy in Close and Deep Maneuver Areas?[13]

5) How does the Joint Force re-compete to consolidate gains and produce sustainable outcomes, set conditions for long-term deterrence, and adapt to the new security environment?[14]

Superiority vs. Supremacy

An important component of MDO is the establishment of local superiority across all domains to create an advantage. Supremacy, on the other hand, implies no contest to a commander's ability to operate in a given domain. The complexity of potential interactions across all domains makes it almost impossible to gain supremacy in any one domain, let alone all of them. This lack of supremacy means that commanders need to accept risk in conducting operations, a risk that can be mitigated by establishing superiority and acting from a position of advantage. By massing forces at a specific time and place, the commander can capitalize on the resulting superiority to gain a decisive victory. Although this local superiority does not give uncontested access to domains, it does allow for stronger operations within them, thereby increasing the chance of success.

Behind MDO is the understanding that in today's complex environment with near-peer competitors, supremacy in any domain is almost impossible. Also, the financial requirements to maintain supremacy across all domains at all times would be beyond the capabilities of any country. MDO allows for units to gain local superiority over an adversary, a marked advantage in a temporary time and limited location: without the need to permanently maintain superiority, commanders can further disperse and protect their forces.

Operational Design

Operational design is a "creative methodology that helps commanders and planners answer the ends-ways-means-risk questions"[15]. This framework gives commanders a methodological approach to understand their environment and to know how to best implement their resources to reach a desired end-state. This methodology "builds a common perspective and shared understanding to create unity of effort."[16] Unity of effort ensures that actions taken by units are all directed towards achieving a common goal. For MDO, this means that all units across a joint force develop a shared understanding of the operational environment, and work together to achieve the local superiority necessary to achieve a decisive victory.

Joint Functions

Joint operations have seven functions: command and control (C2), intelligence, fires, movement and maneuver, protection, sustainment, and information. Planners use these categories to ensure that they are considering all capabilities of units they are tasking. This approach also means that for a unit to be valuable to a commander, it must

be able to contribute to at least one of these categories. Synchronizing actions across all of these functions facilitates unity of effort and local superiority at the correct time and place.

C2 defines the authorities and responsibilities a commander has over assigned forces. Without properly understanding these authorities, a commander will be unable to properly utilize units to gain maximum potential outcome.[17] Communications across the force in the area of operations also fall under the C2 realm. Commanders need the capability to convey their intent to unit leadership under their control. Due to the contested nature of multiple domains, redundant capabilities are required to help maintain C2.

Intelligence is the capability for a commander to understand his environment to include adversary capabilities, changes in the OE, new actors, and inform the commander of whatever he deems to be critical information.[18] Gathering this intelligence requires a robust network of intelligence, surveillance, and reconnaissance (ISR) capabilities; the more units that can assist the commander in ISR, the better the commander's ability to understand the OE. Increased understanding empowers the commander to further mitigate risk and to place forces in the proper time and place, which within MDO translates to maximizing the impact of a unit's local superiority.

Fires defines the combination of available weapons systems to achieve specific effects on a target.[19] This includes not only the application of force but the targeting, weaponeering, and assessment of those fires. These fires range from lethal (i.e., missiles and artillery) to non-lethal (i.e., electromagnetic warfare and cyber). Properly assessing

the requirements and implementation of these fires is what allows the commander to achieve the local superiority required for MDO.

Movement and maneuver gives the commander the ability to achieve positional advantage against an adversary.[20] This function includes proper deployment of forces throughout the operating area. At the Joint Operational level movement and maneuver goes beyond just the tactical movement of units on a battlefield; it includes the rapid aggregation and disaggregation of forces at the proper time and place to achieve local superiority.

Protection involves both active and passive defense, risk management, and emergency management and response to help preserve the force.[21] Protection can include actions such as military deception, displacement of forces, and physical protection of infrastructure. These actions help reduce risk to the force and ensure the availability of maximum strength for attacks on the decisive point. For MDO, protection becomes important to maintain integrity of the force and can also help increase the duration of local superiority.

Sustainment is required throughout an operation to allow forces to accomplish the mission. It "provides the Joint Force Commander the means to enable freedom of action and endurance and to extend operational reach."[22] Sustainment includes the movement of personnel and material, and the application of health services. These actions allow the commander to extend his operational reach and help preserve the force. Sustainment can also become a problem in more austere environments, such as those without developed road networks or incapable of receiving air cargo. The commander requires sustainment

to ensure that units have what they need to create the windows of local superiority for MDO.

The information function "encompasses the management and application of information… to change or maintain… elements that drive desired behaviors and to support human and automated decision making."[23] This function is important to commanders in that it helps make sense of the large amount of data that military activities create. From knowledge and information management systems to application of the information in the real world, the information function assists with the commander and staff's decision-making process.

A2AD

Anti-Access Area Denial (A2AD) is an adversary's capability to deny the U.S. access to a specific location or domain. By utilizing technology or weapon systems that out-range or bypass U.S. protection capabilities, an enemy can prevent forces from approaching or influencing specific locations. This allows opponents to maneuver in spaces that the U.S. cannot influence. The MDO concept recognizes these capabilities and requires unit organizations with counter A2AD capabilities. This can take many different forms, from quick platforms that can close distance quickly and redundant C2 nodes to ensure communications, to electronic warfare capabilities that disrupt an enemy's capabilities. Countering command A2AD problems frees forces to rapidly create avenues of approach for units to maneuver toward and attack the enemy. Within the MDO concept, this function translates to the creation of local superiority in order to gain an advantage over the enemy.

Lines of Communication

Lines of Communication (LOCs) are avenues utilized for sustainment and movement of a force. On a larger scale, these could be Sea Lines of Communication (SLOCs), connecting the U.S. to other parts of the globe via maritime shipping. In the coastal riverine environment, inland rivers are a prime example of a LOC since they provide an avenue to move personnel and material through the area of operations. Both the commander and enemy forces can utilize these lines. If the commander has no force that can navigate an LOC, then that area will be automatically ceded to the enemy.

Distributed Lethality

One of the U.S. Navy's concepts for the future is application of distributed lethality, in that by "increasing the offensive power of individual components of the surface force… and then employing them in dispersed offensive formations,"[24] the U.S. Navy will be more flexible in its responses to future conflicts. Ultimately the design is intended to increase the Navy's ability to seize and maintain local sea control and create a larger maneuver space for the commander. This concept dovetails nicely with the MDO concept: by pushing down more capability to individual units rather than relying on larger aggregate formations, the commander is better able to create local superiority within the environment. If CRF is included in the extension of distributed lethality, then its capabilities within the coastal riverine environment will allow for more effects over the enemy.

Levels of Warfare

There are three levels of warfare applied to military actions: strategic, operational, and tactical. These levels act as a framework to link high level strategic goals to lower level tactical actions.[25] The strategic level of warfare seeks to "develop an idea or set of ideas… to employ the instruments of national power… to achieve national, multinational, and theater objectives."[26] In essence the strategic level of war looks at how military actions can achieve big-picture goals such as national objectives. The identified military actions then lead into the operational level of warfare. The operational level "focus[es]… on the planning and executions of operations," linking "tactical employment of force to national strategic objectives."[27] This level defines what military objectives must be met and how to meet them (balancing ends, ways, means, and risk) in order to achieve national objectives. Finally, the tactical level is "the employment, ordered arrangement, and directed actions of forces in relation to each other."[28] The tactical level is focused on the actual movement of the units or assets to achieve the desired effects established by the operational level.

Scope

Application in the Baltics and Congo

Due to the U.S. Navy's riverine history in the Americas and Asia, application of CRF outside these regions has not been as extensively explored. A large volume of literature on U.S. riverine operations primarily reference operations in the American Civil War, South America, and the Vietnam War. This paper presents an alternative point of view by applying the proposed design to less-considered regions: the Baltics and the Congo River Basin.

The Baltic region is defined as the countries with access to the Baltic Sea. These countries include Estonia, Latvia, Lithuania, Russia (Kaliningrad), Finland, Sweden Poland, Germany, and Denmark. Because most of these countries are NATO members, this region yields important considerations for MDO. As a significant number of inland waterways run through the Baltic region (e.g., Lake Peipus between Estonia and Russia, the Daugava River connecting the gulf of Riga to Russia, and the Moskva River running through Moscow), can all potentially be used to achieve operational impacts.

The Congo region is defined as the area within the Congo River Basin and the countries tangential to the Congo River. These countries include Angola, Burundi, Cameroon, Central African Republic, Democratic Republic of the Congo, Republic of the Congo, Rwanda, South Sudan, Tanzania, and Zambia. Due to the quantity of natural resources located within the Congo, the region is increasingly important to Western and Eastern countries as commercial interests seek new areas into which they can expand their influence. The terrain of the Congo region presents challenges for MDO; the jungle terrain and complicated political climate create their own set of A2AD challenges. The addition of conventional adversarial forces in the area makes it a region especially suitable for study.

Application in Regular Warfare

The coastal riverine environment exists in both regular and irregular warfare. The scope of this paper encompasses only the use of regular forces. Although irregular warfare has an impact on MDO, U.S. Navy Special Forces (SEALs and Special Warfare Combatant Craft Crewmen) have their own set of required skills and equipment that

differ from normal CRF functions. Special forces may work with or be supported by CRF for various missions but are not necessarily part of the main CRF composition.

Limitations

The current paper limits discussion to current capabilities of the CRF and Joint community and any programs that are in production at this time. It is possible to discuss future advancements and their possible impact on the CRF community; these new technologies may also cause changes in the MDO concept. However, such "what-ifs" rapidly turn into prognostication that falls outside the purpose of this paper, which is to discuss how the U.S. Navy and the Joint Force can implement CRFs now and leading into the near future.

Only unclassified material will be consulted throughout this paper.

Delimitations

Not Suggesting Changes to Multi-Domain Operations

MDO are complex. With the Joint Force transitioning to MDO, it is important to understand how each service can contribute its capabilities to that fight. This paper will not recommend changes to the MDO model that would enable smoother integration of CRF. Suggesting these changes would potentially defeat the purposes of the model or narrow its focus to something that is not necessarily applicable in all situations.

Not Suggesting Changes to Manning or Platforms for Coastal Riverine Operations

Each service defines their own requirements for the manning and operation of their individual watercraft. This paper will not discuss the specific manning requirements or make any recommendations of change to the platforms themselves.

Not Discussing Financial Implications of Increasing CRF Capabilities/Assets

Increases in forces or acquisition of new technology can rapidly become expensive. These expenses, unless otherwise approved in a service's budget, must be procured elsewhere. Changes in CRF formations would result in increased numbers of crafts, Sailors and Soldiers to operate them, and facilities to support these forces. An in-depth discussion of force management issues and larger budgetary implications fall outside the scope of this paper.

Remaining at Unclassified Level

This paper examines a broad range of organizations, assets, and capabilities in an attempt to synthesize a joint model of operations. Multiple doctrinal publications are not available at the unclassified level for use in this research.

Significance

Impact of Gaps in Operational Plans

There are approximately 670 miles of river in just the three Baltic states of Estonia, Lithuania, and Latvia.[29] These rivers present large conduits for personnel, supplies, and medical transport, to name only a few of their many potential applications. Rivers are generally viewed as obstacles to be overcome during the planning process.

They can be difficult to cross for ground forces and are thus generally utilized as a natural boundary line between units. These boundary lines can create "seams," lines of confusion about which unit is responsible for actions on that boundary. These seams can then be exploited by adversaries who conduct their own operations along lines less carefully guarded than other avenues of approach.

Rivers also generally rest around major metropolitan areas, allowing for rapid movement of goods and material. Russia also has about 64,000 miles of waterways, with major lines connecting to the Baltic Sea, Black Sea, and White Sea.[30] All are major bodies of water that can be influenced by maritime powers. Without the capability to push further inland along the river systems, the U.S. misses the chance to utilize these massive "highways" in the same way the Army uses traditional highways. Logisticians lose another avenue to push supplies, medical planners lose an additional way to recover wounded, and planners lose an alternative path to introduce troops into an area. The potential losses from neglecting access to these waterways allows the enemy to use this maneuver space to gain the advantage. This operational gap presents a problem. If an enemy is able to exploit rivers and the seams they create, then there is additional security risk for commanders operating near these bodies of water.

Transitioning from Blue Water to Brown Water

U.S. aircraft and missile systems are far-reaching and effective weapon systems. Personnel can utilize these systems to conduct strikes several hundreds of miles inland. Adversaries are developing systems that restrict U.S. access to strategic waters and have the potential to reduce how far inland strikes can reach. The Navy can contribute to MDO by using CRF to mitigate these potential problems; smaller, more versatile craft can

handle multiple mission sets and exercise influence inland. As stated previously, the river systems in the Baltic region are connected to major bodies of water around Europe. CRF has the capability to conduct the transition from blue water operations to brown water operations in these regions, ensuring the U.S. Navy's access to the ground fight.

Joint Army/Navy/USMC Operations

Traditionally, most joint operations are some combination of Navy/Army/Coast Guard or United States Marine Corps/Army. Since MDO primarily applies to Joint operations, the addition of riverine operations provides an opportunity to further refine joint compatibility. Developing techniques, procedures, and doctrine at the joint level facilitates greater collaboration and understanding between the forces. This collaboration can also be done at lower echelons than is generally conducted between the Navy and the Army. Starting with collaboration at lower echelons allows forces to mature together and create better operational understanding at higher levels.

Historical Significance: SEALORDS/Vicksburg

SEALORDS Discussion

South East Asia Lake, Ocean, River, and Delta Strategy (SEALORDS) was an important operation in U.S. Navy riverine history. It transitioned riverine force in Vietnam from a defensive patrolling organization to an offensive organization. The intent of SEALORDS was to move the bulk of U.S. and Southern Vietnamese riverine forces closer to the Cambodian border to prevent the movement of supplies and infiltration of troops into Southern Vietnam. Ultimately, the operation "… effectively cut enemy lines of communication into South Vietnam and severely restricted enemy attempts at

infiltration."[31] This operation was instrumental in subsequent tactical changes by the North Vietnamese forces. They started "… [shipping] munitions to "neutral" Cambodia's port,"[32] allowing them to more easily bypass U.S. and South Vietnamese forces. Navy Riverine forces successfully operated alongside U.S. Army aircraft and ground forces, achieving a combined arms effect during operations. Air support changed how aggressive they could be in the conduct of their operations. River minesweepers were also required to maintain maneuverability within the river delta region. U.S. Sailors employed electronic warfare detection devices to aid in searches and defense of important regions. Even during the Vietnam conflict, riverine forces were able to use multi-domain effects to achieve operational goals.

Vicksburg Discussion

Riverine operations have played an important part in military campaigns for a long time, but there is rarely discussion on riverine operations past the tactical level of involvement in an operation. In short, riverine operations are rarely the center of a whole operation or campaign. The riverine environment is therefore often forgotten during planning, or even considered an obstacle for ground forces. Field Manual 90-7: Combined Arms Obstacle Integration, consistently uses rivers as an example of a natural obstacle impeding ground movement.[33] If planned, operations on rivers can become an integral part of campaign plans. During the U.S. Civil War, Union forces developed a campaign strategy that involved a line of operation for the riverine environment. Union leaders wanted the Navy to assist the Army in seizing the key town of Vicksburg, which would the allow the Union to control the Mississippi River. The campaign conducted by riverine forces facilitated the Army siege of Vicksburg, leading to and eventual

Confederate surrender. As predicted, taking Vicksburg established Union control of the Mississippi River and allowed for the strategic "Anaconda Plan" to go into effect, effectively preventing Confederate forces from receiving outside help. These actions, in addition to the rest of the Anaconda Plan, diminished the Confederate Army's ability to move troops and material around the operational environment and directly contributed to the eventual surrender of Southern forces.

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CHAPTER 2

LITERATURE REVIEW

The literature review examines the major ideas required to conduct the analysis: MDO, the Riverine Environment, Riverine Doctrine, and Joint Planning Methodology. The Vicksburg campaign in the U.S. Civil War and Operation SEALORDS during the Vietnam conflict are also discussed.

Literature on MDO discusses the importance of the concept within today's operating environment. It also provides basic problem statements on the issues that MDO attempts to overcome; however, it does not provide a blueprint for answering each problem statement. Commanders must apply Operational Art to answer questions according to each unique circumstance.

Readings on the Riverine Environment describe the unique nature of the operating area and discuss the current state of U.S. Naval coastal riverine forces. Issues inherent to the environment must be understood before deploying a force; the environment can also facilitate actions of the joint force, achieving effects that would otherwise be difficult. The readings do not identify the most conducive riverine environment in which to operate, nor the current status of Army Watercraft.

Riverine Doctrine examines the doctrines of differing riverine capable units within the Joint Force. Manuals and warfare publications were drawn from U.S. Navy and U.S. Marine Corps Riverine Doctrine, Army Watercraft Manuals, Army Special Operations Manuals, and Joint Riverine Doctrine. The publications discuss the capabilities and limitations of each specialized unit and examples of implementation. They do not provide an overarching framework for their use nor any discussion on how

to integrate the disparate unit types. The different operating philosophies of each branch must be deconflicted in order to achieve the greatest effects possible.

The Methodology section breaks down the two primary tools used for creating the vignettes in Chapter 4. Joint Planning Doctrine describes how to develop an operational framework. The scenario planning readings describe what elements are needed to create a realistic vignette.

Finally, the historical examples of the Vicksburg Campaign and Operation SEALORDS demonstrate the impact that coastal riverines can have on major operations and entire campaigns. The discussion covers obstacles that were overcome and the changes to riverine operations that led to success. These two operations do not encompass the broad scope of the riverine operating environment but rather display the adaptability of coastal riverine forces.

Multi-Domain Operations

TRADOC Pamphlet 525-3-1: The U.S. Army in Multi-Domain Operations 2028

The seminal document on MDO, TRADOC Pamphlet 525-3-1, is the U.S. Army's blueprint for moving into MDO. Its goal is to define the problems in MDO and to determine how to defeat "multiple layers of stand-off in all domains in or order to maintain the coherence of… operations"[1]. Previously labeled "Multi-Domain Battle, the Army shifted to MDO in order to "better reflect the broader scope of competition and conflict"[2]. This change was brought about through various studies and wargames conducted by NATO, who concluded that the multi-domain conflict reaches beyond the immediate "battlefield." Although the operating concept stemmed from competition with

Russian and Chinese A2AD, MDO can be utilized by Joint Force commanders anywhere. The central idea of MDO is:

> Army forces, as an element of the Joint Force, conduct MDO to prevail in competition; when necessary, Army forces penetrate and dis-integrate enemy anti-access and area denial systems and exploit the resultant freedom of maneuver to achieve strategic objectives (win) and force a return to competition on favorable terms.[3]

This goal is accomplished through the three tenets of MDO: Calibrated Force Posture, Multi-Domain Formations, and Convergence. Calibrated Force Posture is "the combination of capacity capability, position, and the ability to maneuver across strategic distances."[4] These combinations and the strategic location of forces reduce the effectiveness of malign foreign influence. They also prevent adversarial entities from conducting actions uncontested, providing a barrier to their operations in any domain. These outcomes are achieved through forward presence forces that are "forward deployed and rotational units and capability sets."[5] Forward units can include anything from actual physical fighting forces, to access to digital networks or infrastructure within the host-nation.

The second tenet, Multi-Domain Formations, are "formations [that] possess the combination of capacity, capability, and endurance which generates the resilience necessary to operate across multiple domains."[6] Multi-domain formations have the training, organic sustainment, and authorities to be adaptive in a complex operating environment.

The third and final tenet is Convergence, "the rapid and continuous integration of capabilities in all domains, the EMS, and the information environment that optimizes effects to overmatch the enemy through cross-domain synergy and multiple forms of

attack all enabled by mission command and disciplined initiative."[7] Synchronization of effects is required to achieve overmatch at a decisive space, a location in time and space where the Joint Force has the capability to achieve advantage over an adversary and reach victory.[8]

Applying the above tenets answers the five primary MDO problems presented in the article (Table 3). Problem one states: "How does the Joint Force compete to defeat an adversary's operations to destabilize the region, deter the escalation of violence, and, should violence escalate, enable a rapid transition to armed conflict?"[9] Problem one requires a shift from a reactionary force to forward-leaning operations. A whole-of-government approach – in coordination with host nations as well as the joint forces– is required to conduct actions that actively deter aggression but also provide a position to transition into conflict if necessary. Actions are taken to in order to defeat an adversary "below the threshold of armed conflict and deterring escalation of violence."[10]

Problem two states: "How does the Joint Force penetrate enemy anti-access and area denial systems throughout the depth of the operational framework to enable strategic and operational maneuver?"[11] This problem is solved by defeating enemy long-range systems (both kinetic and EMS). Defeating A2AD capabilities disrupts adversaries' integrated air-defense systems, allowing greater operational movement for joint forces. The MDO framework provides the "convergence" of systems and capabilities to identify and target high-payoff targets. Destroying the long-range systems also denies adversaries favorable maneuvering conditions, delaying or denying them their intended goals.

Problem three states: "How does the Joint Force dis-integrate enemy anti-access and area denial systems in the Deep Areas to enable operational and tactical

maneuver?".[12] Problem three considers the time between the initial penetration (problem two) and the subsequent exploitation (problem four). The answer to this question requires further refinement of intelligence, provocation of adversarial long- and mid-range systems, and subsequent neutralization of those systems. Identification, targeting, and neutralization of these systems facilitates the operational maneuver of the exploitation forces.

Problem four states: "How does the Joint Force exploit freedom of maneuver to achieve strategic and operational objectives through the defeat of the enemy in the Close and Deep Maneuver Areas?".[13] Adversarial mid and short range systems are disabled through the physical destruction of systems or psychological isolation of forces. After providing solutions to problems two and three, the joint force can then manipulate conditions to exploit a decisive space, create a window of military superiority, and maneuver through resulting gaps in an adversary's defenses. The exploitation force is thus able to achieve the ultimate military objective.[14]

The fifth and final problem presented by MDO asks, "how does the Joint Force re-compete to consolidate gains and produce sustainable outcomes, set conditions for long-term deterrence, and adapt to the new security environment?".[15] After the completion of military objectives, the Joint Force must still consolidate gains to prevent the initial issue from reoccurring. The Joint Force then returns to question one in the face of the new circumstances.

Accelerating Multi-Domain Operations: Evolution of an Idea

MDO encompass far more than individual actions on the battlefield. They "bring together varied tactical actions with a common purpose or unifying theme".[16]. This

unifying theme requires the involvement of more than just one branch of the Armed Forces. A whole-of-government approach is required to effectively win campaigns in the modern era. This approach is in response to the idea that the "world we operate in today is not defined by battles, but by persistent competition that cycles through varying rates in and out of armed conflict" and "[w]inning in competition is not accomplished by winning battles, but through executing integrated operations".[17]. These cycles range the full gamut of military operations, from stability to large-scale combat operations. To remain relevant, branches must be able to scale up and down to achieve operational goals.

For the U.S. Navy, water-based operations beyond blue water may provide the opportunity to develop scalable forces. With the Naval Expeditionary Combat Command, the Navy already has an organization capable of conducting inland operations with Explosive Ordinance Disposal teams and SEABEEs. Although CRFs are also under its command, the Navy does little to leverage their capabilities at the operational level. The CRFs can help to resolve problems confronting MDO along the entire range of military operations.

Riverine Environment

Coastal Riverine Force Analysis

Coastal Riverine Force structure and material are always in flux. Until recently, Coastal Riverine Forces were separated into two commands: Maritime Expeditionary Security and Riverine Squadrons. In 2012 both commands merged into Coastal Riverine Squadrons. As of 2011, the Navy has 588 boats for ship protection, maritime interdiction, law enforcement options, and special operations[18]. This number accounts for all small boats within the Navy, Coastal Riverine Squadrons, and otherwise, implying that the total

number of coastal riverine boats available is under 588. In comparison, at the height of Vietnam conflict, the Navy and Army had 500 boats committed to coastal riverine operations alone[19].

There are several different types of coastal riverine craft to include the riverine assault craft, riverine assault boat, mark (MK) VI patrol boat, and 34' SEA ARK (figures 3-6). CRS units "are designed to support themselves for up to 15 days of operations [and] when… units are deployed in support of Army forces, another option for support may come from Army sustainment forces"[20].

NATO: Prospective Operations in Confined and Shallow Waters

The North Atlantic Treaty Organization (NATO) also recognizes the importance of the riverine environment. In the 2015 paper "Prospective Operations in Confined and Shallow Waters" (CSW), the authors discuss the relevance of the unique operational environment. They point out that "[t]he vast majority of the Sea Lines of Communication [SLOCs], choke points, ports and other infrastructure are located in [confined and shallow waters] and may cause severe disruptions by being exposed to illegal actors like terrorists, pirates, or organized criminals"[21]. These areas not only include littorals and straits, but also inland waterways such as estuaries and rivers. The authors go on to explain that special attention must be given to this important area with unique operating requirements[22]. The paper further defines CSW as follows:

> a cramped, congested and contested operational environment constituting an extremely complex thus challenging littoral joint battlespace which affects the freedom of movement and action by specific geographical and geophysical factors as well as manifold threats and risks. On the other side, CSW also offers a broad range of possibilities and opportunities for military operations.[23]

Due to the complexities and opportunities of the CSW, operations within this environment need to be conducted across all domains (air, land, maritime, cyber, and space) to ensure that this region remains free of adversarial forces and available to allies as a maneuver space. Because "[i]t is to be assumed that in the future many parallel missions are to be conducted simultaneously and not in a linear way,"[24] maintaining operational capabilities across all domains and environments is increasingly important. Joint planners must take this assumption into consideration when addressing problems involving the riverine environment. Neglecting the capability to effectively operate within the environment restricts the number of ways planners can approach problems.

Effectively undertaking operations in the CSW requires more than simply including riverine forces in the planning process. Consideration must also be extended to the types of craft needed for the operation. Planners should "preserve the operational tempo and sustain the initiative as well as be extremely precise and effective, all necessary capabilities must be available right away in the required quality and quantity; if need be providing lethal power with precision and a proper allocation of ammunitions instead of relying on massive firepower"[25]. Therefore, vehicles other than combatant craft will be required to ensure the flexibility needed for successful operations.

To this end, a joint and even intergovernmental approach should be considered when conducting riverine operations. The Navy's offerings for this environment may not suffice to meet the requirements of MDO. Other capabilities within the Joint force (e.g., U.S. Police maritime units) and governmental agencies (e.g., Department of Homeland Security) may provide different riverine capabilities that could augment a more robust Coastal Riverine Force.

Brown-, Green- and Blue Water Fleets: The Influence of Geography on Naval Warfare, 1861 to Present

The riverine environment presents unique problems for conducting operations. Colloquially known as "brown water," inland waterways have unique requirements for the Navy. The geography of the riverine environment itself creates problems for operational plan development. Traditionally, the U.S. Navy is an ocean-going, or "blue water", organization. Moving to brown water plunges the Navy into a less-familiar environment. Planners feel uncomfortable with the new terrain as "most naval vessels… draw too much water for unfettered usage in riverine campaigns"[26]. Simply put, ships designed for open ocean cannot maneuver or operate ideally in brown water. Craft specifically designed to operate in the riverine environment must exist before operations involving inland waterways can be planned. These craft were developed to "counter the shallows, uneven bottoms, and meanders characteristics of rivers"[27]. These craft range from modified vessels in the extant inventory to proposed specialty craft in the research and design phases. However, most of these modified and new vessels are wholly unsuited for traditional Navy blue water operations.

These design considerations create a conflict within the modern, fiscally-constrained military. Investing in riverine craft and capabilities may take away resources from other naval programs that fall in line with traditional blue water requirements. Without recent examples of the impact that riverine operations can have on a campaign, fewer resources may be put aside to develop, or even maintain, these capabilities. Historical examples such as the use of riverine craft during the U.S. Civil War and operations conducted during the Vietnam conflict not only provide examples of the

implementation of riverine craft, but also the impact they can have on a major operational scale. Historical examples of this will be provided later.

Riverine Doctrine

Coastal Riverine Force Analysis Test Publication Joint Publication 3-06: Doctrine for Joint Riverine Operations

Although there is no official joint doctrine for riverine operations, a Test Publication was developed in 1991 to specify what the Joint Force considers important when planning riverine operations. Although there are several other service manuals for riverine operations, the joint publication tried to consolidate them for consideration at the operational level. It ultimately attemps to "facilitate interoperability between the Services conducting joint riverine operations"[28]. The publication also stresses the importance of maintaining capabilities in areas along the coast and inland waterways. The capabilities may include specialized river craft, which require tactics that may be overlooked if not considered prior to commencing operations. Riverine operations can also "exploit the advantage of the waterways for movement, capitalizing on mobility to find, fix, and destroy hostile forces"[29]. It is important to develop operational plans that capitalize on the unique crafts and tactics for the riverine environment rather than treat them as an extension of ground or maritime forces.

If planned properly, riverine operations can include: intelligence collection, embarkation of troops and equipment, patrol/interdiction/ISR, assault operations, close fire support, suppression of enemy air defense artillery, close air support, naval surface fire support, repositioning of forces, resupply, support of psychological operations and civil affairs action programs, withdrawal, support for foreign internal defense,

offensive/defensive mining and mine countermeasure, support of humanitarian requirements, and disaster relief.[30] The broad range of capabilities within the coastal riverine force demonstrates their ability to operate during any phase of a campaign. However, no single force currently has enough ability to achieve all of the missions described above at an operational level. As the U.S. military moves into MDO, it is important for the joint commands to create a force structure capable of maximizing the potential of coastal riverine operations.

FM 55-50 Army Water Transport Operations
ATP 4-15 Army Watercraft Operations

The goal of any sustainment operation is to support forces in extending operational reach and allowing freedom of movement[31]. Through the lens of sustainment operations, Army Watercraft greatly increase operational reach along the coast and in inland waterways. They do this by providing platforms that distribute material and personnel from a multitude of ways. Army Watercraft also play an instrumental role in theater opening operations, either through command and control capabilities, or by providing assets that conduct Joint Logistics Over the Shore (JLOTS). Throughout operations, Army Watercraft allow joint commanders to influence land operations within the littorals, areas that may otherwise be inaccessible to traditional ground movement.

Classifications of Army watercraft are separated into three classes. Class-A vessels are designed for continuous operation and are capable of "long duration, independent mission profiles; some of them are capable of independent ocean-crossing voyages"[32]. These types of vessels include large tugboats and large landing craft (LCU-2000). Class-B vessels are designed for intermittent use and are generally supported by

shore-based units. These types of vessels include small tug boats, small landing craft (LCM-8), and other JLOTS type craft. Class-C vessels require direct support from other waterborne craft. These vessels are generally barges and range from general purpose support barges to more unique platforms, such as floating cranes. These platforms together conduct the "heavy lifting associated with water transport… and intra-theater lift"[33]. Joint officer can use these capabilities to place units in a position the enemy might not expect, and then exploit the surprise this action may create.

The capability sets that Army Watercraft provide include the following: Intra-theater lift, JLOTS, Anti-Access/Port Denial, and Surface Infiltration[34]. These mission sets allow the joint force commander to "circumvent enemy anti-access strategies by providing alternative water transport means"[35]. Although not designed for direct naval or amphibious warfare, Army Watercraft can be augmented by other Coastal Riverine assets to increase survivability.

NWP 3-06M/FMFM 7-5 Doctrine for Navy/Marine Corps Joint Riverine

NWP 3-06M focuses on the conduct of riverine operations. It discusses the integration and employment of various crafts and forces to maintain control of a riverine, coastal, or delta area[36]. Similar to Army Watercraft, riverine forces can exploit the advantages of inland waterways. Riverine forces are highly mobile and have the capacity to find, fix, and destroy adversarial forces[37]. The role they play in major operations include establishing riverine lines of communication, denying LOCs by adversarial forces, and locating/destroying adversarial forces near the riverine area. These effects are achieved through various types of riverine operations: Assault, ISR, and Supporting Operations[38]. These types of riverine operations are traditionally conducted by U.S. Navy

or U.S. Marine forces, but within MDO, that these forces must be combined with Army assets to achieve greater effects.

FM 3-05.212 Special Forces Waterborne Operations

This doctrine differs drastically from the others discussed previously. Whereas most of the other riverine doctrines deal with force protection, direct action, or sustainment, Army Special Forces Waterborne Operations focuses on smaller, clandestine operations. These operations are generally small scale and self-sustainable, but they are nonetheless vital for full exploitation of the riverine environment. Waterborne special forces operations provide Joint Force commanders with a means to infiltrate special forces units quickly and quietly. These mission sets include scout swimmer, diver, kayak, inflatable boat, combat rubber raiding craft (CRRC), submarine and airborne insertion.[39] A special forces presence assists with defeating enemy A2AD capability through special ISR and targeting; it also provides another means to determine landing sites for follow on forces.

Joint Planning Methodology

Joint Publication 5-0: Joint Planning

U.S. Joint Publication 5-0: Joint Planning is the U.S. military's "doctrinal foundation and fundamental principles"[40] for joint planning of campaigns and operations. Each branch of the U.S. military has its own planning process; although all the planning processes are similar, they each use slightly different language or methodology. These differences can cause confusion when multiple branches try to work together, or when one branch attempts to translate a completed order for use in another branch. Joint

Planning provides a common language and methodology for planning in a joint environment at the strategic and operational levels of war, thereby streamlining the process, reducing doctrinal language barriers, and creating a product that is immediately usable by all branches.

Joint Planning creates this product in seven steps: Planning Initiation, Mission Analysis, Course of Action Development, Course of Actions Analysis and Wargaming, Course of Action Comparison, Course of Action Approval, and Plan/Order Development. Before this process can begin, however, planners need to identify the problems to be solved. Joint Planning provides a framework for this phase as well, divided into two parts: Operational Art and Operational Design. Operational Art is "the cognitive approach by commanders… to develop strategies, campaigns, and operations to organize and military forces by integrating ends, ways, means, and risk".[41]. Planners use Operational Art to determine the desired end state (ends), any tools needed to achieve that end state (means), utilization of those tools (ways), and the impacts and potential failures the plan may have (risk). Conceptualizing the plan in this way gives planners the opportunity to define their goals and roughly estimate ways to achieve them, even before the detailed planning of the Joint Planning Process begins. With the sketch complete joint planners then use Operational Design to create blueprint to start planning from. The current paper utilizes Operational Design to better understand the riverine environment and its impact on MDO.

Vignettes and Capability Planning

Creation of Scenarios as a Tool for Predicting the Future Operating Environment

Imagining the future and attempting to shape a path toward it is a daunting challenge. Each approach to building an operational framework has its own assumptions about the future environment. Ultimately, "the approach must be appropriate for the situation, objectives and context in which the analysis is conducted,"[42] which can only happen with a full understanding of the situation. Scenarios must then be examined through the lenses of experience, reasoning, and expert opinions.[43] The last step of this process leaves scenario building with some drawbacks, despite its strength as an effective research tool. Without "hard data," assessments are vulnerable to subjective opinions from experts. The lack of quantifiable measurement also means that two researchers may come to completely different solutions from the same inputs.

Luckily, the goal of scenario development is not to be 100 percent accurate with future predictions but rather to convey a most-likely option to policy makers.[44] It focuses on looking at the important factors that drive the decision-making process and investigates the potential outcomes of those decisions. It also displays ability gaps in a proposal and allows planners to address those gaps. Ultimately, a strong scenario provides a foundation from which to address concerns, study the development of possible solutions, and ascertain the positives and negatives of proposals.

Vicksburg Campaign

Muddy Waters: A History of the United States Navy in Riverine Warfare and the Emergence of a Tactical Doctrine, 1775-1989

During the U.S. Civil War, Union forces developed a strategy that would come to be known as the "Anaconda Plan." It was a strategy that proposed a "naval blockade of the Confederate littoral, a thrust down the Mississippi, and the strangulation of the South by Union land and naval forces".[45] The plan would allow Union forces to "seriously disrupt the internal communications of the Confederacy".[46] In order to effectively accomplish operations on the river, the Union Navy needed to develop specialized river craft to include wooden-clad and ironclad steamboats. These craft provided significant protection and firepower, allowing the Navy to support the Army's actions on the ground by securing river banks to land troops, shelling fortified confederate troops, and providing much-needed supplies to Army forces. Riverine forces also allowed Union personnel to bypass Confederate defensive points and land troops behind Vicksburg's defensive line. In addition, the Navy was able to fire consistently on Confederate batteries and troops, allowing Union forces freedom to maneuver on the battlefields. This support led to the successful seizure of Vicksburg and "…deprived the eastern Confederacy of all but a trickle of the foodstuffs of the trans-Mississippi states and the war supplies imported through Mexico… [dealing] a moral blow… more destructive the measurable losses."[47]

Although small operations were conducted in the riverine environment throughout the Civil War, the Vicksburg campaign demonstrated what could be achieved by including riverine forces in an overall operational plan. The Navy riverine forces helped achieve operational success and impacted strategic level plans simply by controlling the

river. This historical case study provides just one example of how actions in the riverine environment – when a part of an operational plan – can impact more than just the waterways.

Operation SEALORDS

Operation SEALORDS: A Front in a Frontless War, an Analysis of the Brown-Water Navy in Vietnam

It is difficult to say whether Operation SEALORD was a complete success during the Vietnam conflict. Although the operation did not fully achieve its goal of stopping the resupply of material and forces from Cambodia, it did lead to more than 4,000 enemy casualties and the seizure of over 170 tons of materials (Table 2). One study conducted by the Navy Electronics Laboratory Center concluded that "the river interdiction barriers cause the enemy severe operational problems as they greatly increase the enemy's logistic lead time and make it difficult to assemble the requisite material for a large-scale operation."[48] This sentiment was reiterated during the TET offensive in 1968. After expenditure of Viet Cong forces in 1968, there were no other major offensives for the next few years. Admiral Zumwalt, the commanding officer during SEALORDS, said during an interview: "I think if we had that program in effect two years earlier… they would not have been able to infiltrate the supplies necessary to support Tet."[49] Despite questions of ultimate success, SEALORDS showed the unique capabilities of riverine forces and their impact at the tactical, operational, and strategic levels of warfare.[50]

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CHAPTER 3

RESEARCH METHODOLOGY

Purpose of Research

The intention of this research is to discuss how CRF can be incorporated into MDO. As the focus of current Navy operational strategy is on application of Blue Water forces, inland capabilities receive little emphasis. The Chief of Naval Operations' "Design for Maintaining Maritime Superiority" states that "naval forces… from the sea floor to space, from deep water to the littorals… will deter aggression."[1] Although mention is made of the littorals, there is no discussion of influence further inland or brown water. In fact, the design's discussion on "strengthen[ing] naval power at and from the sea" only considers higher-end warfare in primarily blue water environments[2]. With the focus on high-end warfare, lower-end small crafts may not receive the attention necessary to cement their status as valuable assets. In his paper "Coastal Riverine Force Analysis," LT Ruben Maldonado suggests that "CRFs are not provided with enough surface crafts to conduct large-scale combat operations[…]."[3] Since a major focus of MDO is operations conducted during LSCO, the CRF may not be able to participate in an effective roll. The omission of approved Joint Doctrine for riverine operations also suggests a lack of perceived importance for this capability.

This research also discusses possible applications of CRF to MDO as well as provide commentary for the application forces, given current capabilities.

Multi-Domain Operation Problem Analysis

Problem sets identified in conducting MDO (Table 3) are compared with capabilities of the joint force's riverine communities. Each capability brought by the CRF enables analysis of how the CRF directly contributes to problems presented by MDO. These problem sets are pulled directly from the "U.S. Army in Multi-Domain Operations 2028" and are cross-examined with capabilities discussed in doctrinal documents from the Joint Force.

Doctrine from coastal riverine forces is applied to each problem as it is defined in "U.S. Army in Multi-Domain Operations 2028". The problems, stated in chapter two, are:

1) How does the Joint Force compete to enable the defeat of an adversary's operations to destabilize the region, deter the escalation of violence, and, should violence escalate, turn denied space into contested spaces?[4]

2) How does the Joint Force penetrate and disintegrate enemy anti-access and area denial systems throughout the depth of the Support Areas to enable strategic and operational maneuver?[5]

3) How does the Joint Force penetrate and disintegrate enemy anti-access area denial systems in the deep area?[6]

4) How does the Joint Force penetrate and disintegrate enemy anti-access area denial systems, then exploit the resulting freedom of maneuver to defeat the enemy in Close and Deep Maneuver Areas?[7]

5) How does the Joint Force re-compete to consolidate gains and produce sustainable outcomes, set conditions for long-term deterrence, and adapt to the new security environment?[8]

Each problem is discussed individually in terms of possible CRF involvement. CRF capabilities are subdivided into four major categories, each with a coding abbreviation for use in the vignettes. The first is the Naval Coastal Warfare (coding: NCW) forces, comprised primarily of maritime security assets (e.g., 34' Sea Arks). The second group is Riverine assets (coding: RIV), ranging from MK VI Patrol Boats to individual RSTs. The third group is Army Special Forces (coding: ASF), with specific focus on waterborne operations. The fourth and final group is Army Watercraft (coding: AWC), including all classes of available Army Watercraft. Each MDO problem has specific numbers associated with the capability coding discussed above. For example, problem one has coding numbers of NCW1, RIV1, ASF1, and AWC1; problem two has coding numbers of NCW2, RIV2, ASF2, and AWC2; and so on.

The comprehensive comparison is then illustrated by two vignettes set-in real-world conditions. In the vignettes, the coding numbers discussed above are used to denote which specific capability is applied per situation.

Operational Design Methodology

This paper uses the Operational Design Methodology from Joint Publication 5-0. This methodology is utilized by the Joint Force Commander to "aid… planners in organizing and understanding the [operational environment]".[9]. The Design Methodology aids in determining the end-state for an operation and developing a shared understanding of the situational environment among the staff. Joint Force commanders can thereby

visualize how to get from their starting point to the desired end state. Operational Design Methodology is utilized to develop an operational approach for the two vignettes. The continuous process has nine steps, each of which are described in the following subsections.

Understand the Strategic Direction and Guidance

This step involves analyzing all sources of direction and guidance. These sources can include major strategies (e.g., National Security Strategy) and other written or verbal communications, ranging from specific guidance to nebulous interactions between higher and lower echelons. This step can also start defining what the end state looks like for victory. The end state informs military objectives that feed into the later steps of the design process. For this paper, Strategic Guidance is provided within the scenario.

Understand the Strategic Environment

The next step in the process is considering the strategic environment that "… form boundaries within which the operational approach must fit[…]."[10] This step involves considering the U.S. government's goals and the implications of actions on the world stage. For this paper, the implications considered are of large-scale combat operations within the MDO framework.

Understand the Operational Environment

Below the strategic environment is the operational environment. The commander must understand the current environment to determine what the desired end-state should be, so the staff analyzes the environment through the operational variables, PMESII, and the interactions between pertinent actors. For this paper, the operational variables for the

Baltic and South American regions are briefly discussed, with a focus on major ports and waterways. This approach helps to determine the potential operational impact of CRF activities within the region.

Define the Problem

Defining the problem involves "determining what needs to be acted on to reconcile the differences between existing and desired conditions,"[11]. This step goes beyond individual PMESII elements by considering the relationships and tensions among all components. This step also includes development of a problem statement by the commander. For this paper, the problems in question are that which were presented for MDO. The problems are then analyzed in terms of how CRF capabilities can help to achieve the end-state.

Identify Assumptions

Assumptions are required to continue planning. At the Joint Planning Level, assumptions are determined by looking at previously stated guidance and determining if there are any gaps in knowledge. For this paper, it is assumed that deployment of CRF assets is authorized in the vignettes.

Developing Operational Approaches

The Operational Approach is the "description of the broad actions the force can take to achieve an objective in support of the national objective or attain a military end state."[12] The Joint Force commander expresses actions informed by the understanding of the OE developed in the previous steps to the staff. The goal of these actions is to move a situation from its current state and to an end state that addresses the root problem rather

than just the symptoms. For this paper, Operational Approaches are demonstrated through vignettes.

Identify Decisions and Decision Points

The staff must identify decisions that need to be made by the commander and submit them for the commander's consideration. These decisions range from choosing when to commence an operation to determining if deviation is needed from the original plan. For this paper, no specific decision points are addressed.

Refine Operational Approach

Refinement of the Operational Approach is a continuous process. As new information is introduced into the problem, commanders and staff need to remain synched to address changes. Within this network, the commander "adjusts the operational approach based on feedback from the formal and informal discussions at all levels of command and other information."[13] For this paper, no refinements to operational approaches are discussed.

Prepare Planning Guidance

Finally, a commander "provides a summary of the OE and the problem, along with a visualization of the operational approach, to the staff and to other partners through commander's planning guidance."[14] The planning guidance provides planners with enough information about a commander's wishes to allow staff to begin detailed planning for operations. For this paper, no official planning guidance is issued.

Vignettes

Because no "hard data" is available for quantitative analysis, this study utilizes scenario building to analyze potential employment options.[15] Two vignettes are used to analyze CRF capability within MDO. The two scenarios are in drastically different locations and political climates, and contain different adversarial capabilities in order to demonstrate the broad application of CRF capabilities. The first scenario considers a large-scale incursion of a foreign force into a NATO country. The second scenario considers coercion by a nation-state via non-state actors to acquire resources in Africa, at great human cost to the host nations. Building these scenarios can be done in multiple ways. For this paper, the scenarios were built in the two parts described in the following paragraphs.

Strategic Analysis

Strategic Analysis examines pertinent information leading up to the scenario. It utilizes elements from JPP to build understanding of the strategic environment. Strategic guidance takes the form of the guidance passed down from either the U.S. or NATO; it includes an explanation of the event leading to the introduction of coalition forces and describes the military end state. An analysis of the operational environment is also conducted, including a look at the region's geography and its impacts, any political situations that may influence the use of force, adversarial capabilities in the region, and infrastructure available to coalition forces.

Scenario

Following the Strategic Analysis, the MDO Problems Analysis addresses the unique MDO problems presented within the scenario. Each capability is analyzed as a potential solution to the MDO problems. A narrative format is used to create a more coherent sequence of events.

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[1] Headquarters, Department of the Navy (DON), *A Design for Maintaining Maritime Superiority* (Washington, DC: Government Printing Office, 2016).

[2] Ibid.

[3] Maldonado, "Coastal Riverine Force Analysis," 53.

[4] TRADOC, TRADOC Pamphlet 525-3-1, viii.

[5] Ibid.

[6] Ibid.

[7]Ibid.

[8] Ibid.

[9] JCS, JP 5-0, IV-6.

[10] Ibid., IV-9.

[11] Ibid., IV-14.

[12] Ibid., IV-16.

[13] Ibid., IV-17.

[14] Ibid.

[15] Libor and Prochazaka, "Scenarios and Capability Planning," 72.

CHAPTER 4

ANALYSIS

Multi-Domain Operations Problem Set Analysis

How does the Joint Force compete to enable the defeat of an adversary's operations to destabilize the region, deter the escalation of violence, and, should violence escalate, turn denied space into contested spaces?[1]

Naval Coastal Warfare (NCW1): Naval Coastal Warfare (NCW) plays a pivotal role in competition within the multi-domain space by fulfilling the mission of "protect[ing] strategic port facilities and strategic commercial shipping… in order to ensure the uninterrupted flow of cargo and personnel to the combatant commander"[2]. NCW missions provide security to prepositioning ships and important harbor facilities, facilitating the Joint Reception, Staging, Onward Movement, and Integration (JRSOI) of forces into the combatant commander's area of responsibility. Combatant commanders can deter aggression in the theater by assuring security of strategic ports and waterways. If aggression does escalate and turns ports or harbors into denied space, NCW can provide force protection Joint Logistics Over the Shore and other movement operations. Combatant commanders can rely on this security during operations to turn denied space into contested space. NCW commands can also provide theater security training to countries. Countries increase their resilience against outside influences (e.g., foreign funded piracy or terrorism) that may destabilize their national security by building their nation's force protection capabilities.

Riverine (RIV1): Riverine forces function similarly to harbor security units, but on inland waterways instead of in coastal regions. They can work and train with host nation military or police elements to help deter foreign aggression. By displaying force

along waterways, host nations can deter adversarial elements from utilizing inland water routes to infiltrate material or personnel into an area of operations. Riverine forces can also conduct security operations inland, ensuring a safe environment for commerce and transportation. A host nation with good security is less vulnerable to destabilization and maintains better posture to deter foreign aggression, since a show of force is a springboard for immediate response should violence escalate. Riverine forces can also conduct continuous intelligence, surveillance, and reconnaissance (ISR) operations, improving the understanding of the operational environment.

Army Special Forces (ASF1): Special Forces are integral to defeating an adversary's attempts to destabilize a region. Within the context of riverine operations, ASF can conduct training with maritime components and operations with host nations to support governance. ASF Scout Swimmers are also capable of selecting potential Beach Landing Sites,[3] which can be used for follow-on amphibious operations. With these capabilities, ASF gives a host nation access to better training (and future integration) of special forces within the waterborne environment and assists operational planners in developing amphibious plans. Should hostilities break out, commanders will start with a better understanding of where riverine operations are able to assist.

Army Watercraft (AWC1): Two of Army Watercraft's principal missions apply to problem one. First, through Pod and Harbor Support, tugs rapidly dock or displace larger cargo craft. This mission set facilitates the rapid buildup of forces within an operating environment, which then act as a deterrent to adversarial nations. Floating cranes allow for offload operations in otherwise non-functional areas. Placing heavier units at strategic points without use of host nation assets reduces the chance of foreign entities influencing

pier operations (e.g., bribing local workers or sabotaging equipment). It also creates another location that hostile forces must defend, a difficult enterprise without density of forces to disrupt additional avenues of approach.

Inland Waterway operations can also move units and material quickly. LCUs, LSVs, and tugs are able to move larger, non-self-propelled units inland faster than using conventional road networks. These watercraft also increase accessibility by moving goods and services to areas where they are needed. Similar to the effects of Pod and Harbor Support, this capability creates potential dilemmas for an adversary by requiring a density of forces capable of defending neglected waterways.

Additionally, Army watercraft have limited organic defensive capabilities in the form of crew served weapons. Crew served weapons are often utilized to augment harbor and inland waterway security and can assist in turning denied space into a contested area.

Personnel may also configure larger Army watercraft to act as C2 nodes or retransmission sites, creating redundancy in mission command. Redundancy reduces an adversary's initial capability to completely deny command and control within certain areas. Ensuring C2 in this way facilitates turning denied space into contested space.

How does the Joint Force penetrate and disintegrate enemy anti-access and area denial systems throughout the depth of the Support Areas to enable strategic and operational maneuver?[4]

Naval Coastal Warfare (NCW2): Through physical presence and robust C4I, NCW assets provide real-time information across the physical and electromagnetic spectrum for common operating pictures. Combatant commanders commanding NCW units have an additional resource to monitor the movements of A2AD platforms near coastal areas. NCW assets also have the ability to conduct limited assault operations

against small tactical units, guerilla forces, or Special Forces[5]. In this way, NCW forces can monitor and allow for follow-on attacks on A2AD platforms, or in a limited fashion, disrupt A2AD platforms, all within the support area.

Riverine (RIV2): Riverine forces are capable of conducting a wide range of initial operations. They can perform within the joint force's operational plan, from ISR to assaults. With high speeds and low profiles, riverine craft are capable of rapidly moving inside A2AD rings. Able to take supplies of food and water, and robust communication equipment, these forces also support persistent ISR platforms. These platforms can be used either in conjunction with larger force movements or for refinement of the common operating picture within the AO. Once inside the enemy's A2AD rings, Riverine units assist commanders in targeting indirect fires or air strikes, direct action against the system, or ground force insertion. These operations can either be an initial penetration or a disruption of the enemy's A2AD capability to allow for larger ground force movements. Riverine forces can also continue to conduct security operation along waterways, providing protection for inland Army Watercraft movements or ground force maneuvers along a traditional "obstacle". These security operations mitigate risk introduction and support force movements during the initial stages of conflict.

Army Special Forces (ASF2): ASF elements have a large skill set available for conducting operations. These forces utilize low profile and quiet Combat Rubber Raiding Craft (CRRC) for discrete waterborne infiltration into the joint force deep area. CRRCs can be launched via air, sea, or land; these craft provide an additional insertion method for forces, allowing for higher fidelity targeting of enemy forces or direct action against an enemy's support area. A commander can thereby cause disruption of the enemy's C2

capabilities, facilitating the disintegration of enemy elements during follow-on operations. For deep reconnaissance, ASF elements also use kayaks[6]. Although not necessarily useful for direct action, kayak operations can insert ASF in waterborne environments almost instantly, surreptitiously enabling intel gathering about enemy A2AD capability and spotting for fires against elements. Through these actions, the commander can gain (or regain) maneuverability within a contested space.

Army Watercraft (AWC2): Army Watercraft are instrumental for Logistics Over the Shore (LOTS) operations. LOTS operations permit commanders more flexibility in introducing forces into the field by providing an alternative entry method to airborne, ground, or large-scale amphibious landings. These forces in turn present more dilemmas for adversaries and can disrupt A2AD capabilities. LOTS operations can also be part of a deception plan. Army watercraft provide some of the more effective ways to penetrate and disintegrate enemy A2AD capabilities. Tugs can push non-self-propelled craft – outfitted with decoy material or emitters – to confuse enemy sensors. Tugs also increase the mobility of larger inland craft, enabling the buildup of material or forces in areas where an adversary may not be ready to respond. Other Army watercraft could introduce unique force packages to disrupt enemy A2AD and offer a platform rapid withdrawal. Additionally, LSVs can be outfitted as C2 nodes, giving greater range and redundancy for Mission Command within the support area.

How does the Joint Force penetrate and disintegrate enemy anti-access area denial systems in the deep area?[7]

Naval Coastal Warfare (NCW3): With limited augmentation, NCW assets are capable of assaulting the following: CBRNE weapon storage and delivery systems, C2

nodes, ADA sites, port facilities, key LOCs, and critical infrastructure[8]. NCW assets can directly disrupt physical A2AD capabilities in contested areas, albeit with limited ability to counter electromagnetic or cyber concerns.

Riverine (RIV3): Riverine forces can continue ISR operations to further develop the common operating picture. They also conduct call for fire or direct-action missions on enemy A2AD platforms in the deep area. Riverine craft, such as the MK VI Patrol Boat, also have robust C2 capabilities that can act either as an additional node within the C2 architecture or as a control platform for operations. These capabilities provide redundancy within the AO and help mitigate enemy disruption of friendly C2 capabilities.

Riverine platforms can also conduct screening and scout tasks. These tasks provide ground forces with early warning of enemy movement and identify routes for movement of ground forces into the enemy deep area. Riverine forces may rapidly seize a beach landing site along a waterway as well, allowing for quick insertion of larger ground forces via Army Watercraft. Introduction of friendly forces in depth facilitates the disruption of an enemy's forces and can lead to a dis-integration of their ability to effectively command their forces. Depending on the size of the force landed, this Beach Landing Site could also act as the main penetration point for the joint forces. Riverine forces may perform several other functions for the joint force commander, including material transport, reserve force movement, resupply efforts, evacuations, establishment of mobile aid stations, and protection functions as needed.[9]

Army Special Forces (ASF3): ASF continues insertion via waterborne means for deep reconnaissance or direct action. They also begin selection of beach landing sites for Army Watercraft to utilize with movement of larger, conventional forces.

Army Watercraft (AWC3): LSVs could act as mobile indirect fire platforms. With the deck space available, artillery units can fire from the decks of LSVs and then rapidly displace. In this way, the Joint Force can place indirect fires deeper in a denied environment. LSVs can also be configured with launchers for larger unmanned aerial vehicles (UAVs) controlled either from the LSV or remotely and then flown back to friendly forces following ISR operations. As discussed previously, Army Watercraft also allow the insertion of force packages along different avenues of approach, giving commanders another route for penetration into the deep area. LSVs could act as "mother ships" for other inland watercraft as well, increasing their inland reach. With all of these actions, LSVs could extend how far riverine and special forces operate within the deep area.

Lighter Air-cushion Vehicles (LACVs) can rapidly insert forces into deeper territory, too. LACVs, though easily audible, can travel quickly along waterways and instantly transition to ground transportation. This type of craft could potentially introduce heavier units inside an adversary's A2AD capability.

How does the Joint Force penetrate and disintegrate enemy anti-access area denial systems, then exploit the resulting freedom of maneuver to defeat the enemy in Close and Deep Maneuver Areas?[10]

Naval Coastal Warfare (NCW4): Once enemy A2AD capabilities are degraded, NCW assets can maintain force protection within the AO, facilitating freedom of

maneuver close to shore and around harbors and ports. Limited capabilities are available inland. Exploitation opportunities are limited to coastal regions.

Riverine (RIV4): Rapidly introduced forces can be used as an exploitation force, after penetration is complete. Riverine forces can continue ISR and targeting operations and provide security operations for Army Watercraft conducting landings. In a limited capacity, Riverine forces could act as a reserve force or a quick reaction force to further exploit success of a penetration.

Army Special Forces (ASF4): ASF forces can help exploitation forces by identifying targets and continuing deep reconnaissance. They can identify potential crossing sites for enemy forces and assist in pre-designating targets in those areas. In conjunction with riverine forces, ASF may also severely disrupt enemy movements near the waterways, allowing ground forces to more rapidly defeat the enemy's withdrawal in depth. They could destroy or disrupt potential waterway infrastructure (e.g., bridge, ferry crossing), which may stop or delay enemy movement out of an area. Finally, by designating Beach Landing Sites, SF can facilitate the rapid movement and insertion of ground forces via riverine craft or Army Watercraft along an enemy's route.

Army Watercraft (AWC4): For exploitation within close and deep maneuver areas, Army watercraft meet lift requirements to facilitate movement of forces, act as IDF support, and act as C2 nodes. LSVs could act as mobile resupply points along waterways as well, providing additional locations for units to refit. These actions would extend the operational reach and continue any momentum coalition forces have gained, giving commanders greater flexibility within their supply plans.

How does the Joint Force re-compete to consolidate gains and produce sustainable outcomes, set conditions for long-term deterrence, and adapt to the new security environment?[11]

Naval Coastal Warfare (NCW5): Once consolidation has commenced, NCW assets can maintain force protection within the AO to facilitate physical freedom of maneuver for the joint force; the joint force is then able to better set conditions to shape the new security environment. NCW commands can also recommence theater security training with countries to rebuild security forces. Building up host nation security capability provides an environment more resistant to outside influence.

Riverine (RIV5): Along with harbor security assets, riverine security operations help create a stable environment to consolidate gains. Continued operations along inland waterways help establish an environment that fosters freedom of movement. Riverine forces can also continue conducting interdiction operations to locate material or personnel entering or exiting the AO. Disrupting any lingering vestige of adversarial capability assists a host nation in building up their own security and infrastructure. Continuation of training with host nation military and police helps create a force less vulnerable to foreign influence in the future, potentially reducing reliance on joint forces.

Army Special Forces (ASF5): ASF can resume training with host nation and works to monitor adversarial movements within the area of interest.

Army Watercraft (AWC5): Within a coastal region, Army Watercraft can be instrumental in the buildup of infrastructure and flow of additional forces. Continuing their role with LOTS and employing their floating and barge cranes, Army watercraft could operate ports and harbors for onload/offload operations. Facilitating the host nation's port operations allows for more support to be brought into the theater. This

support may help build up the host nation faster, reducing the amount of time it takes for them to adapt to the new security environment. AWCs can move personnel and equipment to areas with limited accessibility due to damages to roads and bridges as well. In this way, AWCs aid commanders in moving coalition forces throughout the theater to further consolidate gains.

Vignettes

Two vignettes are discussed in the following section. One is set in the Baltic region and the other, in the West African Congo River Basin. Joint Design Methodology is used to build the framework for Coastal Riverine operations within the two vignettes. Then, the author discusses how CRS assets overcome the problems presented in the description of MDO. Appropriate code designators denote the specific capabilities outlined during the MDO analysis.

Baltic Vignette

In 2025, Bothnia (i.e., fictional country where Finland is geographically located) decides to move across the Gulf of Finland into Estonia, down through Latvia, and into Lithuania. Bothnia's stated purpose for this is to unify ethnic Bothnian diasporas in the region. In response, NATO has stood up a Multi-National Corps (MNC) and pushed Bothnian forces north, out of the city of Riga, and onto the northern bank of the Daugava River. Bothnian forces still control all major river-crossing points and maintain a robust A2AD network. NATO's goal is to push Bothnian force back across the Gulf of Finland and restore the territorial boundaries of the Baltic region. NATO forces are restrained

from crossing the Gulf of Finland into Bothnian territory. Constraints are also in place to prevent Bothnian allies from entering and expanding the conflict.

Bothnian forces within Latvia are composed of a brigade's worth of troops, about 4,000 personnel, with armor capability. Their A2AD capabilities include robust integrated air defense systems and battle-tested long range fire assets. These capabilities restrict ground forces from continuing advances north and air forces from conducting shaping operations. They also prevent long-range fire assets from deploying and conducting shaping fires. Bothnian forces also have the capability to conduct rapid movements along major road networks. This decreases their response time to a detected ground presence. Bothnian electronic warfare capabilities allow disruption of communication and data networks. Bothnia maintains connections to non-state actors that can conduct surveillance and minor disruption operations as well.

The Daugava River runs east to west and is 634 miles long, ranging in width from 650 feet to one mile. The terrain around the riverbanks ranges from lightly forested to open plains which can impact landing vehicles. Most of the river on both sides has quick access to major road networks. The river also has inlets to smaller lakes and tributaries. For this stage of the operation, the MNC commander is seeking ways to create an opening in the Bothnian A2AD and find river crossings, allowing him to build combat power on the northern bank.

As part of the MNC, Joint River Flotilla ONE (JFR1) is established and moves its forces inland via the Gulf of Riga onto Lake Kisezeres, and sets its headquarters in the Latvian town of Jaunciema. As part of the command, JFR1 has been allocated a Coastal Riverine Squadron, one LSV, two LCU 2000s, and an assortment of LCMs and tugs.

They have also been assigned a SF LNO for coordination. JFR1 is tasked with establishing river crossing sites that Army engineers can bridge to move forces north.

ASF and their local contacts select river crossing sites based on grade and ability for onward movement to assembly areas [ASF1]. ASF also conducts special recon north, reporting on Bothnian A2AD capabilities [ASF2]. This recon identifies any systems capable of long-range fires, integrated air defense systems, electronic warfare and jamming capabilities, and supply depots for these systems. Concurrently, 34' Sea Arks are utilized to maintain security at the entrance of Lake Kiszeres and riverine patrols are sent to conduct patrols and ISR along the Daugava River [NCW1]. Riverine Security Teams disembark and conduct patrols along key river landing sites [RIV2]. During the day, LSV and LCU 2000s conduct military deception operations in preparation for river crossing operations. False landings and feints are run to determine Bothnian reaction and Quick Reaction Force times. Riverine patrols and RSTs conduct security operations and calls for fire for landings. At night, LSV and LCU 2000s with tugs sail as a composite unit displaying the appropriate running lights in order to conduct deception operations, posing as normal merchant traffic, on a consistent nightly schedule. Tarps cover the vehicle bays to obscure units in the bay area. Army units practice loading and landing LCM and LCU 2000s with ground forces [AWC2].

Once ASF has identified appropriate landing sites and Bothnian A2AD systems, operations commence. Army landing forces load out on LCU 2000s and Army long-range artillery load out on the LSV. Army SHORAD elements load out on LCMs with supplies. A Quick Reaction Force (QRF) loads out on LCMs. Riverine forces, including an MK VI patrol boat acting as an additional C2 node, move to act as security for landing

sites. During nighttime operations, the LSV, LCU 2000s, and LCMs move toward an assembly point near Naves Sala on the Daugava River. As the LCUs and LCMs continue moving toward the river landing site, the LSV crew, with 2x LCMs equipped with SHORAD, uncovers the LSV cargo bay, unmasking multiple high mobility rocket systems (HIMARS). Once ASF positively identifies appropriate targets [ASF2], security is set at the river landing sites, and the LCUs and LCMs are prepared to land, the HIMARS conduct strikes at designated targets to disrupt Bothnian A2AD capabilities [AWC2].

The MK VI, with organic drones, compete to maintain LOS VHF communications and data during continuous Bothnian EW disruptions. An RST, having set up an OP, detects a Bothnian counterattack force gathering to disrupt Army engineers attempting to bridge the river [RIV2/3]. Transmitting the grid information back to the MK VI, the mission commander picks an appropriate landing site for the QRF loaded on the LCMs. While the RST calls for fires from the M-777s onboard the LCU 2000 to disrupt the Bothnian counterattack force, LCMs work to offload the remainder of units and vehicles for the QRF [AWC3]. Once offload is complete and deconfliction of fires has commenced, the QRF acts to spoil the movement of the Bothnian counter-attack force. Inevitably, some Bothnian forces and helicopters slip by the QRF and approach the river crossing site. As these forces approach the security element for the Army engineers, SHORAD units, transported on the initial LCU 2000s, fire on the helicopters, defending against the aviation assault [AWC3]. As the ground forces approach the crossing site, the Riverine Assault Boats disrupt the enemy's movement along the river with crew served weapons fire near the shore [RIV3]. They maintain fixing fires until the first security

element for Army ground forces cross the river on Army engineer bridging and destroy the remaining Bothnian forces. All riverine ground elements are withdrawn inside the security forces perimeter and help maintain security for the bridge [RIV4]. Once the preponderance of Army ground forces is across the river, riverine ground units load back onto the LCU 2000 and LCMs for retrograde back to base. During their transit, 34' SeaArk boats link up and help maintain security for the remainder of their voyage [NCW3]. The MK VI, RPBs, RABs, and SHORAD elements stay on station until completion of the Army's movements across the bridge. Once completed, remaining riverine elements load back on the RPBs and RABs and return to Jaunciema.

Upon completion of the bridging mission, Naval Coastal Warfare units maintain security within the lakes and ports around Riga to prevent infiltration of adversarial units [NCW5]. Riverine units maintain presence patrols along the rivers to contest adversarial movement and ISR [RIV5]. SF is reallocated to continue support to MNC forces. Army Watercraft are reassigned to MNC to move supplies throughout the theater as MNC forces continue movement north [AWC5].

Western Congo Vignette

In the year 2050, the Orange Republic (OR) utilizes a combination of diplomatic and economic efforts to move conventional OR forces into the Congo River Basin in central Africa. The OR's stated purpose is to assist in providing security in the region to continue trade with countries in the area. Global news sources and social media confirm that the OR is actually using its conventional forces as "muscle" to enforce draconian working policies for local and international workers in order to strip raw resources from the Congo River Basin. The OR is also supporting non-state actors (i.e., terrorist

organizations and trans-national crime syndicates) in an effort to destabilize the region as much as possible. As OR forces approach the borders of the Central African Republic and the Republic of Congo, the Democratic Republic of the Congo, where the majority of OR forces reside, demands through diplomatic channels that the OR immediately remove all forces from the DRC's border. The OR also refuses to comply with U.N. Security Resolutions resolving them to remove their forces from the region.

A meeting of the African Union (AU) takes place and releases an official statement demanding the withdrawal of all OR forces in the Congo River Basin. It also stands up Multi-National Corps Obangame (MNC-O), composed of units from major African countries, to pressure the OR to leave. In response, the OR threatens to disrupt sea- and air-going traffic through the Gulf of Guinea with shore-based cruise missiles and integrated air and missile defense systems. The OR demonstrates their capability to do this by unmasking one of their missile sites in an OR owned and operated port in Cote d'Ivoire. Through diplomatic channels, the AU requests assistance from the U.S., France, and England to push the OR out of the DRC. The U.S. commits to assisting the AU and the DRC by providing limited ground forces in support of the MNC-O. The U.S. stands up Joint River Flotilla-Congo (JRF-C) to assist MNC-O in operations against the OR.

OR forces within the region are composed of three mechanized battalions, and due to terrain, have little armor capacity. Total manning is approximately 1,200 OR troops with contractor support. They are unofficially supported by several non-state actors that have the capability to disrupt coalition movement and conduct ISR on coalition operations.

The Congo River is just under 3,000 miles long.[12] It is surrounded by alternating dense forestation and swamp lands and connects western Africa to the Atlantic Ocean.[13] The deep forests drastically reduce ground force maneuverability and effectiveness of both ground- and aviation-based indirect fires. Thick rainforest canopy also reduces the ranges of communication equipment, making long distant transmissions difficult. Swamp land also reduces ground force maneuverability and may be impassable if flooded. Overall, the terrain itself presents a multi-domain issue, restricting maneuver, fires, communications, ISR, and coordination for large scale operations. The large area of the river basin contains villages of indigenous people who are dependent on the river basin's resources to maintain their way of life. U.S. forces are directed to limit impact on the ecosystem as much as possible, constraining commanders from using large scale bombings in the region. To avoid escalation, the JFC has reduced access to Carrier Strike Groups and Marine Expeditionary Units in the region until the A2AD threat has been destroyed or neutralized. JRF-C has been directed to assist MNC-O in conducting operations against OR forces.

JRF-C has been assigned a Coastal Riverine Squadron, one LSV, two LCU 2000s, an assortment of large and small tugs, an assortment of LCMs, and the regionally aligned 3-15 Army infantry battalion. The USS John C. Stennis (CVN-68), with attached air wing, is operating in the region and is prepared to assist with AWACs and ISR support. A special-purpose Marine Air Ground Task Force, currently stationed on Cabo Verde, is assigned to support as needed. Special Operations Command Africa is tasked to provide special reconnaissance and unconventional warfare support within the Congo River Basin

as well as special reconnaissance in Cote D'Ivoire to identify additional OR A2AD capability.

JRF-C establishes its coalition command center in Kinshasa (DRC) with MNC-O. For strategic-level deception, U.S. Army Forces Africa and U.S. Navy Forces Africa coordinate to advertise a multinational "exercise" to practice JLOTS capability, offloading an Infantry Brigade Combat Team in the vicinity of Muanda in the DRC [AWC1]. During the retrograde portion of the exercise, an infantry brigade clandestinely starts movements towards Kinshasa. Movement routes are coordinated with ASF to provide security from local militias [ASF1]. Naval Coastal Warfare security boats guard against adversarial disruptions and ISR during the exercise [NCW1].

All riverine assets are established in Kinshasa and the LSV is loaded with class III and class V supplies for MNC-O operations. One LCU 2000 is loaded with infantry units and enablers for landing, while the other LCU 2000 is configured as a Command and Control node [AWC2]. Two LCMs are equipped as mobile aid stations and two LCMs are installed with retransmission nodes. As ASF forces identify and disrupt OR formations in the river basin, MNC-O and JRF-C refine a joint plan to move coalition ground forces through the AO, supported by JRF-C assets along the Congo River [ASF1]. Riverine patrols identify multiple landing sites for insertion, extraction, and resupply in vicinity of the OR's area of influence [RIV1]. SF forces identify the main formations of OR forces and communicate back to JRF-C headquarters as part of final preparations [ASF1].

RPBs, with RSTs embarked, insert behind the identified OR forward line of troops to act as observers and initial security for landing sites [RIV2]. U.S. Navy ISR

from the carrier strike group relay final disposition of OR forces to MNC-O fires organizations to facilitate final coordination between indirect fires and ground forces. As MNC-O ground units, accompanied by elements of the 3-15th, begin to advance, an LCU 2000 begins offload of 3-15th personnel and equipment behind enemy lines, guarded by RABs and RPBs [RIV2/AWC2]. The terrain degrades OR ISR and fires as well, but interior lines make it easier to reinforce weaknesses in their defense. LCMs with retransmission nodes, in conjunction with Navy E-2C Hawkeye support, allow for more communication and data transmission among coalition forces [AWC2/3]. As MNC-O forces reach OR defensive line, the 3-15th begin infiltration from the river, making OR forces to defend against heavy assaults in two areas.

Since the jungle restricts helicopter evacuations, casualties taken during the assaults are moved towards the river where the two medical LCMs work to stabilize personnel's conditions [AWC3]. Two RPBs per LCM are assigned to act as fast CASEVAC platforms, moving casualties from the LCMs to an ambulance exchange point further up-river, outside enemy fires assets [RIV3]. Terrain also degrades the movement of supply vehicles through the jungle. As supplies are needed, the LSV offloads supplies at designated points along the river under RST security [RIV3 / AWC3]. MNC-O and 3-15th units are then able to access these supplies when needed. As the LSV begins to run low on supplies, it returns to Kinshasa under RAB escort.

As the fighting continues, 3-15th and MNC-O forces seize several helicopter landing sites created by OR forces. The special purpose Marine Air Ground Task Force then provides Marine air assault forces as a reserve for MNC-O, all of which is coordinated from the command post onboard the LCU 2000 [AWC4]. ASF forces in Cote

D'Ivoire concurrently identify and neutralize several anti-ship cruise missiles and IAMDS systems [ASF4]. Over several days of fighting, OR ground forces are unable to properly resupply, and their defensive lines become strained by MNC-O forces. The OR government, realizing that it can no longer support their forces in the river basin or effectively influence the Gulf of Guinea, sue for a cease fire. The AU agrees and demands full withdrawal of remaining OR ground forces from the Congo River Basin.

As OR forces withdraw, SF begins rebuilding local militias to reduce any remaining influence of OR proxies [ASF5]. Riverine units maintain limited presence patrols along the river, checking for any additional smuggling of arms or supplies to potentially disruptive force [RIV5]. Naval Coastal Warfare and Army watercraft are reassigned as needed by the MNC commander.

The two vignettes presented discuss application of CRF capabilities in two different situations. Within the European theatre, CRF is shown capable of supporting LSCO and being instrumental in assisting Army ground forces. Within the African theatre, CRF provides the means to effectively move units and supplies through an environment inhospitable to ground force movements. These vignettes demonstrate the wide range of uses for CRF within MDO.

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[1] TRADOC, TRADOC Pamphlet 525-3-1, viii.

[2] Headquarters, U.S. Fleet Forces Command, Navy Tactical Techniques and Procedures (NTTP) 3-10_1, *Naval Coastal Warfare Operations* (Norfolk, VA: Headquarters, U.S. Fleet Forces Command, 2005), 1-1.

[3] HQDA, FM 3-05.212, 9-6.

[4] TRADOC, TRADOC Pamphlet 525-3-1, viii.

[5] Fleet Forces Command, NTTP 3-10_1, 1-6.

[6] HQDA, FM 3-05.212, 8-1.

[7] TRADOC, TRADOC Pamphlet 525-3-1, viii.

[8] Fleet Forces Command, NTTP 3-10_1, 1-7.

[9] CJCS, Test Publication JP 3-06, XII-9.

[10] TRADOC, TRADOC Pamphlet 525-3-1, viii.

[11] Ibid, viii.

[12] J. P. Bossche and G. M. Bernasek, *Source Book for the Inland Fishery Resources of Africa,* vol. 1 (Rome: Food and Agricultural Organization of the United Nations, 1990), 338.

[13] Kevin Oberg, John Shelton, Ned Gardiner, and P. Jackson, "Discharge and Other Hydraulic Measurements for Characterizing the Hydraulics of Lower Congo River," U.S. Geological Survey, OSW Hydroacoustic, July 2008, accessed 01 April 2019, https://hydroacoustics.usgs.gov/publications/Measurements4LowerCongo-6.pdf, 1.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

MDO presents an exceptional problem set. Given the rise of advanced A2AD technologies and operations in harsh environments, conflict is becoming ever more convoluted. The Army is being proactive by developing doctrine to combat the problems presented by MDO; in the spirit of joint action, the Navy should work with the Army to provide solutions for these problems. Considering the Navy's concept of distributed lethality is just one way to bridge with MDO doctrine. Distributing capability throughout the service provides different units with the means to achieve multiple effects across many domains. The ability to achieve these effects across multiple domains gives Joint Force commanders more tools to achieve local superiority.

NCW and riverine assets offer the joint force a means to influence the littoral area. During transition from the sea to inland, a commander can achieve effects across both domains while utilizing craft specially designed to operate in this zone. Although individual riverine assets can impact different MDO problems, a joint command with Navy and Army elements contains a more robust capability set with a greater range of effects. These effects can be applied across the entire MDO problem set.

MDO problem one states, "How does the Joint Force compete to enable the defeat of an adversary's operations to destabilize the region, deter the escalation of violence, and, should violence escalate, turn denied space into contested spaces?".[1] Almost all communities can provide capability to reduce an adversary's influence within a region, from training with regional partners to displaying force in the region. Coastal riverine and

security assets can also decrease the impact of trans-national threats such as terrorist and criminal organizations. Decreasing threats in this way bolsters regional stability and prevents adversarial influence from becoming a fait accompli.

If a scenario progresses past diplomatic actions, the situation may require an answer to MDO problem two, which states: "How does the Joint Force penetrate and disintegrate enemy anti-access and area denial systems throughout the depth of the Support Areas to enable strategic and operational maneuver?"[2] Through assault and patrol craft, SF direct action, and Army transport craft, the Joint Force can rapidly introduce forces into a contested area. These coastal riverine platforms are also uniquely capable of rapidly transitioning from ocean to inland. This ability allows Joint Force commanders to introduce force or effects along unexpected avenues of approach.

After introducing forces, commanders can begin to address MDO problem three, which states, "How does the Joint Force penetrate and disintegrate enemy anti-access area denial systems in the deep area?"[3] Combinations of units provide effects to disrupt adversarial A2AD capabilities. From ISR and targeting to introduction of fires on a unique avenue of approach, Joint Force commanders have a means to achieve surprise. Surprise on an operational or tactical level gives commanders an advantage on which they can capitalize.

Once surprise is achieved, the Joint Force can answer MDO problem four, which states, "How does the Joint Force penetrate and disintegrate enemy anti-access area denial systems, then exploit the resulting freedom of maneuver to defeat the enemy in Close and Deep Maneuver Areas?"[4] The combination of Army logistics ships and Navy riverine craft allow the Joint Force commander to rapidly move forces and supplies along

otherwise inaccessible avenues of approach. This movement facilitates rapid repositioning of forces and supplies in areas that have rivers. The element of surprise also permits consolidation of gains made during the penetration phase.

Consolidating gains leads to tackling MDO problem five, which states, "How does the Joint Force re-compete to consolidate gains and produce sustainable outcomes, set conditions for long-term deterrence, and adapt to the new security environment?"[5] Considerations for problem five are similar to those for problems one and four. Coastal riverine assets can provide effects and displays of force to help consolidate gains. Security, multi-lateral engagements, and training all assist in building an environment resistant to adversarial influence.

The vignettes illustrate different ways coastal riverine assets create resistance to outside influence and, if required, furnish solutions to the MDO problem set. Descriptions of hypothetical operations in the Baltics demonstrate the impact CRS can have on LSCO operations. CRS offers improved maneuverability of and access to an avenue of approach that would otherwise be restricted. They also provide the Joint Force commander with unique command and control assets and more ways to rapidly move fire assets.

In the Congo River Basin vignette, CRS units perform in formations that do not reach the threshold of a "large-scale" maneuver force. Reasonably self-reliant, CRS can create logistics and medical lines of communication in regions with difficult terrain. They can provide security for JLOTS operations on both the maritime and shore side, increasing the number of areas a Joint Force commander can introduce troops. They also offer unique ISR capabilities, enhancing collection plans for staffs.

The capabilities described in the vignettes are captured and reviewed in a final coding table (Table 5). The table shows that CRF has the most impact during initial penetration into the support area (problem two), and can provide assistance in subsequent operations penetrating the deep area (problem three). Naval Coastal Warfare and Army Special Forces provide the most support during initial and final phases (problems one and five) by providing intelligence and security elements for unit introduction and removal. The table suggests that CRF has difficulty mounting an exploitation force (problem four), most likely due to the constraints of the environment in which it operates.

The coastal environment requires special attention during operational planning. coastal riverine assets offer the Joint Force Commander a wide array of capabilities to address problems inherent to the operating area. However, CRS lacks the capacity for comprehensive action in MDO. Within cyber, space, EW, and information domains, CRS could only play a small role, possibly supporting operators by providing a mobile platform. The vignettes described in chapter four also portray discrete, non-persistent operations. In both the Baltic and Congo discussions, the goals were short term. There are not enough riverine craft in the inventory to maintain persistent presence patrols such as those conducted during the Vietnam era Operation SEALORDS. Presence patrols could be instrumental in answering problems one and five by combatting the destabilization efforts of non-state actors. They would also establish an existing infrastructure of units and facilities to augment larger CRS commands if needed.

A CRS command structure that could be used is a Joint River Flotilla, an organizational framework that is scalable to the limitations of host nation infrastructure. The concept requires a dramatic shift in the way Army Watercraft are utilized. LSVs and

LCU 2000s are generally used in a strategic lift capacity in low-threat environments. A Joint Force Commander would be hard pressed to give up an asset of strategic lift value for the purposes of CRS operations. The concept also requires integration of command and control across services. The process would not be as simple as administratively giving a Navy unit operational control of an Army vessel; the systems for basic communication may not be compatible. Even functions as basic as maintenance cycles differ between the two services and could create difficulties.

Another potential issue concerns the movement and introduction of Army Watercraft into a hostile theater. Not all classes of vessels are fully seagoing, so additional Navy or contracted sealift would be required to move them into the AO. Some of the larger craft may also have restrictions on inland movement. Most watercraft have limited self defense capability and would require escorts in most MDO.

Overall, further development of Coastal Riverine capabilities would be beneficial for Joint Force commanders; the littoral region and river systems can become a vital maneuver space. These capabilities, like any other specialized military capability, are difficult to build quickly. Riverine units should not be a considered a "break glass in case of emergency" asset – it would take time and practice to effectively employ these constructs.

Recommendations

The littorals and inland river systems comprise a unique operating environment. Although there are many studies on the importance of these regions and their operational impact, few offer discussions of application in real world scenarios. The literature could benefit from further exploration of the following subjects:

1. A detailed look into the employment of Coastal Riverine Forces in a specific region such as the Baltics or the Congo. Focus should be placed on the specific operational variables at play and hydrography of the inlets and major river systems.

2. Design of an actual Joint River Flotilla construct. Researchers could analyze how many vessels would be needed to achieve different effects and what the manning and supply requirements would be.

3. A holistic review of the impact coastal riverine operations have had on historical military operations. Many publications consider such operations during the American Civil War and Vietnam conflict, but there is a dearth of research on usage of this maneuver space by older militaries.

4. Developing recommendations to enhance capabilities across all domains for MDO. As discussed above, CRF is lacking abilities in cyber, EW, space, and intelligence domains. This could include enhancing ISR and drone capabilities or utilizing CRF assets to act as hubs for space and intelligence operations.

5. Create a finalized Joint Publication for Joint River Operations Doctrine. Doctrine would define tactics, techniques, and procedures, as well as codify the Joint River Flotilla concept. Utilizing DOTMLPF framework, researchers could refine the Joint River Flotilla concept and produce an organizational chart that dictates units and assets required for MDO.

6. Look at the effectiveness of liaison officers working in already established CRF elements. Without creating an independent Joint River Flotilla, liaison officers could address the issues of communication between services. Liaison officers may allow for

rapid fielding of forces in a Joint organization without requiring a large lead time for cross training of Navy and Army assets

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[1] TRADOC, TRADOC Pamphlet 525-3-1, viii.

[2] Ibid.

[3] Ibid.

[4] Ibid.

[5] Ibid.

ILLUSTRATIONS

Figure 1. 39’ Riverine Patrol Boat

Source: Department of Defense, Navy Tactics, Techniques, and Procedures 3-06.1, *Riverine Operations* (Washington, DC: Government Printing Office, February 2008), A-2.

Figure 2. 33’ Riverine Assault Boat

Source: Department of Defense, Navy Tactics, Techniques, and Procedures 3-06.1, *Riverine Operations* (Washington, DC: Government Printing Office, February 2008), A-3.

Figure 3. MK VI Patrol Boat

Source: Navy League of the United States, "U.S. Navy," *Seapower* (January 1, 2018): 29.

Figure 4. 34' Sea Ark

Source: Navypedia, "Dauntless 34V Patrol Boats, 2008, accessed February 1, 2019, http://www.navypedia.org/ships/usa/us_cf_seaark.htm.

Figure 5. Logistics Support Vessel (LSV)

Source: Headquarters, Department of the Army, Army Techniques Publication 4-15, *Army Watercraft Operations* (Washington, DC: Government Publishing Directorate, 2015), 2-4.

Figure 6. Landing Craft Utility 2000 (LCU 2000)

Source: Headquarters, Department of the Army, Army Techniques Publication 4-15, *Army Watercraft Operations* (Washington, DC: Government Publishing Directorate, 2015), 2-5.

Figure 7. Landing Craft, Mechanized 8, Modification 1 (LCM 8)

Source: Headquarters, Department of the Army, Army Techniques Publication 4-15, *Army Watercraft Operations* (Washington, DC: Government Publishing Directorate, 2015), 2-6.

Figure 8. 128’ Large Tug

Source: Headquarters, Department of the Army, Army Techniques Publication 4-15, *Army Watercraft Operations* (Washington, DC: Government Publishing Directorate, 2015), 2-8.

Figure 9. Small Tug 900

Source: Headquarters, Department of the Army, Army Techniques Publication 4-15, *Army Watercraft Operations* (Washington, DC: Government Publishing Directorate, 2015), 2-9.

Figure 10. Barge Derrick, 115 Ton

Source: Headquarters, Department of the Army, Army Techniques Publication 4-15, *Army Watercraft Operations* (Washington, DC: Government Publishing Directorate, 2015), 2-10.

APPENDIX A

TABLES

Table 1. Overview of Navy Small Boat Inventory as of November 2011

Boat type	Number in inventory	Description
Amphibious landing boats	79	Landing craft to bring troops, tanks, trucks, supplies, and equipment to and across the beach
Dive boats	117	Used for tethered diving operations and scuba operations
Oil spill response boats	366	Oil skimmers, platform boats, and utility boats for the oil spill response program
Rigid inflatable boats	966	Standard ship's boats and others used for various missions, including search and rescue and visit/boarding/search
Security boats	588	Used for fleet protection, maritime interdiction, law enforcement operations, special operations, and others (riverine boats are included)
Ship's boats	114	Personnel and utility boats with some configured as gigs and barges (gigs are boats assigned to commanding officers and used for visiting ships or hosting dignitaries in an afloat setting)
Utility boats	271	Shore-based utility boats
Work boats	171	Tugboats and multipurpose work boats with a variety of applications, including cargo carrying and harbor cleaning
Other boats	200	Includes ferry boats, unmanned craft, training craft, and others
Total	**2,872**	

Source: United States Government Accountability Office, *Navy Small Boats: Maintenance Report Addressed Most Directed Elements, but Additional Information Needed* (Washington, DC: Government Printing Office, 13 March 2012), 4.

Table 2. Statistics from Operation SEALORDS

	Tran Hung Dao	Giant Slingshot	Barrier Reef	Search Turn	Ready Deck
Enemy KIA:					
BY USN	271	1096	92	242	340
BY VNN	69	162	31	0	85
Other	295	1057	111	51	246
Friendly KIA:					
USN	12	38	6	16	6
VNN	9	17	0	0	0
FRIFF	247	509	73	175	51
ENIFF	198	716	56	90	62
AMMO CACHES	7	275	1	14	22
CACHE WT (TONS)	11.5	142.9	.4	12	4.3

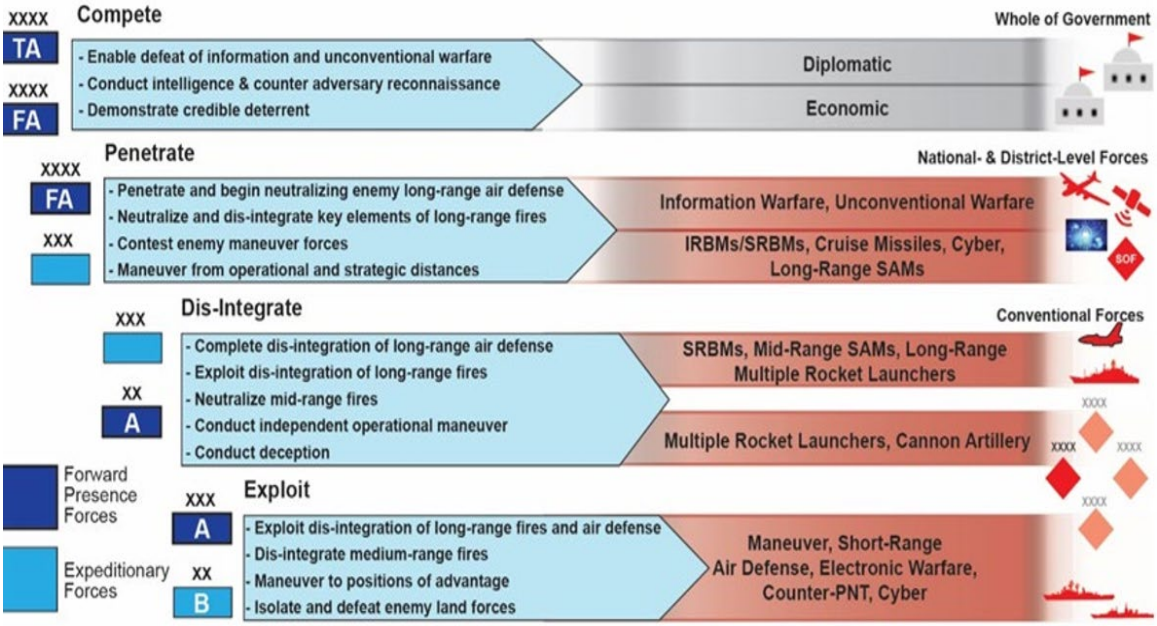
Source: William C. McQuilken, "Operation SEALORDS: A Front in the Frontless War, An Analysis of the Brown-Water Navy in Vietnam," (Master's Thesis, U.S. Army Command and General Staff College, Fort Leavenworth, KS, 1997), 67.

Table 3. MDO Problems

Multi-Domain Operations (MDO) Problems
1. How does the Joint Force **compete** to enable the defeat of an adversary's operations to destabilize the region, deter the escalation of violence, and, should violence escalate, enable a rapid transition to armed conflict?
2. How does the Joint Force **penetrate** enemy anti-access and area denial systems throughout the depth of the Support Areas to enable strategic and operational maneuver?
3. How does the Joint Force **dis-integrate** enemy anti-access and area denial systems in the Deep Areas to enable operational and tactical maneuver?
4. How does the Joint Force **exploit** the resulting freedom of maneuver to achieve operational and strategic objectives through the defeat of the enemy in the Close and Deep Maneuver Areas?
5. How does the Joint Force **re-compete** to consolidate gains and produce sustainable outcomes, set conditions for long-term deterrence, and adapt to the new security environment?

Source: Headquarters, U.S. Army Training and Doctrine Command (TRADOC), TRADOC Pamphlet 525-3-1, *The U.S. Army in Multi-Domain Operations 2028* (Fort Eustis, VA: TRADOC, 2018), v.

Table 4. MDO Solutions



Source: Headquarters, U.S. Army Training and Doctrine Command (TRADOC), TRADOC Pamphlet 525-3-1, *The U.S. Army in Multi-Domain Operations 2028* (Fort Eustis, VA: TRADOC, 2018), 26.

Table 5. Vignette Coding Chart

	Baltic Vignette	Western Congo Vignette	
NCW1	X	X	
RIV1			
ASF1	X	X	
AWC1		X	
NCW2			
RIV2	XX	XX	
ASF2	XX	X	
AWC2	XX	XXX	
			X = Use of capability during vignette
NCW3	XX		
RIV3	XX	XX	
ASF3			
AWC3	XX	XX	
NCW4			
RIV4	X		
ASF4		X	
AWC4		X	
NCW5	X		
RIV5	X	X	
ASF5		X	
AWC5	X		

Source: Created by author.

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