

## Abstract

### Human-Environment Interaction and Water Complexities: Mustering Science and Policy for a Coastal Resources Management Approach to Counterinsurgency (COIN) Operations

by

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August 2012

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Managing coastal resources is challenging in the best of circumstances. Bringing science and policy together to manage coastal resources effectively for the purpose of orchestrating population-centric counterinsurgency operations in the midst of war is Herculean. From a military perspective, there is no coastal resource management logistics officer tasked to handle the details required for such an approach. There is no “Tactics, Techniques, and Procedures” (TTP) guide that clearly states the “who, what, when, where, and how” to determine what resources need to be rallied. There is no predetermined value chain that clarifies why one resource over another should be considered mission critical in a counterinsurgency coastal zone type of fight. The research presented here was carried out to address this gap.

The overall goal of this dissertation is to tie coastal scientific research, policy, and management together with counterinsurgency strategy, tactics, and procedures to help military leaders grapple with the complex natural and social systems in areas of operation that include the coastal edge. The overarching research goal is reached by tackling the research problem, which

is fourfold: (1) a data gap exists in U.S. Military Counterinsurgency (COIN) Doctrine because it fails to address water's complex role in population-centric security and stability operations. (2) COIN Operations generally fail to consider or address both sides of "COIN Effect" in socio-economic development programs and projects that are linked to water resources. (3) human-environment interaction in any area of counterinsurgency operation is linked directly to water and is tied to a population's security and stability. (4) The military operational paradigm lacks a multi-disciplinary, holistic approach to assess human-environment interaction in coastal environments before or during counterinsurgency operations. The research objectives that guide the study and deal with the various aspects of the research problem are: (1) determine water's significance to U.S. national security, (2) address environmental resource (water) security/stability "data gap" in counterinsurgency military operations, and (3) develop a coastal resources management approach for counterinsurgency operations in watersheds that have a terminus in the sea.

The non-traditional, three article method used to address the research problem and to meet the research objectives culminates in the recommendation of a coastal resources management course of action. As proposed, such an approach would muster the science and military communities to engage in practice and policy that could lead to sustainable water-relevant stability projects in future coastal areas of operations.

Human-Environment Interaction and Water Complexities:  
Mustering Science and Policy for a Coastal Resources Management Approach to  
Counterinsurgency (COIN) Operations

A Dissertation

Presented to Faculty of the Program in Coastal Resources Management

East Carolina University

In Partial Fulfillment of the Requirements for the Degree

Doctor of Philosophy

by

Laura Jean Palmer-Moloney, PhD

August 2012

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## List of Acronyms

AO	Area of Operation
ASCOPE	Areas, Structures, Capabilities, Organizations, People, and Events
BSC	Building Security Capacity
BRAC	Base Realignment and Closure
CALL	Center for Army Lessons Learned
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERP	Commander's Emergency Response Program
CIA	Central Intelligence Agency
CMO-HEI	Civilian-Military Operations – Human-Environment Interaction
CO	Commanding Officer
COA	Course of Action
Col	Colonel
COIN	Counterinsurgency
CRM	Coastal Resources Management
DCERP	Defense Coastal/Estuarine Research Program
DFID	Department for International Development
DOD	Department of Defense
DOS	Department of State
ERDC	Engineer Research and Development Center
HAVA	Helmand Arghandab Valley Authority
IDP	Internally Displaced People
IPB	Intelligence Preparation of the Battlespace
ISAF	International Security Assistance Force
LNO	Liaison Officer
LOO	Line of Operation
Maj	Major
MCB	Marine Corps Base
MCCLL	Marine Corps Center for Lessons Learned
MEF	Marine Expeditionary Force
MET-TC	Mission, Enemy Terrain, Troops, Time, Civil Considerations
MNF	Multi-National Force
MND(S-E)	Multi-National Division Southeast
MOD	Ministry of Defence
NATO	North Atlantic Treaty Organization
NDAA	National Defense Authorization Act
NEPA	National Environmental Protection Act
PMESII	Political (governance), Military (security), Economic, Social, Infrastructure, Information
PRT	Provincial Reconstruction Team
PS	Partner State
QDR	Quadrennial Defense Review
RC(SW)	Regional Command Southwest
RIP/TOA	Relief in Place/Transfer of Authority
RO	Reverse Osmosis

SARA	Superfund Amendments and Reauthorization Act
SBSP	South Bay Salt Pond
SERDP	Strategic Environmental Research and Development Program
TCAPF	Tactical Conflict Assessment and Planning Framework
TTP	Tactics, Techniques, and Procedures
UNDG	United Nations Development Group
UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational, Scientific, and Cultural Organization
USACE	U.S. Army Corps of Engineers
USAID	U.S. Agency for International Development
USGS	U.S. Geological Survey
USWP	U.S. Water Partnership
Wg Cdr	Wing Commander

## **Chapter 1: Purpose and Parameters**

- **Introduction**

Military bases are full of muster points—identified locations where personnel, supplies, vehicles, and such are gathered together. And military officers as well as enlisted personnel across all branches of service understand the critical role of mustering—pulling together the right people and materiel to get a job done. Hence the services have designated logistics officers, acting as the wizards behind the curtain, who tend to the details--procurement, maintenance, and transportation of military materiel, facilities, and personnel needed--for each operation.

Coastal zones are full of muster points—identified locations where components of the ecosystem come together, such as the littoral zone where surf meets shore; the estuary where fresh and salt waters mix; the tidal marsh where aquatic and terrestrial systems blend; and the settlements where humans congregate, whether for brief visits or generations, to take advantage of what the coastal edge has to offer. And coastal resource managers understand the critical role of mustering science (the knowledge of physical and human systems) and policy (the course of action used to guide and determine present and future decisions) to get a job done in this complex setting.

Managing coastal resources is challenging in the best of circumstances. Bringing science and policy together to manage coastal resources effectively for the purpose of orchestrating population-centric counterinsurgency operations in the midst of war is Herculean. From a military perspective, there is no coastal resource management logistics officer tasked to handle the details required for such an approach. There is no “Tactics, Techniques, and Procedures” (TTP) guide that clearly states the “who, what, when, where, and how” to determine what

resources need to be rallied.<sup>1</sup> There is no predetermined value chain that clarifies why one resource over another should be considered mission critical in a counterinsurgency coastal zone type of fight. The research presented here was carried out to address this gap.

This dissertation is fundamentally a study of *human-environment interaction*, one of the five foundational themes of geography (Bednarz et al. 1994). Human-environment interaction involves the study of how people adjust their lives to fit various environmental conditions and how people alter the natural environment to meet their needs. As research in human-environment interaction, this study emphasizes *water*, a fundamental human need (Maslow 2011), and its complex relationship to people and their environment. Furthermore, as research centered on *counterinsurgency* (Kilcullen 2010), this is an analysis of policy, social behavior, and military operations as they relate to natural resource management. Finally, as research that builds to support a case study of a watershed that empties into the sea, this is a study of *coastal resources management*. What the military observer may see as a problem manifesting itself in an estuarine setting may well have its cause upstream. Military leaders dealing with internally displaced people (IDP), insurgent activities, and anti-government sympathies in coastal zones may have to plan tactical and strategic responses across a watershed and could benefit from incorporating a coastal resources management understanding and approach to achieve enduring solutions to the problems.

- **Research Goal and Objectives**

The overall goal of this dissertation is to tie coastal scientific research, policy, and management together with counterinsurgency strategy, tactics, and procedures to help military

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<sup>1</sup> COIN doctrine, training, and tactics, techniques, and procedures (TTP) developed during the Vietnam era were shelved in 1975 to allow for focus on mid-to-high intensity combat against conventional forces. Since 2002, U.S. military has had to relearn COIN at tactical, operational, and strategic levels of war (Lionberger 2007, 2).

leaders grapple with the complex natural and social systems in areas of operation that include the coastal edge. The overarching research goal is reached by tackling the research problem, which is fourfold: (1) a data gap exists in U.S. Military Counterinsurgency (COIN) Doctrine because it fails to address water's complex role in population-centric security and stability operations, (2) COIN Operations generally fail to consider or address both sides of "COIN effect" in socio-economic development programs and projects that are linked to water resources, (3) human-environment interaction in any area of counterinsurgency operation is linked directly to water and is tied to a population's security and stability, and (4) the military operational paradigm lacks a multi-disciplinary, holistic approach to assess human-environment interaction in coastal environments before or during counterinsurgency operations.

The research objectives that guide the study and deal with the various aspects of the research problem are: (1) determine water's significance to U. S. national security, (2) address environmental resource (water) security/stability "data gap" in counterinsurgency military operations, and (3) develop a coastal resource management approach for counterinsurgency operations in watersheds that have a terminus in the sea.

The approach used in this dissertation links the coastal resources management background and experience that I gained as a student in the East Carolina Coastal Resources Management (CRM) Program to my research agenda as a senior research geographer with the U.S. Army Corps of Engineers at the Engineer Research and Development Center (USACE ERDC) in Alexandria, Virginia and to my work as Senior Advisor to two Commanding Generals when I was deployed during Operation Enduring Freedom. I found several tenets of coastal resources management that apply to counterinsurgency operations in coastal watersheds. First, to have a rich contextual understanding of a situation, those coordinating COIN activities in

watersheds that terminate at the sea need to consider human as well as environmental factors in the area of operation. Second, in order to understand cause and effect of water-relevant counterinsurgency projects, commanders need to be aware that the population living within a watershed affects and is affected by the surface water and the groundwater resources, which are interconnected. Finally, scientific analysis at the local, national, and regional levels needs to inform policy and decision-making in water-relevant counterinsurgency operations at the tactical, operational, and strategic levels.

- **Background—Defense Department and Environmental Management**

In 1970, environmental issues first appeared on the Department of Defense (DOD) radar. Faced with a federal mandate in the form of the National Environmental Policy Act (NEPA) of 1969 (Pub. L. 91-190, January 1, 1970, as amended by Pub. L. 94-52, July 3, 1975, Pub. L. 94-83, August 9, 1975, and Pub. L. 97-258, Sept. 13, 1982), followed by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, also known as ‘Superfund’) of 1980, and the 1986 Superfund Amendments and Reauthorization Act (SARA) of 1986, the DoD’s environmental program evolved to ensure that military installations complied with U.S. environmental laws. As a result, the Defense Environmental Restoration Program was established (1986), and each of the uniformed services (Army, Navy, Marines, and Air Force) was directed to guarantee that environmental considerations were integrated efficiently and effectively into the military decision-making process (USAEC n.d.). Over time, these environmental considerations had to be factored into environmental cleanup associated with Congressional base realignment and closure (BRAC) decisions in 1988, 1991, 1993, 1995, and 2005 (USAEC 2004).

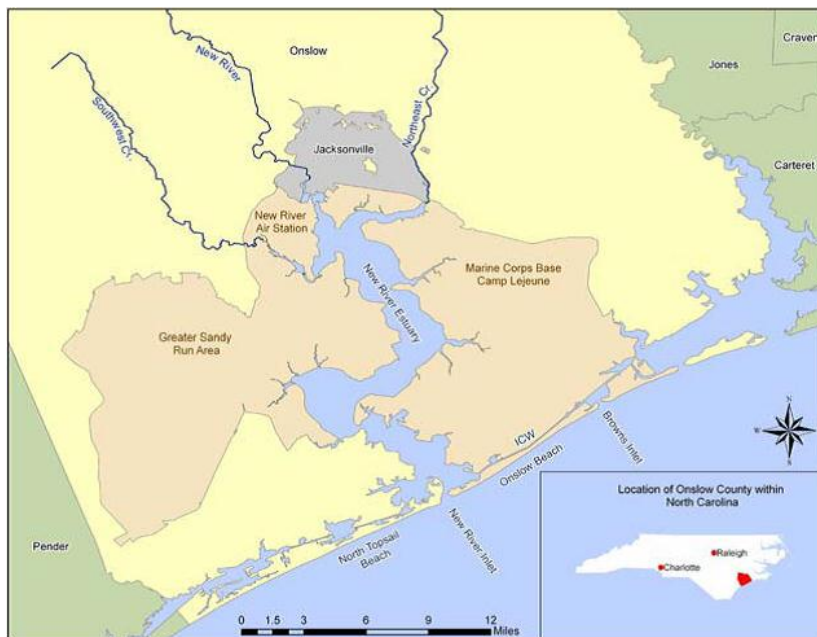
Following federal guidelines, the DOD now implements NEPA requirements, including environmental assessments, environment impact statements, and findings of no significant impact, when modifications to land and air space on U.S. military installations and training grounds are proposed (FedCenter n.d.). With these findings, decision-makers and stakeholders can more completely understand the environmental impacts of a proposed course of action and then manage associated environmental consequences and trade-offs (USAEC n.d.).

Congress established the Strategic Environmental Research and Development Program (SERDP) in 1990 to help DOD address environmental concerns. SERDP focuses on the “development and application of innovative environmental technologies to reduce the cost, the environmental risks, and the time required to resolve environmental problems while, at the same time, enhancing and sustaining military readiness” (SERDP n.d.). As of winter 2011-2012, the SERDP program was still federally funded to support both basic and applied research, as well as advanced development projects.

For the past two decades, the Department of Defense dollars allocated through SERDP funds have been used to enhance and sustain its training and testing assets and to optimize its stewardship of natural resources through an ecosystem-based management approach (DCERP n.d.). Many of the agency’s installation and training assets, such as Marine Corps Base (MCB) Camp Lejeune/Marine Corps Air Station New River, are in coastal and estuarine areas that have both terrestrial and aquatic resource management concerns. MCB Camp Lejeune is one of the DOD’s largest assets, encompassing an estimated 156,000 acres including the onshore, near shore, and surf areas in and adjacent to the Atlantic Ocean and the New River in eastern North Carolina (USMC MCB Lejeune 2006). (Figure 1) The facility is the Marine Corp’s most expansive coastal training center, with 11 miles of beach capable of supporting amphibious



operations, 32 gun positions, 48 tactical landing zones, three urban terrain training facilities, and 80 live fire ranges (USMC MCB Lejeune 2006). The installation's environmental concerns range from managing the habitat of the red cockaded woodpecker to monitoring the quality of its drinking water. The Defense Coastal/Estuarine Research Program (DCERP) supporting US Marine Corps Base Camp Lejeune, funded by SERDP dollars, is designed to support ecosystem-based natural resources management (DCERP n.d.).

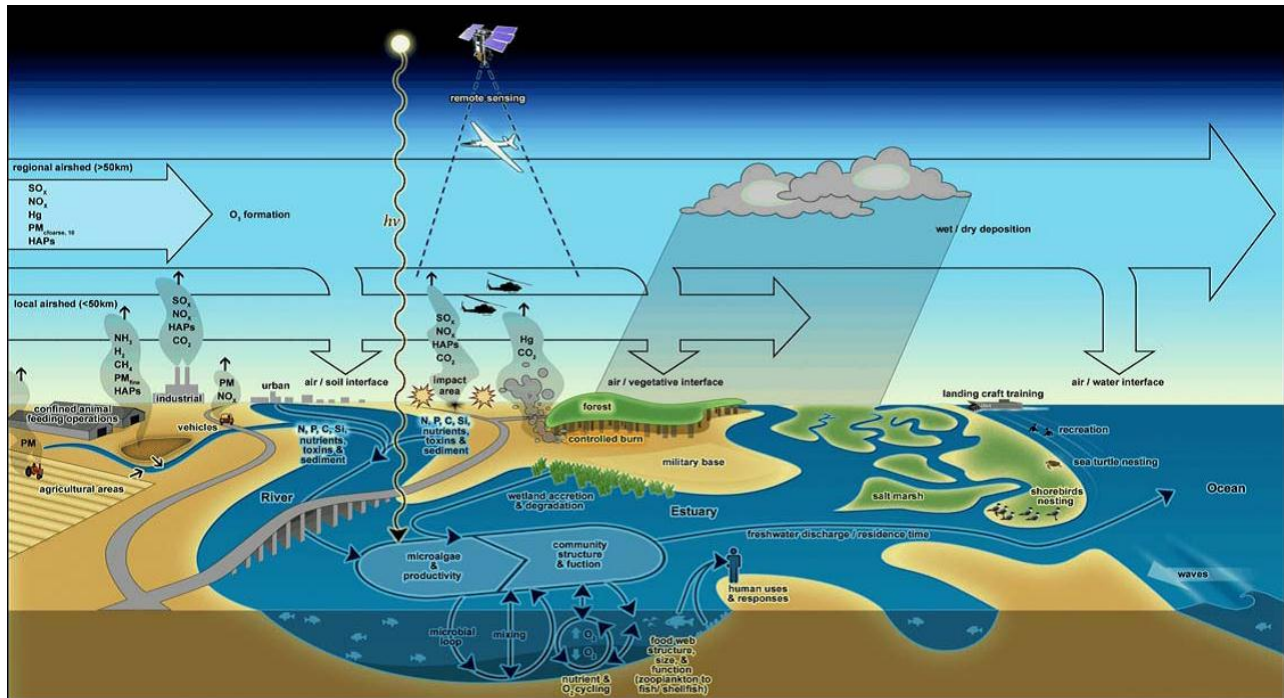


**Figure 1:** Location of USMC Base Camp Lejeune. (USMC MCB Camp Lejeune 2006)

The single and exclusive purpose of USMC Base Camp Lejeune is for military preparedness. In order to instruct and maintain combat-ready troops for expeditionary deployment, the installation provides a variety of environmental conditions and ecosystems in which to train Marines. According to the MCB Lejeune Integrated Natural Resources Management Plan, this objective must be met in a way that “provides for sustainable, healthy ecosystems, complies with all applicable environmental laws and regulations, and provides for no net loss in the capability of military installation lands to support the military mission of the installation” (USMC MCB Lejeune 2006). To support this effort, DCERP research scientists are

developing a holistic understanding of coastal and estuarine ecosystem composition, structure, and function within the context of the military training environment.

As noted on the DCERP website, the program’s specific objectives include: (1) develop appropriate conceptual and mechanistic ecological models to guide research, monitoring, and adaptive management feedback loops; (2) identify significant ecosystem stressors, their sources (on and off Camp Lejeune), and their level of impact on the installation’s ecological systems, and (3) incorporate stressor and other ecological indicator information into the models with the aim to develop more effective management guidelines for sustainable ecosystems (DCERP n.d.). (Figure 2) DCERP has Aquatic/Estuarine, Coastal Wetlands, Coastal Barrier, Atmospheric, and Terrestrial Ecosystem modules as well as a Data Management module, each with defined objectives, monitoring procedures, research, and modeling goals.



**Figure 2:** Components of DCERP ecosystems management (DCERP n.d.)

From the NEPA mandates of the 1970s to the SERDP and DCERP goals of 2012, the

Department of Defense’s interest in the environment has been focused on *environmental*

*management tied to U.S. military assets. However, the significance of the natural environment and the need for environmental resource management during security and stability operations in a time of military intervention are missing.*

- **Background—Counterinsurgency Fights and Water: Review of Military “Lessons Learned”**

The Center for Army Lessons Learned (CALL) collects, analyzes, shares, and develops tactics, technique, and procedure (TTP) records to facilitate rapid adaptation initiatives and to conduct focused knowledge sharing and transfer to support military decision making. Since 2002, numerous lessons learned have been written about fighting asymmetrical wars to counter insurgents. One lesson highlighted by CALL details ASCOPE-PMESII<sup>2</sup>, the model used for gaining situational awareness in counterinsurgency conflicts<sup>3</sup>. Each letter of ASCOPE stands for an aspect of the operational environment: Areas, Structures, Capabilities, Organizations, People, and Events. The six ASCOPE areas of civil considerations are used to inform the six PMESII operational variables: Political/governance, Military/security, Economic, Social, Infrastructure, and Information. ASCOPE-PMESII is population-focused rather than enemy-focused, and in contrast to a traditional area assessment, ASCOPE-PMESII organizes and examines strategic and operational factors for their relevance to local stability (USA 2011). Designed to give leaders a comprehensive understanding of stability conditions and the factors influencing them, ASCOPE focuses on civil considerations while PMESII identifies operational variables.

However, in ASCOPE/PMESII, natural resources are missing as fundamental components of stability operations and counterinsurgency tactics and strategy. This gap is

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<sup>2</sup> ASCOPE-PMESII has replaced METT-TC (Mission, Enemy Terrain, Troops, Time, Civil Considerations) in counterinsurgency operations. Elements of METT-TC seen in the Army Terrain Analysis (FM 5-33) (US Army 1992).

<sup>3</sup> It is beyond the scope of this dissertation to review the literature of insurgency and COIN, for these encompass military, political, civil society, sociology, psychology, and history topics far from this water/coastal resources management thesis.

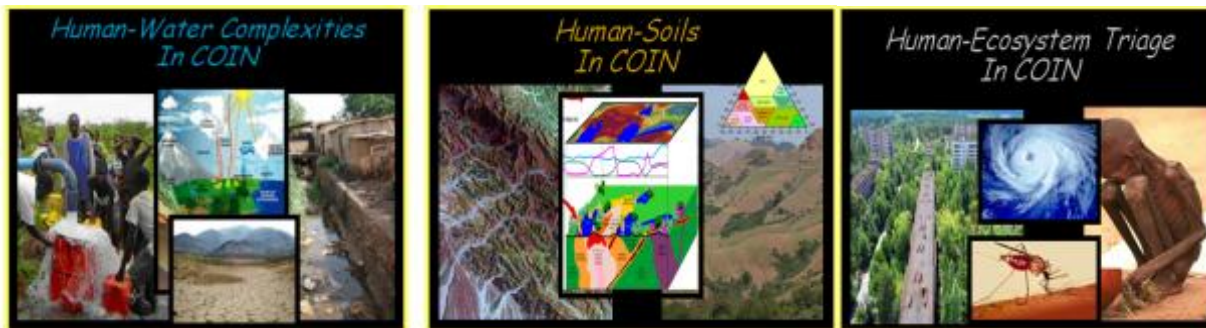
exposed in Annex B of CALL Handbook 11-16, which explains the ASCOPE-PMESII stability matrix. The “A” (area) of ASCOPE includes the natural environment, but it is included as the physical terrain—the traditional battle space—within which insurgent and counterinsurgency actions take place, not as a critical part of the stability operations. “Geography” is bundled in the “E” (economic) of PMESII, along with trade, development, finance, institutional capabilities, and regulation. Water is subsumed under “I” (infrastructure) as part of basic services, again, not as one of the keys to security, stability, and counterinsurgency (USA 2011). Neither environmental nor water resource management is mentioned.

Lionberger notes in his thesis on the Niger Delta, “given that all insurgencies are unique in context and conduct, the COIN methodology from one operational experience may only be partially applicable to or be completely incompatible with the next COIN requirement” (2007). However, as shown in this research, because *water crosscuts all COIN lines of operation (governance, development, and security), water’s ties to security and stability are applicable regardless of the insurgency’s context or conduct.*

- **Background—Water Complexities and Counterinsurgency Operations**

In 2010, the U.S. Army Corps of Engineers’ Engineer Research and Development Center (USACE-ERDC) began funding a multi-million dollar research project entitled “Civil-Military Operations/Human-Environment Interaction” (CMO-HEI), and I am the project’s Principal Investigator. The CMO-HEI research team is tasked to develop an integrated approach for investigating and analyzing the interactions of humans and the environment to address security and stability in counterinsurgency (COIN) efforts. (Figure 3) Though the Department of the Army funds this research, it is of interest to the Joint Staff (formerly known as the Joint Forces Command) because the current military operational paradigm is deficient. All branches of the

Department of Defense collaborate in COIN operations and need a multi-disciplinary, holistic approach to assess human-environment interaction and its effects in the context of regional stability in high-risk areas that are national security priorities.



**Figure 3:** CMO-HEI Areas of Research

The CMO-HEI research exploration includes investigation of: (1) “Water complexities”-- supply, quality, availability, and accessibility-- as they relate to secure and stable environments in military areas of interest and areas of responsibility, (2) Food/Energy/Water Nexus as it affects and is affected by counterinsurgency operations, (3) Parameterization of land cover variables and quantitative analyses of surface feature parameters to determine individual and combined effects on the COIN environment, and (4) Human-Centric Ecosystem Triage – a rapid decision process for military Civil Affairs teams to identify the critical ecosystem services (support, provisional, cultural, regulating) and the ‘value’ of those services as they relate to security and stability in an area of operation.

CMO-HEI research initially concentrated on water and COIN because water is a basic human need. Climate variability will only increase the critical importance of systemic water management, which, if executed well, can foster water security or, if executed poorly, can lead to water insecurity and population destabilization (Palmer-Moloney and Duckenfield 2012). Beyond that, water resource management and water quality control (for health assurance) offer opportunities for socio-economic development that can be supported by military

counterinsurgency initiatives. Finally, water security is a key to successful COIN “hold” and “build” phases in areas of interest/areas of responsibility.<sup>4</sup>

My leadership role of CMO-HEI research has given me an opportunity to influence the larger, human-environment research agenda (Palmer-Moloney, Dehgan, and Duckenfield 2012; Palmer-Moloney and Duckenfield 2012; Dehgan, Palmer-Moloney, and Mirzaee 2012; Palmer-Moloney 2011a, 2011b, 2011c, 2010a, 2010b; Palmer-Moloney et al. 2009, 2010). Because of unique challenges that a coastal setting poses to counterinsurgency planning and operation execution, the USACE ERDC has added “coastal resources management and COIN” to the CMO-HEI program and work package. Furthermore, what began as a narrowly focused research investigation looking at water, security, and stability in civil-military operations has broadened into an opportunity to effect institutional change at the level of the Joint Staff and DOS/USAID, adding a “water complexities/ coastal resources management” approach to the civil-military COIN tactics, techniques, and procedures toolkit.

- **Background—Literature Review of COIN and Coastal Resources Management**

A literature review of prominent, peer-review scholarly journals on water resources and coastal management (2002-2011) confirms the absence of research on counterinsurgency stability operations and coastal resource management and the absence of research on the interrelationship between COIN and water. Journals queried include *Coastal Management* (“0 matches”), *Journal of Environmental Management* (“0 results”), *International Journal of Ecology and Development* (“0 matches”), *International Journal of River Basin Management* (“0 results”), *International Journal of Water Resources and Environmental Management* (“0 results”), *International Journal of Water Resource Development* (“no matches”), and *Water*

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<sup>4</sup> The phases of counterinsurgency operations are discussed in Chapter 3.

*International* (1 match, article by Palmer-Moloney). The same result (“no matches”) was determined after queries to *Natural Resources Journal*; *Society and Natural Resources*; *Annals of the Association of American Geographers*; and *Environment and Planning*.

Search of *Estuaries and Coasts*, the journal of the Coastal and Estuarine Research Federation, produced no results for “coastal resource management and counterinsurgency operations.” However, an examination of the CERF website did yield the 2012 Strategic Environmental Research and Development Program (SERDP) request for proposals. The call is to fund studies that “perform fundamental ecological research on estuarine, coastal, and associated terrestrial ecosystems that are necessary to sustain military readiness.” The desired outcome of the requested research is: (1) to understand the effects of military activities and infrastructure on these ecosystems and (2) to support their sustainable and adaptive management” (CERF n.d.). “Military activities” as used in the SERDP narrative implies the effect of military actions during traditional kinetic war (i.e., storming the beaches) rather than the effect of stability operations in COIN environments.

Beyond the search of peer-review journals, the review of literature also verifies the absence of counterinsurgency stability operations and coastal resource management research by geographers. The geographical perspective on human-environment interaction spans generations of scholars, incorporating a diversity of opinion. From the environmental determinism of Ellen Churchill Semple (1911) to the landscape morphology of Carl Sauer (1925, 1952, 1956; Sauer and Sotomayer 1975); from the global scale and international power dimensions of environmental politics (O’Lear 2010), to waterpower, and geography of water provision (Agnew 2011; Mustafa 2007), from the global impact (Cohen et al. 1998; Dalby 2007) to the local and regional (Colten 2009; Davidson 1974; Nietschmann 1979; Walker and Solecki 2004; Wescoat

et al. 2007), geographers from all of the field's subdisciplines see environment as an enduring and evolving theme (Murphy and Johnson 2000). Geographers studying environment and human-environment interaction, however, have not explored in any substantive way a military counterinsurgency perspective with coastal resources management components. And though military and political geographers (i.e., Batson 2008; Galgano and Palka 2010; Krakowka 2011; Winters 2001) focus on environment's influence on the regional stability and regional conflict and on environmental security, they do not address aspects of coastal resources management or the importance of water for measuring stability and security COIN effect.

- **Methodology**

This dissertation departs from traditional CRM doctoral dissertations in two significant ways. First, while most (but not all) doctoral candidates complete a dissertation and then move out into the larger policy arena to implement projects, I am already the lead scientist for a federally funded, CRM-relevant venture. Because of this, I can develop ways to integrate coastal resources management approach into the investigations I direct. For example, the research I conducted for my dissertation became the justification used for adding a CRM component to the CMO-HEI portfolio. Second, unlike a traditional doctoral dissertation, this study is presented as three research articles, which allows me to contribute directly to the literature and fill aforementioned voids quickly and strategically.

Each of the three articles is focused on a specific research objective. The first two articles provide foundation information, establishing the baseline necessary for the third and final article, which culminates in articulating a way forward for the development of a coastal resources management course of action for counterinsurgency operations.



The first article, “Leveraging U.S. National Security Interests to integrate Environmental Security and Water Resource Challenges effectively into Defense Policy and Procedures”<sup>5</sup> concentrates on the environment’s role in national security interests and in military planning and strategy. Military decision-makers must determine strategic, operational, and tactical responses to situations of insecurity and instability in areas of interest that span the globe. Their comprehension and synthesis of physical geography help them evaluate the battlespace; their knowledge and analysis of human geography help them assess socio-cultural actions across the combatant commands. However, integration of the complex interrelationships between people and the physical places that they occupy is not a requirement for the military decision-maker’s toolkit.

From kinetic combat maneuvers in areas of operation to civil-military engagements in areas of responsibility, human activities impact the environment, and the environment influences options and decisions of people and societies in the battlespace. Environmental security, water resource challenges, and human-environment interaction, therefore, are critical variables for evaluating both the U.S. national security interests and Department of Defense policy and procedures. This first paper examines the significance of environmental security and water resource challenges in the U.S. national security agenda and scrutinizes the Department of Defense response to national security mandates with regard to environmental security and the stability of U.S. Partner States (commonly referred to as “allies”). Presently a holistic understanding and incorporation of natural and social systems in areas of operation is missing in military doctrine and at all scales of military command and control. I make the case that the U.S. military needs to expand its definition of “threats” to include environmental security, considering

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<sup>5</sup> Based on Palmer-Moloney, L.J. (2011) Water as Nexus: Linking U.S. National Security to Environmental Security. *Journal of Military Geography*, Special Issue 1:1: 52-65.

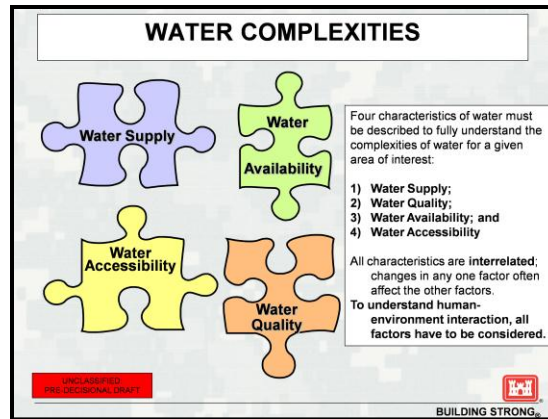
security and stability connections to water resources. From this, a CRM perspective that encompasses actions and activities within a watershed as well as on the coastal fringe can be developed.

The second article, “COIN Effect: Understanding Water's Role in Counterinsurgency Stability Operations,”<sup>6</sup> surveys U.S. government agency relationships in counterinsurgency environments. It reviews the effectiveness of interagency collaboration on COIN initiatives and examines the situation of water resources in the dialogue and decision-making in the midst of combat. It addresses the processes in counterinsurgency environments, current assumptions about causes and effects of insurgency, progress to date on water’s role in security and stability operations, and introduces the CMO-HEI water complexities. (

Figure 4) For a post-conflict area of operation to achieve security, it needs water to stabilize population movement, to support agriculture, to ensure food security, and to support public health. To achieve these objectives, a suite of complex water issues (dealing with water quantity, quality, availability, and accessibility) must be incorporated into decision-making. However, in areas of operation around the world, commanders at the strategic and tactical levels lack critical knowledge that they need to make informed decisions that are tied to water’s role in counterinsurgency (COIN) efforts.

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<sup>6</sup> Based on Palmer-Moloney, L. J. (2011) Water’s Role in Measuring Security and Stability in Helmand Province. *Water International*, 36:3: 207-221.



**Figure 4:** Water Complexities (Palmer-Moloney et al. 2010b)

The purpose of this second paper is to demonstrate the need for inclusion of a water resource management perspective in all lines of operation—governance, socio-economic development, and security—during implementation of COIN Stability Operations. After scrutiny of pertinent military doctrinal publications (COIN Operations, FM 3-24, and Stability Operations, 3-07), water’s role in the “*hold*,” “*build*,” and “*transition*” phases of COIN is evaluated. COIN goals and lines of operation (LOOs) are identified in a counterinsurgency course of action, and the key players and their roles in COIN stability operations are introduced. Then a synopsis of water’s tie to security and stability in the COIN environment is presented by deconstructing water into “water complexities” and linking them to LOOs. The paper then examines the COIN effect of water-relevant projects in the counterinsurgency stability operations battlespace and concludes with military lessons learned from Operation Enduring Freedom.

Of key importance, this second article identifies a “data gap” in counterinsurgency doctrine and develops connections between water complexities, human-environment interaction, and counterinsurgency operations. These factors are the scaffolding needed to support the development of COIN and water in the coastal zone, described in the third article.

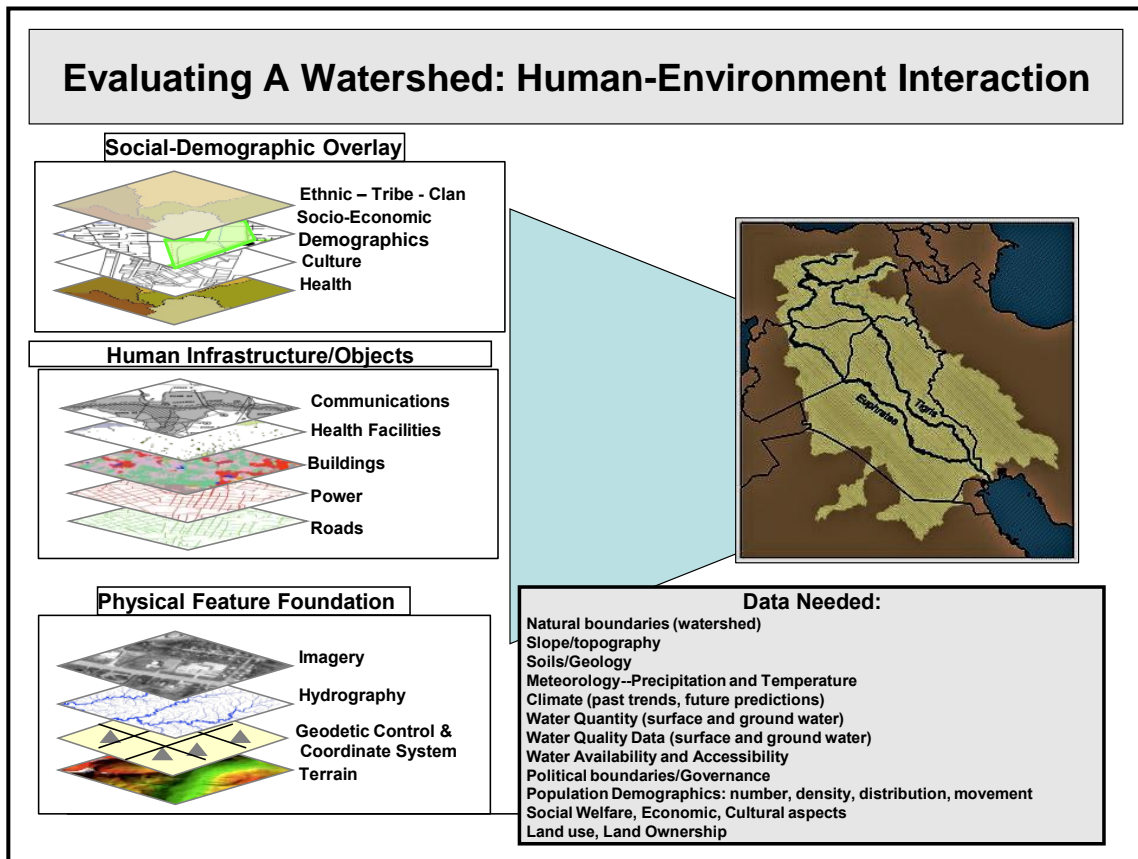
The third and final article, “Towards a Coastal Resources Management Course of Action for Counterinsurgency Stability Operations,”<sup>7</sup> examines the area of operation in Basra Province, Iraq and one COIN operation—*Op League*. In 2009, Basrah Province was showing the effects of over two decades of war: the natural marshes and the lives and livelihoods of the Marsh Arabs were in recovery after near decimation; essential services in the city of Basra were in disarray, its most disenfranchised residents effectively without public works; and there was an underlying socio-cultural power struggle in play. In the midst of this, British military leaders fighting as part of the Multinational Force pushed to move security and stability forward by conducting counterinsurgency (COIN) operations. These efforts were designed to counter unrest rooted in the political, economic, social, cultural, and security dimensions of their area of operation. One specific COIN project carried out in 2009 was the repair and rehabilitation of a saltwater regulator. This COIN engagement in an estuarine setting on the Shatt al Basra Canal, demonstrates how upstream activities in the Tigris-Euphrates basin linked to downstream effects, which literally and figuratively moved back and forth with the changing tides of the Persian Gulf.

This final paper examines the saltwater regulator COIN initiative from a human-environment interaction perspective, highlights the cause and effect of the engagement in context of the watershed and estuarine setting, and puts forward a coastal resource management approach to similar stability operations. (Figure 5) First an historic overview of the region’s physical and human geography is presented. Next conditions in and around Basra, 2004-2009, are highlighted. This is followed by a description of the saltwater regulator COIN project and its

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<sup>7</sup> Manuscript submitted to peer-review journal *Coastal Management* for publication.

outcomes. Following a discussion of military lesson learned, a coastal resources management approach to future similar COIN undertakings is put forward.



**Figure 5:** Example of Human-Environment Interaction data layers for Basra analysis

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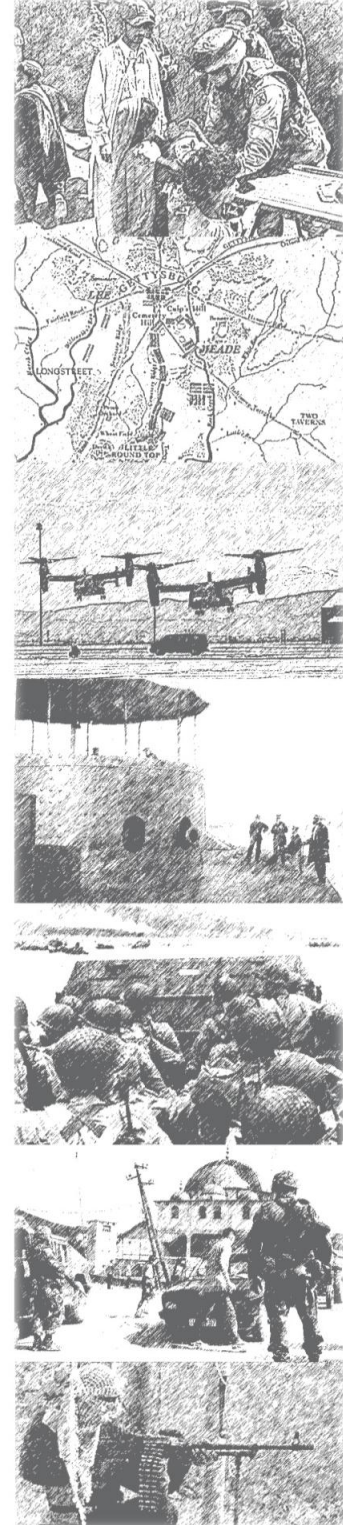
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## Chapter 2: Leveraging U.S. National Security Interests to integrate Environmental Security and Water Resource Challenges effectively into Defense Policy and Procedures <sup>8</sup>

### ABSTRACT

Military decision-makers must determine strategic, operational, and tactical responses to situations of insecurity and instability in areas of interest that span the globe. Their comprehension and synthesis of physical geography help them evaluate the battlespace; their knowledge and analysis of human geography help them assess socio-cultural actions across the combatant commands. However, an integration of the complex interrelationships between people and the physical places that they occupy is missing from the military decision-makers' toolkit. From kinetic combat maneuvers in areas of operation to civil-military engagements in areas of responsibility, human activities impact the environment, and the environment influences options and decisions of people and societies in the battlespace. Environmental security, water resource challenges, and human-environment interaction are critical variables for evaluating both the U.S. national security interests and Department of Defense policy and procedures. This paper examines the importance of



<sup>8</sup>This article is based on Palmer-Moloney (2011) Water as Nexus: Linking U.S. National Security to Environmental Security. *Journal of Military Geography*, Special Inaugural Edition, 1:1: 52-65.

environmental security and water resource challenges in the U.S. national security agenda and scrutinizes the Department of Defense response to national security mandates with regard to environmental security and stability of Partner States.

**Key words:** National Security, Environmental Security, Water Resources, Human-Environment Interaction, U.S. Department of Defense, Partner States.

• **Introduction**

Military decision-makers determine strategic, operational, and tactical responses to situations of insecurity and instability in areas of interest and areas of operation that span the globe. Their comprehension and synthesis of physical geography help them evaluate the battlespace; their knowledge and analysis of human geography help them assess socio-cultural actions across the combatant commands. Nevertheless, integration of the complex interrelationships between people and the physical environments that they occupy is missing from the defense decision-maker's toolkit.<sup>9</sup>

Human actions affect and are affected by the natural environment. In military operations, whether troops are involved in kinetic maneuvers or in civil-military engagements with local populations, both sides of human-environment interaction must be considered to gain a rich contextual appreciation and awareness of the situation. This is particularly true in contemporary asymmetric<sup>10</sup> (counterinsurgency) warfare (U.S. Army 2006).

Water is critical to sovereign state stability. It is needed to stabilize population movement, to support agriculture and ensure food security, and to sustain public health. And it

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<sup>9</sup> This is not to say that it does not occur. When it does, it occurs because of the happenstance of having a staff that is aware of the importance making the connections, not because of doctrine or TTPs.

<sup>10</sup> Asymmetric warfare is being fought when opposing groups or nations have unequal military resources, and the weaker opponent (i.e., the insurgent group) uses unconventional weapons and tactics, as terrorism, to exploit the vulnerabilities of the enemy (Ancker and Burke 2003).

often underpins the essential services that a country's citizens expect to have provided by the established government (Palmer-Moloney 2011). This links water to U.S. national security interests because countries around the world face profound water resource challenges such as those caused by flooding or drought, which can exacerbate ethnic and political tension, negatively effect economic and social wellbeing, and increase the likelihood of a sovereign state's instability (Krakowka 2011, Parthemore and Rogers 2010).

This paper examines the importance of environmental security and water resource challenges in the U.S. national security agenda and scrutinizes the Department of Defense response to national security mandates with regard to environmental security and the stability of U.S. Partner States. First, an overview of the U.S. national security framework is presented to place environmental security and water resource challenges in the Defense Department context. Next, water's tie to sovereign state stability is examined. Finally, water resource challenges, human-environment interaction, and environmental security are considered collectively and a method for integrating these concepts into the Department of Defense policy and procedures is proposed.

- **Navigating the U.S. National Security's Uncharted Waters**

*“Rather than one, single entity—the Soviet Union—and one, single animating ideology—Communism—we are instead facing challenges from multiple sources: a new, more malignant form of terrorism inspired by jihadist extremism, ethnic strife, disease, poverty, climate changes, failed and failing states ...”*

Secretary of Defense Robert Gates, 18 April 2009

Following the collapse of the Soviet Union, the U.S. security posture faced substantive adjustment. The U.S. Congress wanted oversight of security changes and eventually mandated that the country's defense strategy undergo formal legislative review. Since 1997, the Department of Defense (DOD) has produced a defense review every four years to serve this

purpose. The Quadrennial Defense Review (QDR) is used to set a long-term course as the Department of Defense assesses the threats and challenges that face the nation. It is also used to rebalance defense strategies, capabilities, and force structure to address current conflicts and future threats (Parthemore and Rogers 2010). In its February 2010 edition, the QDR recommends that policy, doctrine, and capabilities of the DOD support six key mission areas that include: (1) succeeding in counterinsurgency, stability, and counterterrorism operations and (2) building the security capacity of U.S. Partner States (DOD 2010).

The 2008 National Defense Authorization Act (NDAA) requires the DOD to consider effects of climate change in all of its facilities, capabilities, and missions; and to incorporate climate change in future Quadrennial Defense Reviews. This mandate sets the expectation that the DOD accounts for a security landscape that includes resource scarcity and environmental uncertainties. In spite of this, as teams of experts from the Joint Staff grapple with how to respond to the key mission areas of the QDR and how to meet the expectations of the NDAA, climate change is not emphasized and the strategic and tactical relevance of water to environmental uncertainties goes unappreciated.

In climate change<sup>11</sup> discussions that take place at the Pentagon, water's significance is understated or disregarded because water is tied to development and public health, topics that traditionally fall under the purview of the Department of State and U.S. Agency for International Development. This omission by Defense should not be excused or ignored because water is clearly tied to success in counterinsurgency operations and the security of U.S. Partner States.

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<sup>11</sup> The QDR points out potential climate change effects on the operational environment as well as DOD facilities and U.S. military capabilities. This paper addresses only the operation environment aspects of the report.

An analysis of the Pentagon's action related to QDR Key Mission 3: *Building Security Capacity (BSC) of Partner States* illustrates this point.<sup>12</sup>

According to the QDR, "America's national security and defense strategies depend on strong foreign ties, including a vibrant network of defense alliances and partnerships adapted to this challenging era" (DOD 2010, 57). Climate change and water extremes (flooding and drought) affect the security and the stability of U.S. Partner States when they cause these countries to incur the cost of insurmountable human needs. It follows that proactive engagement with Partner States is needed to build their capability to respond to environmental stress (DOD 2010).

By consensus the QDR BSC committee selected six 'core capabilities' and four 'enabling technologies' to meet the QDR-directed dictates. The core capabilities are cultural immersion, language training, socio-cultural dynamics for decision-making, theater logistics and mobility, and distributed essential services, while the enabling technologies consist of interactive language training tools, modeling, simulations, and emergency response technologies (BSC Committee 2010).

The BSC Committee could have identified enabling technologies that would have had direct impact on the Partner States, such as tools and techniques to predict and cope with food/water scarcity or environmental stress (such as flood or drought conditions). The BSC Committee could have recommended Partner State capacity building in geospatial technologies, such as geographic information systems (GIS), for collecting data to track spread of disease or the movement of environmental refugees or internally displaced people (Goodchild 2010,

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<sup>12</sup> The author was a member of the QDR Review Team *Building Security Capacity of Partner States*. Comments are from her first-hand observations of how the process progressed.

Palmer-Moloney 2010a). Nevertheless, the BSC committee relegated water to the bin of "Distributed Essential Services," where water, like energy, is traditionally placed as a collective *infrastructure concern*.

Environmental stress and water security challenges are highlighted on one briefing slide entitled "The BSC Imperative—Help Others Mitigate the Effects of Climate Change" (BSC Committee 2010). Words spell out and images illustrate some of the threats of climate change to Partner State security (i.e., food and water scarcity, disease, and mass migration). Information on the slide lists ways to mitigate the effects of climate change on security, specifically noting (1) training in geospatial technologies, (2) human-environment interaction monitoring and response, and (3) predictive modeling for emerging food/water scarcity and spread of disease. The slide demonstrates that the BSC committee acknowledged the challenging "way forward," by clearly stating that climate change is a key issue that will shape the future security environment, and by noting that climate change, energy security, and economic stability are inextricably linked (BSC Committee 2010). An unpublished white paper associated with the BSC Technology Area Study briefing goes on to describe how potential consequences of climate change could stress U.S. defense capabilities and capabilities of the nation, in general. Yet, neither the briefing slide nor the unpublished white paper had a documented effect outside of the BSC committee meeting room.

Environmental security, climate change, and their relationship to national security interests are complicated when it comes to water. Though there are informal initiatives within the DOD, at this time there is neither an overarching climate change/environmental stress/water security program nor a Combatant Command Theater Security strategy dedicated to water. There is a need to link U.S. national security efforts to climate change, environmental stress, and

water insecurity of U.S. Partner States. By providing integrated planning processes and tools, sharing critically relevant information, and understanding points of dissent, the Joint Command could provide focused engagement with U.S. allies that is cost-effective, relevant, and enduring. In spite of this, Joint Staff action on issues of climate change, environmental stress, and water insecurity is taking a back seat to topics that are easier to work with such as “socio-cultural dynamics for decision-making”.

This is not to say that DOD does not address environmental stress with Partner States. Since receiving a mandate from the Secretary of Defense, Robert Gates, the U.S. Army Corps of Engineers (USACE) Civil-Military Emergency Preparedness Division has been attentive to building security capacity of Partner States on a daily basis. The Civil-Military Emergency Preparedness Division of USACE addresses water issues and Partner State concerns when it responds to crises, such as the flooding in Pakistan or mudslides in Tajikistan (USACE 2010). The program is directed to increase emergency management and disaster preparedness skills in Partner States, and its teams orchestrate disaster preparedness GIS workshops, as well as response plan development and interagency crisis management planning (Pietrowsky 2010). This level of engagement is not, however, tied back to U.S. national security interests.

- **Water Insecurity and State Instability**

To understand water’s significance to the national security of U.S. and its Partner States, water must be considered at different scales, from the watershed to the village level. (Table 1) This makes incorporating water resource challenges into national security mandates particularly vexing (Vivekanandan and Nair 2009).



**Table 1: Water Challenges. Source: Vivekanandan and Nair (2009)**

WATER CHALLENGES	
1	Competition for use—agricultural, industrial, and domestic.
2	Competing rural and urban needs in low and high density populations.
3	Traditional over-exploitation of surface water supplies (common resource).
4	Private control of groundwater; vulnerable to unregulated exploitation.
5	Transboundary considerations—upstream and downstream riparian states may disagree on approach to watershed management.
6	Inequitable access.
7	Social, ecological, and economic problems caused by large-scale water projects (i.e., dam construction).

There are disparities in water distribution between countries and within countries, and seldom, if ever, is there a clear-cut solution to water resource challenges (Vivekanandan and Nair 2009). A country with large variability in climate and landscape characteristics may simultaneously suffer from water shortages, causing serious drought, and from water excess, causing destructive floods.

Dealing with water insecurity requires effective water management plans. And effective water management plans require support of stakeholders as well as transparent, current data collection, data sharing, and data analysis efforts (USAID 2010). These prerequisites for water resource management success are often missing or unachievable in U.S. Partner States.

As recorded in research of Vivekanandan and Nair (2009, 1-2),

*(t)he resilience and adaptive capacity of local households to cope with the effects of climate change are dependent upon the functioning of systems at higher levels, such as information flows, governing and administrative structures, and market and delivery systems that would facilitate the timely passage of information and resources.*

Hence, response to environmental stress and water resource challenges needs to be supported by a flow of information so that U.S. government agencies and U.S. Partner States can work together and respond effectively to environmental crises (BSC Committee 2010).

Effective information flow requires data collection, data sharing, data analysis, and collaborative planning. Many times this is hampered because of information classification restrictions. For example, water data collected and shared by civil-military units responding to an environmental crisis may be at the UNCLASSIFIED level. Yet if the data are stored and shared via a DOD network, they will often be held in a SECRET computer system, which means Partner States government agencies cannot access them.

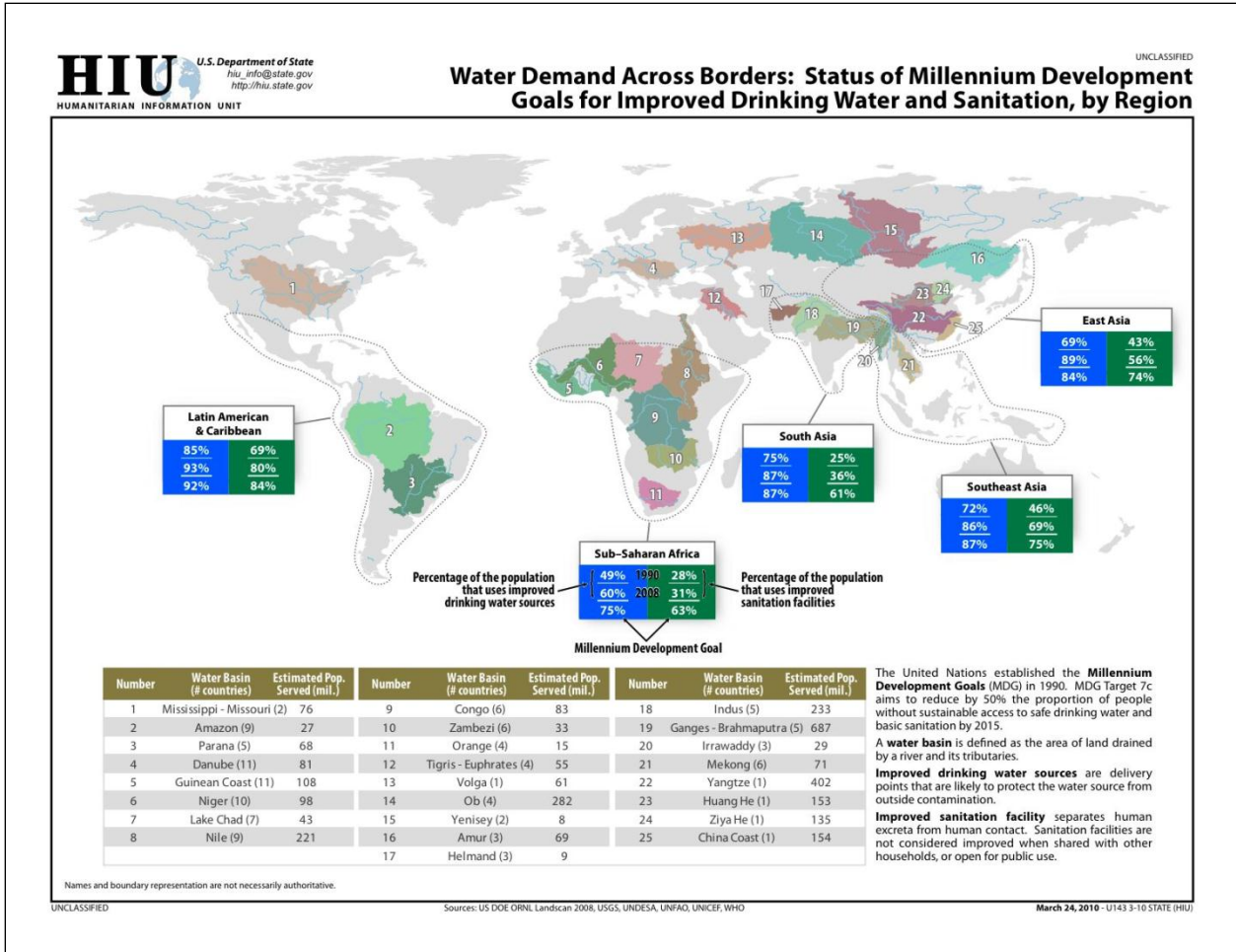
Krakowka (2011) defines environmental security as a process involving environmental risk analysis based on complex linkages between anthropogenic and natural processes that destabilize the environment and contribute to political volatility. According to her thesis, environmental processes can undermine governments and promote insecurity and trigger civil conflict. As such, water stress can prompt unrest and lead to destabilization. In times of climate uncertainty and environmental stress, if Partner States do not address the basic needs of their populations because they have limited or failing information flow, limited or failing governance and administrative structures, and/or no infrastructure to support development, U.S. national interests could be compromised.

- **Water Resource Challenges, Human-Environment Interaction, and Environmental Security**

*“Part of being serious about dealing with and adapting to climate change is about being serious about water. As the earth warms, rainfall patterns can shift, bringing new patterns of drought and flooding. And we need to get out in front of that problem.”*

Secretary of State Hilary Rodham Clinton, 22 March 2010

Water is a precondition for life, and although there is enough fresh water on the planet to support billions of people, it is distributed unevenly. As reported by the United Nations (2010), if current climate change scenarios, almost half the world's population will be living in areas of high water stress by 2030. Currently, more than 1 billion people lack access to water, and more than 2.4-billion lack access to basic sanitation. Access to clean water is lowest in Africa, while Asia has the largest number of people with no access to basic sanitation (UNDP 2006a). Rural populations without access to reasonable sanitation infrastructure face increases in disease (Vivekanandan and Nair 2009). From the perspective of regional environmental security, the importance of water—to help alleviate poverty and to support human and ecosystem health—and the management of water resources are of central importance (Otero 2010; UNDP 2006a). Although the world is on track to meet the United Nation's Millennium Development Goals (MDGs), there are major gaps (Figure 6) in many regions, particularly in Sub-Saharan Africa and Asia (UNDP 2006b).



**Figure 6:** Cross-border water demand, emphasizing the status of millennium development goals for improved drinking water and sanitation by region. Source: Department of State, Humanitarian Information Unit (2010)

History indicates that in areas of water uncertainty brought on by drought or flooding, populations are prone to move, creating environmental refugees and internally displaced people. Emigration may allow environmental refugees to escape locations of drought or flooding, but it creates stress in destination areas, putting heavy burdens on natural resources and the social and economic capabilities of host communities (Michel and Pandya 2009).

Well-intentioned government public works projects to provide water to the disenfranchised and displaced population may take years and may require extensive assistance from the international donor community (USAID 2010, UNDP 2006b). Without water for

consumption or irrigation, these populations could face profound hardship and become predisposed to recruitment by insurgents (Batson 2008).

In a report for *The Washington Post*, reporter Glenn Kessler suggests that a reliable indicator of a country's safety is the return of refugees and the reduction of internally displaced people, because if people feel secure, they will return home. He points out that the situation in Iraq remains deeply troubled because there are 2.8 million Iraqis who are internally displaced, out of a population of 26 million. More than 1 million have no regular income and 300,000 do not have access to clean water (Kessler 2008). Analysis by The Center for a New American Security connects continued instability and insecurity in Iraq to water, noting that severe water shortages have compromised meaningful reconciliation between the Iraqi people and the government (Rogers 2010). If the government fails to provide essential services (i.e., water), there may be renewed support for an insurgency.

- **Water and Security Policies and Procedures as part of U.S. Defense**

As America's political leaders acknowledge climate change issues and the work of the Intergovernmental Panel on Climate Change, environmental security and water resource challenges are beginning to seep into the country's defense strategy dialogue. This is demonstrated in the U.S. Senate's Committee on Foreign Relations 2011 report on "Avoiding Water Wars":

*Water plays an increasingly important role in our diplomatic and national security interests...and in achieving our foreign policy objectives...The United States has elevated water-related issues in its bilateral relationships with priority countries...and U.S. strategy and foreign assistance budgets now include significant investments allocated toward activities that promote water security...Water scarcity, coupled with how governments address these challenges, can exacerbate conflict or promote cooperation. (pp. v, 1-2, 21)*

In many respects, wars driven by ideology are giving way to conflicts triggered or intensified by demographic and environmental factors (Annin 2006, Chartres and Varma 2010,

Harris and Alatout 2010, Pearce 2006, Pomeranz 2009, UNDP 2006a). Nevertheless, many scholars note that water resource challenges and environmental stress lend themselves to interstate collaboration and problem-solving because water is central to all life and because states have mutual interests in supporting water management and their populations (Agnew 2011, Budds 2009, Cohen and Frank 2009, Delli Priscoli and Wolf 2010, Dehgan and Palmer-Moloney 2010, and Mullin 2009).

What is needed is the development of a geospatially-enabled toolset on water supply, quality, availability, and accessibility programs to develop and enhance training and analysis abilities of Partner States and for U.S. civilian-military units. Used in areas of operation such a toolset could help determine water resource specifics that can be tied to environmental security.

Key questions that should power this geospatial effort include:

- Where are water resources, i.e., wells, water pipelines, aquifers, reservoirs?
- Is the water infrastructure safe or is it vulnerable to attack or natural disaster? If vulnerable, explain/locate place(s) of weakness.
- Are water sources contaminated or are they potable? If contaminated, is pollution point source or non-point source? Is the cause of pollution/contamination known?
- What quantity of water is available from sources (groundwater, surface water, snow pack, etc.)?
- What is the state of water accessibility? (Is it tied to control based on ethnic groups, gender, etc.?) Is one group more than others impacted by water stress?
- How are competing water needs/uses prioritized?

If used as a data collection, data sharing, and data analysis opportunity, such a geospatial approach could support U.S. national security interests and meet the directives specified in the QDR and NDAA. Water questions based on a geospatial approach could strengthen the capacity of Partner States by offering predictive and coping mechanisms to address environmental security stress brought on by water resource challenges.

- **Conclusions: Water as a Nexus between U.S. National Security and Environmental Security**

*“Water plays an increasingly important role in our diplomatic and national security interests...and we must ensure that our approach is carefully considered and coordinated across the interagency.”*

Senator John Kerry, February 2011 (U.S. Senate Report “Avoiding Water Wars”)

Since the collapse of the Soviet Union, environmental security has become an important paradigm in security planning, policy, and analyses. Contemporary events have demonstrated that the environment—and specifically water—has had an important influence on state stability and in some cases, has triggered violent conflict. This reality has been addressed in various U.S. national security documents since the early ‘90s, and the QDR is now focused (in part) on the intersection of U.S. national security and environmental issues.

The national security strategy of the United States needs an expanded definition of our national defense interests that includes threats fostered by environmental stress. In fact recent government documents, such as the U.S. Senate report “Avoiding Water Wars” (2011), and numerous scholarly articles have reinforced this concept by suggesting that wars driven by ideology have essentially given way to conflict triggered or intensified by demographic and environmental factors. This means that national security is no longer simply about armies and weapons. It increasingly correlates to environmental factors and dynamics that have been rarely considered by military leaders in the field.

Environmental change and resource scarcity are already contributing to instability and violence in the developing world, and may be enabling violent non-state actors and insurgent forces in places like Iraq and Afghanistan (Batson 2008, U.S. Department of Army 2006, Kessler 2008, Palmer-Moloney 2011, and Palmer-Moloney and Duckenfield 2012). Environmental security refers to a broad range of security issues triggered or exacerbated by demographic and

environmental factors such as competition for resources, population growth and displacement, disease, natural disasters, environmental change, environmental damage, and non-sustainable practices. Environmental stresses intensify latent ethnic and political rifts, thus undermining security and confidence in the government. Thus, it is incumbent on commanders in the field to understand the importance of water to stability, and the ability of water-related environmental stress to undermine security efforts.

Data collection and data sharing are needed to understand and to address water situations that could lose or gain the trust of the local population. They are also needed to support tactical and strategic decision-making. To meet these objectives requires reliable access to and guaranteed flow of information to all stakeholders. To address water issues, data must be shareable, with options for unclassified accessible data postings by military forces, government agencies (i.e., Department of State, and U.S. Agency for International Development), and civilian non-government organizations.

To measure progress in our defense operations, the U.S. should institute the collection of environmental security data and analyze proxy observables associated with water supply to inform decision-makers. Questions asked about water resource challenges and environmental security need to tease out the human-environment interaction as well as human and physical geographies.

At the same time, U.S. government agencies should address the key missions in the QDR in ways that encourage the training of and support for Partner States to deal with water's ties to their security and stability. Otherwise, from a national security perspective, environmental uncertainty and water-related crises could lead to instability and require the international community military intervention. ★



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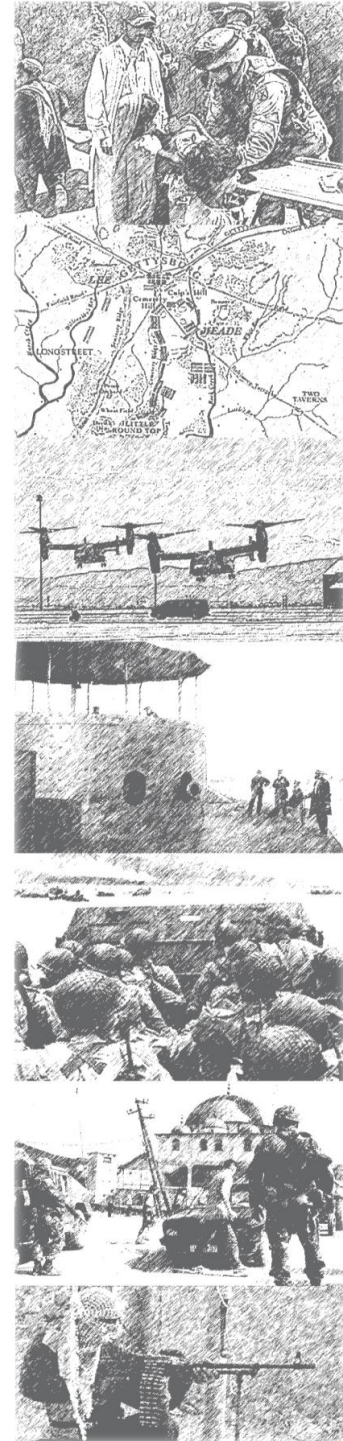
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## Chapter 3: COIN Effect: Understanding Water’s Role in Counterinsurgency Stability Operations<sup>13</sup>

### ABSTRACT

For a post-conflict area of operation to achieve security, it needs water to stabilize population movement, to support agriculture, to ensure food security, and to support public health. To achieve these objectives, a suite of complex water issues (dealing with water quantity, quality, availability, and accessibility) must be incorporated into decision-making. However, in areas of operation around the world, commanders at the strategic and tactical levels lack critical knowledge that they need to make informed decisions that are tied to water’s role in counterinsurgency efforts. The purpose of this paper is to demonstrate the need for inclusion of a water resource management perspective in all lines of operation—governance, socio-economic development, and security—during implementation of counterinsurgency Stability Operations. After scrutiny of pertinent military doctrinal publications, water’s role in the “*hold*,” “*build*,” and “*transition*” phases of counterinsurgency (COIN) is evaluated.



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<sup>13</sup> This paper draws from research originally published in Palmer-Moloney’s article (2011) Water’s role in measuring security and stability in Helmand Province, Afghanistan. *Water International* 36:2:207–221.

The paper then examines the “COIN effect” of water-relevant projects in the counterinsurgency stability operations battlespace and concludes with military lessons learned from Operation Enduring Freedom.

**Key words:** military doctrine; counterinsurgency; stability operations; water complexities

- **Introduction**

The introductory pages of the Counterinsurgency (COIN) Field Manual, 3-24 (U.S. Army 2006) state that by focusing on efforts to secure the safety and support of local populations, U.S. forces can defeat an insurgency. This document, which establishes U.S. counterinsurgency doctrine, points out that:

*During any period of instability, **people’s primary interest is physical security for themselves and their families.** When Host Nation forces fail to provide security or threaten the security of civilians, the population is likely to seek security guarantees from insurgents, militias, or other armed groups. This situation can feed support for an insurgency. However, when Host Nation forces provide physical security, people are more likely to support the government.*  
U.S. Army 2006, 3-67.

*Essential services provide those things needed to sustain life. Examples of these essential needs are food, water, clothing, shelter, and medical treatment. Stabilizing a population requires meeting these needs. **People pursue essential needs until they are met, at any cost and from any source. People support the source that meets their needs.** If it is an insurgent source, the population is likely to support the insurgency. If the HN government provides reliable essential services, the population is more likely to support it. Commanders therefore identify who provides essential services to each group within the population.*  
U.S. Army 2006, 3-69.

So, successful execution of COIN operations depends upon establishing security among the local populations to ensure stability in an area of operation. But without water security, there can be no stability. Water security means not only an adequate supply of clean water, but also

that everyone who needs clean water can obtain enough of it when – and where – they need it (Palmer-Moloney, Dehgan, and Duckenfield 2012). Thus, water security is driven by both environmental and human factors.

Severe, long-term water stress is the norm for many people who live across the combatant commands, and in many areas of operation, they struggle to live in the face of profound water insecurity. Many times strategies, both cooperative and competitive, have been pursued to meet the challenges water insecurity brings, but success has been limited. Examples from around the world and throughout the historical record suggest that people can make a living, and live amicably with their neighbors, in the absence of an acute water crisis. Typically, however, when water becomes scarce, stability is lost. Likewise, when the perception that others are threatening water security arises, conflict follows.

*“Clear. Hold. Build. Transition”* According to counterinsurgency doctrine employed by U.S. military forces, these operational stages<sup>14</sup> lead to the security, governance, and economic development necessary for building peace and for supporting a Host Nation (HN) government that is being challenged by an insurgent force. Each counterinsurgency phase has temporal and spatial dimensions depending on the operational environment – ranging from relatively simple tactical decisions and actions to more complex strategic planning. Such operations vary from close personal dialogue between troops (soldiers, Marines, sailors, and airmen), civilian workforce, and local leaders to international debate and arbitration among global forces, U.S.

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<sup>14</sup> As outlined in the joint forces Counterinsurgency Field Manual (JP 3-24), a COIN operation typically includes the following phases:

(1) **CLEAR**: “Create a secure physical and psychological environment”; (2) **HOLD**: “Establish firm (host nation) government control of the populace and area, and gain the populace’s support”; (3) **BUILD**: “Progress in building support for the Host Nation government requires protecting the local populace. People who do not believe they are secure from insurgent intimidation, coercion, and reprisals will not risk overtly supporting COIN efforts. The populace decides when it feels secure enough to support COIN efforts” (US DOD 2009). (4) **TRANSITION** phase was added to the framework by 2009 but does not appear in the COIN field manual. In this final phase, control of the population-centric security, governance, and development initiatives is passed from the assisting US and /or multinational military force to the Host Nation government.

Government agencies (such as Department of Defense, Department of State, US Agency for International Development, and US Department of Agriculture), and the governments of “host nations” (HN). But despite the irreversible trajectory implied by the phases of counterinsurgency operations, “clear” does not always lead to “hold”, nor “hold” to “build”, nor “build” to “transition,” as illustrated by the ebb and flow of fighting in “post-conflict” areas of operation from 2007 to 2012<sup>15</sup> (Palmer-Moloney 2011).

From a U.S. military perspective, counterinsurgency operations are population-centric by design and demand action different from the traditional “kinetic” military response (Flynn et al. 2010; Petraeus 2010; U.S. Army 2006). Water’s significance in economic development is understood and clearly linked to numerous Coalition Force<sup>16</sup> and United States Government interagency COIN activities.<sup>17</sup> However, water’s significance in counterinsurgency operations and its ability to serve as a tangible, “proxy observable” (indicator) to measure operational COIN effect is underappreciated, if it is considered at all.

In areas of operation around the world, commanders at the strategic and tactical levels lack critical information that they need to make informed decisions about water’s consequence in counterinsurgency efforts. At all levels of stability operations, there is a critical need for a water resource management perspective to bring together complex water issues that deal with water quantity, quality, availability, and accessibility.

The purpose of this paper is to demonstrate the need for inclusion of a water resource management perspective in all lines of operation—governance, socio-economic development, and security—during implementation of COIN Stability Operations. To achieve this objective,

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<sup>15</sup> COIN ops 2007 (initiation of COIN doctrine in the field)- 2012 included Operation Enduring Freedom (Afghanistan, Philippines, Horn of Africa, Trans Sahara, Caribbean and Central America, and Kyrgyzstan) and Operation Iraqi Freedom.

<sup>16</sup> These include the multinational forces in Operation Iraqi Freedom and in Operation Enduring Freedom.

<sup>17</sup> Information included in this article is based on field experience of the author who was deployed (2011-2012) as a member of the Command Element, Stability Operations General Staff, II MEF Headquarters, Regional Command Southwest, Afghanistan.

pertinent military doctrine (COIN Operations, FM 3-24, and Stability Operations, 3-07) is scrutinized and water's role in the “*hold*,” “*build*,” and “*transition*” phases of COIN is evaluated. The paper begins with an overview of COIN goals and the identified lines of operation (LOOs) in a counterinsurgency course of action. This is followed by a summary of the key players and their roles in COIN stability operations. Then a synopsis of water's ties to security and stability in the COIN environment is presented by deconstructing water into “water complexities” and linking them to LOOs. Finally, COIN effect of water-relevant projects in the stability operations is analyzed using military lessons learned from the Operation Enduring Freedom battle space.

- **COIN Operational Goals and Lines of Operation Objectives**

An *insurgency* is “an organized movement aimed at the overthrow of a constituted government through the use of subversion and armed conflict” (U.S. Army 2006). In response, *counterinsurgency operations* are designed to disrupt organized insurgent movements against a constituted government. Though they have been given various names over the past 150 years of modern military history, all insurgent groups share some attributes: (1) they challenge conventional military forces with unconventional tactics and with support (sometimes strong, sometimes tenuous) from the civilian population, and (2) though they require “an uncommon combination of conditions” to begin, once started, insurgencies are difficult to stop using traditional military responses. Conventional state-sponsored military forces, prepared for the straightforward proposition of defeating another conventional state-sponsored military force, lack the organizational structure, logistics, and intelligence architecture to defeat an insurgent force (Lionberger 2007).



British doctrine and methods for fighting insurgents were developed in response to the Malayan Emergency (1948-1960)<sup>18</sup>, and French and American COIN doctrine evolved over the course of the Indochina/Vietnam War (1950-1975) and the Algerian War (1954-1962) (Galula 1964; McCuen 1965; Nagl 2002, 2005). In most cases, population-centric counterinsurgency operations were only ever employed by a core function of a small, select group within the Special Operations community.

From the end of the Vietnam War in 1975 until late 2002 counterinsurgency lessons learned for “winning hearts and minds” were lost as tactics, techniques, and procedures of “Big Army” and “Big Marines” focused on mid-to-high intensity combat against large armored and mechanized formations (Lionberger 2007). During this period U.S. Special Operations COIN engagements were limited to experiences in El Salvador (1980s) and in Nicaragua (1981-1988).<sup>19</sup> The COIN doctrine used in Central America was directed to low intensity conflict against a rural-based insurgency with a focus on how to destroy its combat forces (Lionberger 2007). None of the counterinsurgency military lessons learned focused on the critical, cross-cutting importance of water in the battle space. When it was considered, water was mentioned as a limiting factor, getting in the way of progress (Lionberger 2007), not a key to population-centric COIN success.

In the aftermath of successful conventional campaigns against al Qaeda and the Taliban (in Afghanistan) and the Saddam Hussein regime (in Iraq), the U.S. military and Multinational Coalition Forces were faced with continued insecurity and instability in the areas of operation

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<sup>18</sup> The approach of “winning hearts and minds” was used by the British military long before, writing of the British Counterinsurgency Manual, which is discussed in Chapter 4.

<sup>19</sup> “Winning hearts and minds” was not then nor is it now restricted to handing out candy and medical supplies or crafting good news propaganda about a contested established government being challenged by insurgents. Counterinsurgency operations include elements of psychological operations geared to lowering insurgent morale and popular support. The COIN Psy Ops component is beyond the scope of this study.

(AOs). In tactical, operational, and strategic levels of the post-Taliban and post-Saddam periods, the Multinational Forces found that they could engage in a conventional fight with limited success against emerging insurgent groups in the fragile democracies, or they could change the paradigm and move to a counterinsurgency approach (Lionberger 2007, Palmer-Moloney and Duckenfield 2012).

The decision was made in late 2006 to adopt COIN doctrine (FM 3-24 Counterinsurgency<sup>20</sup>) and to execute a comprehensive stability and reconstruction strategy to win hearts and minds of the civilian populations in Operation Iraqi Freedom and Operation Enduring Freedom. According to the authors of Field Manual 3-24, a counterinsurgency campaign is a combination of offensive, defensive, and stability operations conducted along multiple lines of operations, constantly adjusted to the prevailing circumstances and enemy action by adaptive leaders (JM 3-24, I-14). Clearly, the COIN lines of operation called for more than the conventional military could provide.

*Field Manual 3-07 Stability Operations* was published shortly after FM 3-24, to explain and to illustrate roles and a general course of action for not only the U.S. military but also the U.S. Department of State and other agencies in support of Stability Operation's "lines of effort" (a.k.a "lines of operation" LOOs): establishment of (1) *governance* (including provision of basic essential services), (2) *rule of law, security, and* (3) *socio-economic development* (improving/repairing infrastructure and creating jobs) (U.S. Army 2008). Although the descriptions of the lines of effort and the explanations of key roles and players are clearly described, the order of operations is not scripted. What should come first? Why? Many military and civilian experts believe that security must first be achieved before governance, rule of law,

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<sup>20</sup> FM 3-24 was a joint publication (Army and Marines) that was also published as Joint Publication 3-24.

and development can take hold. But others feel that without an economic foundation upon which a population can support itself, there can be no security in an area of operation. Still others judge that the need for rule of law and governance must be in place before development or security can be established at the different levels of operation. Regardless of which comes first, water's ties to security and stability cut across all lines of effort/LOOs and affect all aspects of counterinsurgency stability operations.

The LOOs are interconnected, and dissociating them is a formidable undertaking. The ways in which the LOOs have an effect on one another and precisely how a change in one changes others is complicated; their interconnections are easy to miss. For example, many times insurgent groups in a country gain traction with the civilian population when the people's needs for basic essential services (i.e., public works (water/electricity/sewage treatment)) are not being met. Though the insurgent groups are usually *not able to provide* the missing essential services (considered part of "governance" LOO), they *are able to condemn* the established government for not having done so (Palmer-Moloney 2011). Though the provision of basic essential services is considered the role of governance, the absence of the essential service will have socio-economic development and security repercussions.

- **Key Players and their Roles<sup>21</sup> in COIN Stability Operations**

In his Point IV address delivered on 20 January 1949, President Truman identified *poverty* in newly independent nations as a threat to U.S. national security. He declared that general *prosperity* in the developing world would lessen the chances of war and would lead to strong, stable, effective democratic governments (Truman 1949). Henceforth, international development has been linked to American strategic and economic security. And since that time,

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<sup>21</sup> For purposes of this study, Key Players do not include non-government organizations (NGOs), private individuals, or the international donor community (i.e., World Bank, Asian Development Bank, etc.).

the U.S. State Department's economic assessments and socio-economic development support for countries and world regions have been directly or indirectly part of U.S. military strategic thinking.

Today military COIN and stability operations doctrine state that the greatest threats to our national security will come from nations unable or unwilling to meet the basic needs and aspirations of their people (U.S. Army 2008). In reaction to this threat, U.S. military forces are prepared to support efforts included under the umbrella of Stability Operations:

*[Stability operations encompass] various military missions, tasks, and activities conducted outside of the United States in coordination with other instruments of national power to maintain or reestablish a safe and secure environment, provide essential governmental services, emergency infrastructure reconstruction, and humanitarian relief.*

JP 3-07<sup>22</sup>.

As part of “full spectrum” military operations (a.k.a. “military operations other than (kinetic) war”) associated with Operation Iraqi Freedom and Operation Enduring Freedom, stability operations are to be considered equal in importance to combat operations. This is made evident a Department of Defense directive from November 2005:

*Stability Operations are a core U.S. military mission that the Department of Defense shall be prepared to conduct and support. They shall be given priority comparable to combat operations and be explicitly addressed and integrated across all DOD activities including doctrine, organizations, training, education, exercises, material, leadership, personnel, facilities, and planning.*

USACAC n.d.

The Stability Operations doctrine (FM 3-07) approved in 2008 spells out objectives and describes the military's role in supporting broad reconstruction and stabilization efforts: establish a safe and secure environment; facilitate reconciliation among local adversaries; establish political, legal, social, and economic institutions; and help transition responsibility to legitimate

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<sup>22</sup> As with FM 3-24, FM 3-07 was also published as Joint Publication (JP) 3-07.

civil authority operating under the rule of law. Success in these endeavors requires long-term commitment by external and internal (Host Nation) actors and is ultimately determined by support of and acceptance by the host nation population (U.S. Army 2008).

Together FM 3-24 *Counterinsurgency* and FM 3-07 *Stability Operations* describe the coordination and cooperation between intergovernmental, indigenous, and international agencies that are needed to achieve success in a country where the constituted government is being challenged by insurgents and where multinational forces have been called to assist (U.S. Army Combined Arms Center 2006; Lionberger 2007; USACAC n.d.). The coordination and cooperation between the agencies and their designated key players vary over time and spatial extent and constitute a variety of goals and objectives:

*Stability operations are usually conducted to support a host-nation government or transitional civil or military authority when no legitimate, functioning host nation government exists...By nature, stability operations are typically lengthy endeavors. All tasks must be performed with a focus toward maintaining the delicate balance between long-term success and short-term gains...To [this] end, military forces have to operate with other instruments of national power to forge unity of effort through a whole of government approach...that accounts for broader national policy goals and interests.*

U.S. Army 2006, vii.

Though key players are explicitly identified in the Stability Operations field manual, the doctrine does not specify tactical, operational, and strategic work to be done by each. *The manual leaves the breadth and depth of the tasks at hand to the discretion of the civilian and military leaders.* It stipulates that civilian-military collaboration will occur through “stability sector” lines of effort—civil security, civil control, essential services, support of governance, and socio-economic development, including infrastructure—that become the basis for collaborative interagency planning and dialog to synchronize action toward a common end state (U.S. Army 2008, 4-11). The end-states (essential services operational, critical positions staffed,

infrastructure and populace secured, and civil order attained), however, are long-term nation building endeavors that may continue well beyond the time of military engagement.

The broad framework used in Operation Enduring Freedom, Regional Command Southwest (shown in Table 2) illustrates the overlapping and not necessarily coordinated interagency attempts to support the lines of effort (a.k.a. lines of operation) related to governance/rule of law, security, and development:

**Table 2: Command and Control RC(SW) 2012**

- |  |
|--|
| <ul style="list-style-type: none"> <li>• <b><u>Regional Combined (RC) Command</u></b> (active duty and reserve U.S. Army, Marines, Navy, and Air Force, and coalition partners providing security to area of operation defined by Commanding General ISAF) <ul style="list-style-type: none"> <li>• <b><u>Marine Expeditionary Force Headquarters ★★</u></b> (including Coalition Forces) <ul style="list-style-type: none"> <li>• General staff, C-9 Stability Operations <ul style="list-style-type: none"> <li>• <b><u>Task Force Leatherneck ★</u></b> <ul style="list-style-type: none"> <li>• Marine Division G-9 Stability Operations <ul style="list-style-type: none"> <li>• Civil Affairs Groups <ul style="list-style-type: none"> <li>• Civil Affairs (CA) Teams (US Marine Reserve)</li> </ul> </li> <li>• Regimental Combat Teams</li> <li>• Agribusiness Development Teams (ADTs) (National Guard Reserve Units collaborating with USDA and USAID)</li> <li>• Provincial Reconstruction Teams (Marine component tied to RC Stability Operations; UK-led civilian component, separate and apart from DOS Regional Platform)</li> </ul> </li> <li>• <b><u>Task Force Helmand ★</u></b> <ul style="list-style-type: none"> <li>• U K Stability Operations <ul style="list-style-type: none"> <li>• Military Stability Support Teams (MSSTs)</li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> </ul> </li> <li>• <b><u>Regional Platform</u></b> (★★ civ equivalent, US) ((DOS, USAID, USDA, representing the U.S. Embassy’s position in the areas of operation defined by the four-star Commanding General’s headquarters) <ul style="list-style-type: none"> <li>• District Support Teams (USAID, USDA)</li> </ul> </li> <li>• <b><u>Provincial Reconstruction Team</u></b> (★★ civ equivalent, UK lead) (Civilian component—i.e., USAID, USDA, or DFID (UK Department for International Development) <ul style="list-style-type: none"> <li>• District Support Teams (USAID, USDA, DFID)</li> <li>• Specialist Team Royal Engineers (STRE)</li> <li>• Agribusiness Development Teams (ADTs)</li> </ul> </li> <li>• <b><u>Sector Working Groups</u></b> (Host Government lead, working with ISAF/Multinational Forces, USAID, DFID, DOS in five areas: civil security; civil control; essential services; governance; and economic and infrastructure support)</li> <li>• <b><u>District Level Government Development</u></b> (DOS working through/with provincial</li> </ul> </li></ul> |
|--|

government)

- **Line Ministries Support** (USAID, DFID, DOS, ISAF/Multinational Forces working with provincial and district level ministry representatives as provided by the Host Nation)

(N.B.: “★” indicates the level of “General Office” or civilian equivalent in charge.)

In addition to defining lines of effort, key players, and a map for interagency collaboration, Chapter 4 of Field Manual 3-07 introduces a method for planning and executing tasks associated with stability operations: SWEAT-MSO-- Sewage, Water, Electricity, Academics, Trash, Medical, Safety, and Other Considerations. Though SWEAT-MSO builds from and augments the traditional civil affairs tactics, techniques, and procedures known as METT-TC (Mission, Enemy Terrain, Troops, Time, and Civil Considerations), as well as relatively new COIN tactics, techniques, and procedures known as ASCOPE (Areas, Structures, Capabilities, Organizations, People, and Events) and PMESII (Political, Military, Economic, Social, Infrastructure, Information Operations). It, however, does not capture the critical role that water plays in COIN security and stability operations. “Water” is merely an essential service associated with operational, dysfunctional, or needed water supply systems or water treatment plants.

- **Water in the COIN environment**

Once COIN operations move beyond the “clear” kinetic phase, socio-economic development and governance programs are put into action to stabilize the population. Water is needed to back many of them. For example water for human consumption, water for industry, water for agriculture, and water for hydropower generation. *Most often, attempts to address water and COIN result in numerous uncoordinated, ad hoc projects that emphasize job creation rather than sustainable water solutions* (Palmer-Moloney, Dehgan, and Duckenfield 2012). The focus is on water supply and infrastructure as part of the essential service package of a

community (U.S. Army 2008; USAID 2009), not on water quality or on how water ties to socio-cultural and political power or on the water budget of the entire watershed (Dehgan, Palmer-Moloney, and Mirazee 2012).

In the geographic regions of Operation Iraqi Freedom and Operation Enduring Freedom, those living in the major urban centers were relatively wealthy and will received essential services (sewage, electricity, and trash pick-up), if they were available, long before their rural neighbors (Veeravalli 2011; Zimmerman 2011). This holds true for water. Urban dwellers were more likely to obtain potable water—though sources may not be reliable or dependable (Zimmerman 2011). It was in the relatively poor rural areas and in informal urban “squatter settlements” as well as government subsidized housing projects where the inhabitants were relatively poorer than their established urban counterparts, that essential services were often absent, and potable water, one of the most fundamental human needs, was not available or accessible (USAID 2010). Coincidentally, it was in these poor, underserved, disenfranchised areas lacking potable water and essential services that insurgents could have had the most influence (Batson 2008; Gallup 2010; Veeravalli 2011; Zimmerman 2011).

According to FM 3-07, water’s role in COIN lines of operation is that of an “essential service,” fundamentally a governance concern to be addressed in Infrastructure/Water Sector Working Groups at the community and district (~county) levels. Nevertheless, water was also a matter of public health, a matter of socio-economic development, and a matter of population and geopolitical security and stability. Control of water equaled power. As such, water was a point of contention or an opportunity for collaboration.

Knowledge and insight into the complex nature of water is needed to gain a rich contextual understanding of the area’s security and stability situations. (Figure 7) Water



complexities, more than water’s mere presence or absence, need to be addressed and must be understood to critique water’s role in a given area of operation. These intricacies or characteristics are water supply, water quality, water availability, and water accessibility. All are interrelated – changes in any one characteristic often affect the others – and all are linked to security and stability in peacebuilding.

<b>WATER COMPLEXITY DEFINITIONS*</b>	
<b>SUPPLY</b>	<b>The quantity of water necessary for a variety of uses</b>
<b>QUALITY</b>	<b>The chemical, physical, and biological characteristics of water, usually in respect to its suitability for the variety of uses</b>
<b>AVAILABILITY</b>	<b>The capability of the water source to meet the variety of uses</b>
<b>ACCESSIBILITY</b>	<b>The socio-cultural and transaction cost (time, distance, money)** of acquiring water supply.</b>  <small>**For example, ability of community to travel spatially and temporally as well as percentage of monies spent</small>
<b>* Each definition is subject to spatial-temporal variability</b>	

**Figure 7:** Water-complexity definitions

Source: Civ-Military Operations/Human-Environment Interaction Research Team, US Army Corps of Engineers, Engineer Research and Development Center (Alexandria, VA).

By 2009, the civilian and military leaders of Operation Enduring Freedom realized that successful counterinsurgency operations had to include positive interaction with the local population in the “hold” and early “build” phases of a COIN engagement. As 2010 drew to a

close, water complexity questions<sup>23</sup> were just beginning to be utilized in the analysis of security and stability situations in areas of interest (Palmer-Moloney et al. 2010).

By the Autumn of 2010, a growing number of policy makers and decision makers designing counterinsurgency metrics understood that water-sector data could be used as tangible “proxy observables” to measure counterinsurgency operational progress. Though the ISAF Joint Command intelligence center was briefed on the significance of water to the short-term, mid-term and long-term success in Afghanistan, specifically in Helmand Province, flashier, higher-visibility items, such as increasing electricity production at the Kajaki Dam, captivated ISAF leaders. Though community leaders and GIRoA ministers were anxious to expand the electric grid to support economic growth (MRRD n.d.; Palmer-Moloney 2010), many communities in RC South and Southwest continued to be without reliable water supplies, potable water sources, and/or wastewater treatment (Veeravalli 2011).

As counterinsurgency doctrine drove operations in Operation Enduring Freedom, the USACE Engineer Research and Development Center (ERDC) in Alexandria, Virginia, became involved in developing a methodology to examine the interaction of humans and the environment at cultural (human) and hydro-physical (watershed) local level. The goals of the Civil-Military Operations/Human-Environment Interaction (CMO-HEI) research were: (1) address water issues specific to time, place and culture; (2) produce context-rich information for analysis; and (3) produce methodology and models that support actionable analysis for decision making. The CMO-HEI pilot program for Helmand Province, Afghanistan was aimed at district-level analysis of water’s relationship to environmental security and regional stability. To assist with “civ-mil” (specifically Civil Affairs, District Support Teams, and Agribusiness

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<sup>23</sup> Water Complexities and SMART Questions on water (Graff et al. 2011) are incorporated in the Water Smart Card presented in Appendix C.

Development Teams) community support and situational awareness, the CMO-HEI team developed “SMART (Specific, Measureable, Accountable, Reasonable) Water Questions,” a comprehensive list of questions on water complexities, bundled into 3 topics—point of source; point of use; and point of impact (Graff et al. 2011). The SMART questions were linked to ISAF goals, COIN metrics, and associated development indicators. The impact of the pilot project between CMO-HEI and AgriBusiness Development Teams (ADTs) in Afghanistan has yet to be determined as of this writing.

By December 2010, Marines in Regional Command Southwest, Army National Guard Agribusiness Development Teams in Regional Command South, and the USACE Kandahar City Water Project were prepared to initiate water-complexity data collection. Over the past 13 months, if data were collected, they had never been shared. And as of this writing, April 2012, if data were collected and shared, no analyses on them have been reported. As ISAF and Afghan government officials prepare for the changeover from ISAF to GIRoA leadership by 2014, data collection, data sharing, and data analyses of water quantity, quality, accessibility, and availability could be used to help determine district and province readiness for transition. Iterative use of the SMART water questions and answers can support post-conflict peacebuilding by helping decision makers connect water complexities to local and regional security and stability. However, the piecemeal, local and district-level “essential services” approach to water results in omission of the impact on the water budget and geopolitical ramifications of water capture, diversion, and extraction (Palmer-Moloney and Duckenfield 2012; Palmer-Moloney, Dehgan, and Duckenfield 2012).

- **Two sides of the COIN Effect – “HOW DID WE MISS THIS?”<sup>24</sup>**

On 2 July 2010, US Marines launched Operation Khanjar in Helmand Province, Afghanistan and one month later the US Department of Defense initiated the “Helmand Deep Dive” research project. The goal of the project was to develop a “rich contextual understanding” of Helmand Province that could be used to strengthen and support counterinsurgency operations. From August 2009 to February 2010, experts from US government agencies and academia worked with coalition forces in the field to answer fundamental questions about the operational environment and those individuals ISAF was trying to “protect and persuade” (Flynn et al. 2010). Originally, the research plan focused on human factors – the behavioral psychology, sociology, cultural anthropology, history, economics and political science – with no regard given to human geography, water, or human–environment interactions. By the end of the research and reporting period, however, the briefings presented to the civilian and military decision makers at the Pentagon and in theater laid out the significance of water to the security and stability of the region.

This shift occurred as a result of the work done by an interagency geography/geoscience research team composed of scientists from the US Army Corps of Engineers-Engineer Research and Development Center, Alexandria, Virginia, US Geologic Survey, Reston, Virginia, and the Department of State, Office of the Science and Technology Advisor to the Secretary. The interagency team joined the Helmand Deep Dive in November 2009 (Palmer-Moloney et al. 2009). The conclusions reached by the geography/geosciences research team include the following:

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<sup>24</sup> Comment made during Palmer-Moloney’s “Helmand River System—Stability Ops and Water” briefing to Command Element, RC(SW), 11DEC11.

(1) ISAF efforts to stabilize Afghanistan must balance near-term gains in agricultural production with: (a) the potential of increased transboundary conflicts over water; and (b) the potential to exhaust Afghanistan's water resources. Actions must focus on improving resource policy/water resource management capacity and effectiveness, with special focus on increasing efficiency of water quantity and quality monitoring and assessment.

(2) There is sparse, uncoordinated data collection on the depth of groundwater. In unconfined and confined aquifers, the water level is dropping as a result of drought and groundwater overdraft. Augmenting reduced surface-water flow by tapping the unconfined water-table aquifer and withdrawing from the deeper, confined fossil groundwater sources is not a sustainable alternative if the amount of withdrawal is greater than the rate of groundwater recharge.

(3) There is no coordinated, cross-ministry, ongoing watershed-scale water-quality data collection/dissemination/analysis. Data about water quality are more difficult to come by than surface-water and groundwater supply data. Little information is found in the literature; most reporting is anecdotal.

ISAF civilian and military commanders in Helmand Province were challenged to find measurements that could be used to determine the degree of success in counterinsurgency operations. As seen in the examples that follow, though water could have served as a tangible “proxy observable” to measure stability operations headway (or lack thereof) or could have been gauged COIN effect related to security, governance and development, this did not happen.

- **Helmand Provincial Reconstruction Team and Civ-Mil Operations Water Projects in RC(SW)**

After the signing of the Bonn Agreement in 2001, provincial reconstruction teams (PRTs) consisting of military civil-affairs soldiers, National Guard members and Afghan civilians, were set up in key Afghan provinces. Regardless of the directive to engage the population and to “do good things” for them, the civilian-military operations lacked consistency and had no overarching goals or strategic guidance for nearly nine years (Erickson 2010; Chatfield 2009).

Once counterinsurgency and stability operations doctrine was adopted for Afghanistan in 2009, each PRT commander was given a Provincial Reconstruction Team Handbook (2010)

based on foundational Provincial Reconstruction Team guidance found in FM 3-07. According to the handbook's guiding principles, a PRT should "focus upon improving stability by seeking to reduce the causes of instability, conflict, and insurgency while simultaneously increasing the local institutional capacity to handle these on their own." Furthermore, a PRT should reduce the destabilizing threats and their underlying causes while simultaneously building the capacity of local institutions to counteract these destabilizing "causes" with minimal ISAF support (PRT 2010). Water was not given status as a "destabilizing threat" (MRRD n.d.), and civilians sent to the PRT commands were not selected because of their hydrology or water-resource management skill sets.

By April 2010, the principal role of the Helmand PRT (HPRT) was defined: to support the government of the Islamic Republic of Afghanistan (GIROA). The HPRT leaders were aware that GIROA was susceptible to appearing incompetent if the locals had unrealistic expectations regarding the level of basic services the government was able to offer them. However, they were sure that "an area in which the government could little afford to fail if called upon was dispute resolution pertaining to land ownership and particularly issues involving water rights" (USAID 2009). To address the PRT's instruction and to meet the expectations that came with counterinsurgency doctrine, the HPRT encouraged the civ-mil teams under its umbrella to use a survey instrument developed by USAID to help determine local stability (MCCLL 2010).

The Tactical Conflict Assessment and Planning Framework tool (TCAPF) was designed to (1) help users understand complex situations from a people-centered perspective, (2) target sources of instability, and (3) determine ways to gain traction with local populations (USAID 2010)<sup>25</sup>. Marine Corps Civil Affairs Groups were charged with doing TCAPF surveys in

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<sup>25</sup> By Spring 2011, USAID replaced TCAPF with the "District Support Framework".

Helmand Province. They determined that in the rural countryside and in the barrio settlements of Lashkar Gah, most local Afghans requests for assistance centered on water. Though there were specific requests for digging wells and for the reconstruction of canals to improve irrigation, most requests from the locals were for safe, sweet water to drink (MCCLL 2010).

As a result, ISAF Commander's Emergency Response Program (CERP) dollars as well as funding from USAID and DFID paid for "implementing partners" to dig of hundreds of wells and to install hundreds of pumps to move the groundwater to the surface throughout Helmand Province (Palmer-Moloney 2011). Did the wells and pumps provide sustainable potable water to communities in need? In some areas, the unregulated extraction of groundwater led to dropping water tables, which caused drilling ever deeper wells. Drilling deeper for water requires money, as does the obtaining the energy needed to pump water from deep wells, and money is a critical limiting factor for the people of Helmand Province.

According to a Program Expert for USAID's Sustainable Water Supply and Sanitation (SWSS) initiative in Afghanistan, the main challenge in Regional Command South (RC-South) was procuring reliable construction subcontractors and the operation and maintenance follow-up to engage poor communities to be involved in the upkeep of their newly installed infrastructure. This challenge was directly related to the non-permissive, insecure environment and the threat level for all those working with ISAF and GIRoA projects in the area of operation. In RC Southwest, with its greater insurgent activity, the threat level was higher, the work of CERP, USAID, and DFID implementing partners was more restricted, and because of this, the understanding of project cause-and-effect on the river system was not addressed (Palmer-Moloney 2011).

As summer of 2010 became summer of 2011, Taliban influence and control in many of Helmand Province's districts increased. Even with financial backing from USAID, the SWSS Project did not move into Helmand Province because of security concerns. In the meantime, water needs continued to mount in the province's rural areas. As of this writing, "tipping point" communities wait for someone to deal with their water needs, and they may not have the patience to wait for SWSS/USAID and GIRoA to bring solutions. The Taliban have gained some capacity to step in and provide the essential services, and they continue to be able to point out services GIRoA has failed to provide.

"Water projects" funded by CERP, USAID, and DFID, while well intentioned, typically are designed to support stability through job creation. Many times "water projects" are not designed to produce sustainable solutions to water problems. As of January 2012, the ad hoc nature of water capture, diversion, and extraction endeavors in RC(SW) area of operation considered neither the possible effects on neighbors nor the larger geopolitical effects are taken into account.<sup>26</sup>

- **Two Sides of COIN in the Helmand Watershed**

*Helmand Kajaki Dam is very irreplaceable and valuable asset for both saturation and incalculable farming purposes...Snow and precipitation play a paramount role in swelling the Kajaki Dam and keeping its water level steady and lasting. When compared with previous years amount of water Kajaki Dam held, this year's is much more lesser that we could have anticipated...Nimruz Province deserves as much (of Helmand River water) as Helmand does...Today I telephoned Kajaki District. We discussed water issue and finally we arrived at an agreement aimed at prioritizing and saving some amount of already still water in Kajaki Dam.*

Radio Broadcast by Deputy Director of Helmand Arghandab Valley Authority (HAVA)  
24September 2011 (Lashkar Gah, Helmand Province, Afghanistan)

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<sup>26</sup> Mott MacDonald (implementing partner for DFID at the HPRT) has drafted the "Helmand River Basin Master Plan," not to be confused with a water strategy for the Helmand watershed. This master plan (due to be finalized by 2014) focuses primarily on surface water in the river channel and in primary irrigation canals, with limited attention to groundwater, water quality, or human consumption water needs.



It was ten years into the fight before the intelligence communities sent out their “requests for information” on the water situation in the lower watershed. From 2002-2011, the lion’s share of money and attention from the international coalition went to Kandahar Province and to the districts in central Helmand Province rather than to districts in southwestern Helmand or to Nimruz Province. Located in the extreme southwestern reaches of RC(SW), Nimruz did not show up on Coalition Force radar until Fall of 2010, when the II Marine Expeditionary Force (II MEF) C-9 (Stability Operations) at Camp Leatherneck began engagement with government officials to discuss illicit trade and border security (Palmer-Moloney, Dehgan, and Duckenfield forthcoming).

Summer of 2011 found Nimruz Province in dire straits. Daytime temperatures had averaged well over 100°F for weeks, and the Helmand River and all of the region’s irrigation canals ran dry. At the behest of Nimruz’s Provincial Governor, the Minister of Energy and Water in Kabul directed the Helmand Arghandab Valley Authority (HAVA) to close central Helmand Province’s primary irrigation canals for 24 hours so that water from the Kajaki Dam would flow downstream to the stressed lower watershed.

Shortly after the release of water for Nimruz, HAVA announced a fall water discharge reduction from the Kajaki Dam. The plan was to close two irrigation valves, reducing discharge by approximately 15-20%.<sup>27</sup> No one questioned that water level in the Kajaki reservoir was critically low. Few challenged HAVA’s decision to try to replenish the reservoir because they were told that water captured and held now would provide water for crops in the next growing season. And none in HAVA acknowledged that the planned irrigation water shutdown would impact water availability below the confluence of the Helmand and Arghandab rivers. From a

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<sup>27</sup> This figure is based on unpublished, unclassified 2009 and 2010 Kajaki Dam discharge records provided by the US Army Corps of Engineers.

geopolitical perspective, the reduced water flow in the lower Helmand River watershed was destined to sharpen rising tensions (tribal, district, provincial, and international) over competition for diminishing water resources.

In 2010 Kajaki Dam's irrigation water valves was closed for 21 days. In fall 2011 irrigation water shutdown was scheduled to last an additional 11 days in order to store water that would support the growth of crops other than poppy.<sup>28</sup> There was little doubt that the planned Kajaki irrigation valve closure would exacerbate the already severe water shortages in southern Helmand Province and in Nimruz Province, or that people who depended on the river's surface water for consumption could be at risk.

With the lack of data on the effects of water reduction in the past (specifically the stream discharge during this time of year) and no knowledge of the time it takes for the lower Helmand to feel the effects of water discharge reduction at the Kajaki Dam, it was almost impossible to determine what the exact impact would be on the lower reaches of the watershed. At the time of this writing, concerns from those in Helmand and Nimruz Provinces were that water in the river and canals was desperately low and the distribution of water among districts and between provinces was inequitable. According to reports from the field, communities in Nimruz believed that water was being held in Helmand and kept from them, while farmers in central Helmand felt threatened when the canals were closed for the flow to continue unabated to Nimruz.

Before a watershed can be managed in a sustainable fashion, there must be an understanding of the water budget (input/out-take that includes extraction, consumptive use of water, and rate of evaporation). Gauging stations with reliable monitoring technology are

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<sup>28</sup> The central Helmand wheat seed distribution program was in full swing during September 2011. If anticipated winter rain failed to fall, water from the reservoir would have to support this agricultural effort. If water for irrigation came neither from rain nor from the reservoir, the fear was that the drive to plant poppy would increase, and it would become the crop of last resort. This would have implications for long-term effects of the Helmand Counter Narcotics Plan, Governor-Led Eradication effort, and continued income for the insurgent forces.

needed to capture information about a river system's rate of discharge and to develop a water budget. This holds true for the Helmand, yet no monitoring of the Helmand had taken place since 1978.

In late September 2011, in an attempt to address the stream flow data gap, rudimentary stream depth gauging of the lower Helmand began. A joint Stability Operations team from the II MEF C-9 (Regional Command strategy-level) and G-9 (Task Force Leatherneck tactical-level) traveled to Khan Neshin District and installed a stream depth gauge in the river channel. Measurements began on 23 September 2011 and continued through April 2012. The stream depth gauging helped establish an environmental baseline prior to water reduction caused by the planned closure.

To augment the stream depth gauging in the short-term, RC(SW) Space Operations cell ("Space Ops") collaborated with C-9/G-9 Stability Ops. From September 2011- April 2012, Space Ops provided geospatial analysis that helped all concerned gain a better understanding of pre- and post water shutdown situation. The information needed required fusing together factors of human geography and physical geography, using geospatial tools/analysis for data sparse areas, which are the norm rather than the exception in the RC(SW) area of operation.

Space Ops focused its geospatial tools/analytic skills on the following interrelated issues/problems/concerns:

1. Land use/land cover change over the past 5 years in the lower Helmand watershed (especially related to population increase, agricultural fields, canals/reservoirs) at the Iranian border with Afghanistan.
2. Proposed Kamal Khan Dam (Nimruz Province) (modeling to see effect of a potential dam's construction)
3. During the Kajaki Dam water release reduction/irrigation canal closures (6 October to 7 November 2011), monitor for indicators of changes in reservoir capacity increase (the purpose for withholding water from the river system) and agricultural activity (particularly in canals in districts of Nawah and Garm Ser and

in historically productive agricultural areas of Nimruz Province from the Helmand Province border up to the Kamal Khan Dam site).

Though support from RC(SW) Space Operations helped establish an environmental baseline, the fact remains that no functioning monitoring stations were on the lower Helmand River downstream from Khan Neshin district (Helmand Province) into Nimruz Province.

- **Assuring water’s significance stays afloat in the RIP tide**

As demonstrated above, water’s tie to security and stability reaches beyond the level of Stability Ops lines of effort and civ-mil sector working groups. In RC(SW) and across the battlespace of Operation Enduring Freedom, water is “vital ground,” essential to mission success. Its control and continued provision cut across all lines of operation, and command elements at all levels need to take water resource management issues into account.

Water cannot be managed if it cannot be measured, and this requires data. Empirical evidence on the status of water (supply, quality, accessibility, and availability) is needed to develop recommended courses of action for commanders and staff directors to consider when engaging the Afghan population and identifying points of friction as well as opportunities for collaboration and support.

In RC(SW), it took months of relentless effort to garner command team support from II MEF Headquarters, Task Force Leatherneck, Task Force Helmand, the Helmand PRT, and the Regional Platform.<sup>29</sup> It is difficult to determine if the effort so far has been worth the time and energy spent.<sup>30</sup> By January 2012, three gauging stations were set up river under the security

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<sup>29</sup> This was my role from August 2011-June 2012. The only reason I volunteered to deploy to Afghanistan was so that I could get to Helmand and Nimruz Provinces. My position on the RC(SW) General staff of Stability Operation was water resource management “Subject Matter Expert.” I worked with civ-mil leadership to call attention to the need for a GIROA water strategy for the middle and lower Helmand River watershed. The story of how I managed to do this is beyond the scope of this study!

<sup>30</sup> See “Dedication”.

umbrella provided by the international coalition forces. These stations provided stream depth<sup>31</sup> and were reinvigorating data collection on the middle/lower Helmand that had been suspended since 1978.

Regardless of the significance given to water by all civ-mil elements in January 2012, there was no guarantee that water will be seen as vital ground to those taking command in March 2012. Change of command– from the regional military and civilian leaders to the provincial and district teams – causes lack of continuity for water management and public works-projects because not all incoming military commanders and civilian leaders understand or care to consider water’s importance.

RIP/TOA: Relief in Place/Transfer of Authority. This is military jargon for the change of command that happens throughout the battlespace. Most of the coalition partners rotate out every six to seven months. Precious few stay for a year. With the pending withdrawal of military forces in 2014, many slots being vacated will not be refilled once soldiers, sailors, airmen, and Marines redeploy. In March 2014, II MEF (FWD) will RIP and I MEF (FWD) assumed command. Those in II MEF who “got it” and became engaged in working with water as “vital ground” left and there was no guarantee or requirement that those coming in would continue to put the same emphasis on water’s ties to security and stability. The mission has been changing rapidly as the 2014 drawdown is in the sights, and the mission change coupled with new people could have resulted in confusion and/or realignment of program priorities. As turnover began and new personalities came into play, it was my job as the “water resources

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<sup>31</sup> Because of security issues at the time of this writing, neither a map nor specific grid points can be shared. However, in general terms, one monitor is approximately 2 km downstream from the Kajaki Dam, one approximately 80 km downstream near Lashkar Gah, and one is another 100km downstream in Reg-e Khan Neshin district. Unfortunately, the monitoring station at Khan Neshin was vandalized in April 2012. If it gets repaired or replaced, the GIRoA will have to be the responsible party.

management SME (subject matter expert)” to figure out how and when to engage with the new group.<sup>32</sup> (See Appendices A and B)

- **Using water to grow Operation Enduring Freedom’s Lessons Learned**

- (1) **Water use is not the same as water management. Without management, water projects are often unsustainable.** In COIN operations, when the military leaders want to have an immediate “win” in early stages of the counterinsurgency effort, quick-fix water projects (i.e., putting in a well or paying locals to dig a diversion canal for irrigation) are often selected to win hearts and minds of the local population. These types of projects may not be sustainable and may even negate one another. (For instance putting in shallow wells that pull water from the surface water flow may pull water from the canals where water is needed for irrigation.)
- (2) **Water projects planned by civ-mil entities need to be documented, coordinated, and evaluated to determine COIN effect.** Again, in many regions only provincial, national, or regional data are all to be had. These efforts need support from Host Nation agencies and ministries because analyses done and conclusions reached will affect the water budget long after COIN forces have withdrawn.
- (3) **Bigger is not always better.** Individual promotion packets and personal awards are tied to money spent and managed in the battlespace, not to the overall effect, sustainability, or long-term effects of the water projects supported. Because of this, many CERP dollars and dollars from USAID and DFID have been spent on grandiose projects connected to Host Nation prestige and pride rather than to socio-economic benefits for the local population that could be drawn to support the insurgency. Many times military and

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<sup>32</sup> This is based on personal field experience in RC(SW) as II MEF RIPs and TOA goes to I MEF, Jan-Mar 2012.

civilian promotions are based on the amount of money spent on projects administered, not on whether or not projects were appropriate or sustainable.

- (4) **Geospatial tools and data acquisition can augment quantitative and qualitative field data collection and support adaptive management strategies.** Many areas of operation have inaccessible, data sparse regions. Geospatial data are regularly used to address military movement issues. They can also be used to analyze aspects of both socio-cultural human geography and physical geography to muster all information needed for rich contextual awareness needed to access a water-relevant operation. Geospatial tools can support adaptive practices to confront increasing variability of the water supply resulting from climate change. This ties to the need for adaptive management mechanisms, as water complexities shift and change. Adaptive practices related to water conservation and water use reduction (USAID 2007, UN 2010a) can be implemented across LOOs if a water resource management perspective supports them.
- (5) **The Host Nation government may lack a national strategy for water.** In Operation Enduring Freedom, there has been a disconnect between water policies and water goals at the national, provincial, and village levels. Many times the goals and objectives for water in one government agency contradict those in another. To implement a holistic, integrated water resources management approach there needs to be “transparent” and “collaborative” effort between government agencies. Yet even though a national strategy for water may exist (USG Interagency 2010), implementing it and enforcing it in areas outside of effective political control is another issue (Davidson 1978). Use of IWRM system is recommended once honest, transparent data collection and sharing mechanisms are in place.

- (6) **Water management needs a watershed – scale setting and a focus on water complexities rather than water infrastructure and water use.** Though infrastructure development is linked to agricultural development and is critical to post-conflict peacebuilding, infrastructure development misses the water-quality, availability and accessibility aspects of water-complexities resource management. Social-impact assessment is as consequential as water-resource assessment. A conflict-sensitive approach to analysis of water complexities in COIN stability operations context can give insight into a region’s environmental security and stability and can enhance options for using water management as a peacebuilding and reconstruction tool.
- (7) **Data collection can be challenging during COIN operations.** In non-permissive environments and in insecure areas, data collects require a security umbrella. Setting up monitoring stations or maintaining them and gathering data from them may literally require someone to put his life on the line. Is data collection worth it? Military, civilian, and/or Host Nation leaders in the area of operation must decide the answer to this question.
- (8) **Data sharing is critical to post-conflict peacebuilding.** Data need to be collected and shared at the lowest level of security classification possible to allow use among as many stakeholders as possible. In COIN areas of operation, data dissemination can be problematic. If data cannot be shared, data collection is of little use. If data are not analyzed and used to support decision-making, the data are of little use.
- (9) **Water projects are at risk as the civilian and military commands cycle.** *Change of command– from the regional military and civilian leaders to the provincial and district teams – causes lack of continuity for watershed management and public works-projects*



*because not all commanders understand or care to consider water's importance.* Empirical research is needed to develop recommended courses of action for commanders and staff directors to consider when engaging the population and identifying points of friction as well as opportunities for collaboration and support in areas of counterinsurgency stability operations. This can be changed through guidance and training of civilian and military leadership at the command and control levels, and by development of tactics, techniques, and procedures for soldiers, Marines and civilians participating in civilian–military operations. (See Appendix C, Water Smart Card for Civil Affairs Teams)

- (10) **Military involvement with water is an indication of a paradigm shift in the US Department of Defense.** Afghanistan and Iraq are unique cases that may become increasingly the norm in which militaries and their contractors are undertaking work that was once delegated to the realm of humanitarians. Though COIN doctrine population-centric goals and objectives demand attention to humanitarian issues, the military is taking the lead at the *hold* and early *build* phases of COIN, then transitioning to the civilian agency (USAID) and its NGO contractors.

- **Conclusion**

According to FM-3-07 and FM 3-24, water's role in COIN lines of operation is that of an essential service, fundamentally a governance concern to be addressed in Infrastructure/Water Sector Working Groups. As such, water is a matter of public health, socio-economic development, and population security and stability.

Lessons learned during Operation Enduring Freedom, however, have shown that in addition to being an essential service, water is also “vital ground.” Control of water equals

power. Its can be a point of contention or an opportunity for collaboration from the local tactical level to the geopolitical international strategic level. Yet commanders at strategic, operational, and tactical levels in all combatant commands lack critical knowledge they need to appreciate and to make informed decision about water's ties to security and stability in counterinsurgency efforts.

Water plays an important part in counterinsurgency stability operations, and it can be used to measure COIN effect. But this requires a water resource management perspective across all lines of operation. ★

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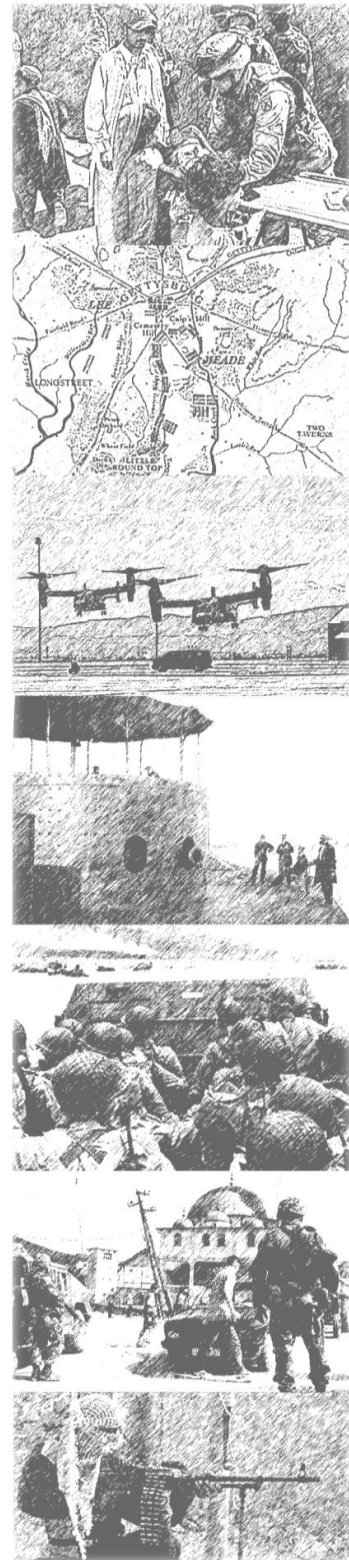
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## Chapter 4: Towards a Coastal Resources Management Course of Action for Counterinsurgency Stability Operations<sup>33</sup>

### ABSTRACT

In 2009, Basrah Province was showing the effects of more than two decades of war: the natural marshes and the lives and livelihoods of the Marsh Arabs were in recovery after near decimation; essential services in the city of Basra are in disarray, its most disenfranchised residents effectively without public works; and provincial and local governance is fledgling. In the midst of this, British military, fighting as part of the Multinational Division South-East, strove to move security and stability forward by conducting counterinsurgency stability operations. One specific initiative that they carried out was *Op League*--the repair and rehabilitation of the saltwater regulator on the Shatt al Basrah. The purpose of this paper is to examine *Op League* from a human-environment interaction perspective, to highlight the cause and effect of the engagement in context of the watershed and estuarine setting, and to put forward a coastal resources management approach for future relevant stability operations.



<sup>33</sup> Manuscript submitted to peer-review journal *Coastal Management* for publication.

**Key words:** Basra, Iraq; Tigris-Euphrates Rivers; Shatt al Basra; Marsh Arabs; stability operations; counterinsurgency; *Op League*

- **Introduction**

The repair and rehabilitation of the saltwater regulator on the Shatt al Basrah (a.k.a. the Sweet Water Canal) west of the city of Basra<sup>34</sup>, Iraq is considered a textbook counterinsurgency<sup>35</sup> (COIN) stability operation. It resulted from engagement with a key community leader who conveyed a request for assistance from local nationals living in the area of military operation. It addressed needs that were directly relevant to the area's socio-economic development, which according to doctrine would weaken the population's support of insurgents.<sup>36</sup> It had a defined and achievable problem-set—to fix a saltwater regulator that then could be used to control tidal influence upstream. And once complete, the project could be transitioned to local Iraqi government authorities, thereby bolstering local support for the established government.

In and of itself, the saltwater regulator effort, known as *Op League*, was a COIN success. Over the course of six months, the 523<sup>rd</sup> British Specialist Team Royal Engineers working with Combat Engineers and Iraqi contractor support repaired the machinery; as a result, tidal surge coming from the Persian Gulf into the canal could be regulated once again. Based on metrics used, the project had a positive COIN effect: preventing tidal surge from entering the canal reduced salinity, which improved water quality, which would lead to increased agricultural

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<sup>34</sup> “Basra” is the transliteration used for the city name, while “Basrah” is the transliteration used for the name of the province and Shatt al Basrah canal(also known as the Sweet Water Canal).

<sup>35</sup> According to the *British Army Field Manual, Volume 1 Part 10—Countering Insurgency* (Army Code 71876), counterinsurgency is defined as “Those military, law enforcement, political, economic, psychological and civic actions taken to defeat insurgency, while addressing the root causes”. Successful counterinsurgency requires a multifaceted approach that addresses the political, economic, social, cultural, and security dimensions of the unrest.

<sup>36</sup> As specified in the *British Army Field Manual, Volume 1 Part 10—Countering Insurgency* (Army Code 71876) an insurgency is ‘An organised, violent subversion used to effect or prevent political control, as a challenge to established authority’ (MOD 2009). Therefore, an insurgent is participating in overthrow of the established government.

production from irrigated land and reinvigorated freshwater fishing grounds in the area of operation, thereby lessening social unrest and reducing popular support for insurgency.

From the standpoint of stability operations, the influence and implications of complex activities in the Tigris-Euphrates basin upstream from the saltwater regulator were beyond the scope of *Op League*, as was assessing or responding to any cause and effect relationship in the estuary and coastal ecology downstream. And so, in keeping with stability operations protocol, the project's success was measured against subjective opinions of local nationals (Palmer-Moloney 2010, 2011b; Palmer-Moloney and Duckenfield 2012) and against a set of discrete technical performance metrics (Jenkins 2009) that were not intended to examine or to determine operational success in the context of the greater watershed.

The purpose of this paper is to examine COIN stability operations in and around Basra, specifically *Op League*, through the lens of human-environment interaction<sup>37</sup> in the context of the watershed and estuarine setting and to recommend a coastal resources management course of action for similar COIN stability operations in future military engagements. First, the methodology is presented to introduce the qualitative approach used in the research. Then the stage is set for the COIN engagement in an overview of the study area's physical and human geography in the milieu of the greater Tigris-Euphrates watershed after more than two decades of war. This is followed by a description of *Op League* and a discussion of the operation's impact and military lesson learned. Finally a plan for a coastal resources management course of action for COIN stability operations is proposed.<sup>38</sup>

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<sup>37</sup> *Human-Environment Interaction* is one of the five foundational themes of geography (Bednarz et al. 1994). It involves the study of how people adjust their lives to fit various environmental conditions, and how people alter the natural environment to meet their needs.

<sup>38</sup> Scrutiny of counterinsurgency doctrine and analysis of the condition of the Marsh Arabs, the Mesopotamian Marshlands, and the estuarine ecosystem of the Al Fawr Peninsula are beyond the scope of this study.



- **Methodology**

The research presented in this paper is drawn from an investigation conducted by the author to determine the relationship between water-relevant counterinsurgency (COIN) stability operations, the coastal environment, and coastal resource management. Basra and *Op League* were chosen for the study for the following reasons: (1) COIN stability operations doctrine was not implemented until 2007 in the midst of Operation Iraqi Freedom. At that time, British-led Multinational Division (South-East) command and control centered in and around Basra and the Al Fawr Peninsula, and (2) Of the counterinsurgency stability operations conducted from 2007 through 2009<sup>39</sup>, the *Op League* COIN initiative was selected because of the project's well-known success.

This study sought to answer two key questions: (1) How do water-relevant COIN stability operations consider or address their interaction within the greater coastal environment? and (2) What is an appropriate course of action for coastal resource management in counterinsurgency stability operations? To answer these questions, the author conducted a detailed contextual investigation that incorporated background document research, in-depth interviews with key military leaders, and geospatial analysis, in addition to her own professional experience as Senior Advisor/Planner Watershed Management on the general staff of Combined Force (C-9) Stability Operations<sup>40</sup>. By using multiple data collection methods and analysis techniques, the author triangulated information to strengthen the research findings and conclusions (Denzin and Lincoln 1998; Yin 2003; Ward 2010). Facts and figures from British military reports and open source (unclassified, public) documents, journal articles, news releases,

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<sup>39</sup> By end of July 2009, all non-US Coalition Force troops left Iraq, taking the "multi" from the Multinational Force/Multinational Division.

<sup>40</sup> From July 2011 – May 2012, the author was deployed in support of Operation Enduring Freedom, Regional Command Southwest, Afghanistan.

and geospatial data were blended with the introspection and personal experience of military personnel to describe the setting and to analyze the COIN stability operations problem as well as its solution.

Interview subjects were selected after informal screening of British troops deployed with the author in support of Operation Enduring Freedom. Each interviewee was chosen because he had served in Basra between 2003 and 2009 and because he had first-hand knowledge of counterinsurgency stability operations and/or direct involvement with *Op League*.<sup>41</sup> During January and February 2012<sup>42</sup>, semi-structured interviews (Yin 2003) were conducted with six key British officers who were based in Basra (some on various tours) with the Army's 35 Engineer Group, Army's Civil Military Cooperation Teams, the Headquarters Multi-National Division (South-East) Governance and Economy Desk, the British Foreign & Commonwealth Office, the Royal Air Force Expeditionary Air Wing Engineering and Supply Squadron, the Army Infantry Civil Affairs Police Headquarters, and the Iraqi Army Military Training Team. Prior to the face-to-face exchange, each officer received the set of interview questions designed to solicit general information about (1) *the area of operation* (Basra and its surrounding environs), (2) *stability operations relevant to water* (other than Op League), (3) *the role of water in security, stability, and coastal ecology*, as well as specific information about (4) *Op League* and (5) *COIN and coastal resource management in the estuarine setting of the saltwater regulator repair*. Because

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<sup>41</sup> The exception to this was the e-Interview conducted with the *Op League's* commanding officer (CO), Col P.B. The author was introduced to him through one of the CO's former officers who was based with her in C-9 RC(SW). Col P.B.'s interview questions were answered and dialogue with him was conducted via email.

<sup>42</sup> Interviews were conducted in Helmand, Province, Afghanistan, where the author was based with UK forces in the Stability Operations C-9 Staff Section, II Marine Expeditionary Force (FWD) Headquarters, Regional Command Southwest. Interviews were scheduled to take approximately 90 minutes each. Due to security restrictions, interviews were not taped (audio or video); the interviewer transcribed responses. Prior to use by the interviewer, transcripts were made available to the interviewee for review of accuracy.

of the degree of anonymity promised, the names of officers interviewed are withheld. However, when quoting an interviewee, his rank, initials, and date of service in Iraq are cited.

- **Background - Physical and Human Geography of the Tigris-Euphrates Watershed**

#### The Marsh

The study area, situated from 29° 55' to 32° 45' North latitude and from 45° 25' to 48° 30' East longitude, is in the southern most extent of Iraq's Mesopotamian Plain. There the marsh ecosystem found at the confluence of the Tigris and Euphrates rivers is fed by water that originates in the Taurus Mountain Range of Turkey. The annual spring snowmelt rapidly releases vast quantities of water into the rivers, creating periodic pulses flooding downstream. These flood waves have been a driving force in the ecology of the Tigris-Euphrates river system, particularly in the alluvial-deltaic plains of lower Mesopotamia (Richardson et al. 2005; UNEP 2001).

The Mesopotamian marshes are rivers of *Phragmites australis* grass, fed by water from the Tigris and Euphrates river systems. Once renowned for their biodiversity and cultural richness, the marshes covered more than 15,000 km<sup>2</sup>, an area nearly twice the size of the original Everglades (Richardson 2010). They were the permanent habitat for millions of birds and a flyway for millions more migrating between Siberia and Africa (Richardson and Hussain 2006). Coastal fisheries in the Persian Gulf used the marshlands for spawning migrations, and the marshes served as nursery grounds for shrimp and numerous fish species (Richardson and Hussain 2006). The marshlands also served as a natural filter, protecting the Persian Gulf from waste and other pollutants carried by the Tigris and Euphrates rivers (UNEP 2001).

The name Mesopotamia means "between rivers". It is here, on the fertile plain between the Tigris and Euphrates, where historians believe the first civilizations developed as populations

became settled rather than nomadic, farmers rather than hunters, and developed a system of central governing authority (Hnouch n.d.). Rainfall in Mesopotamia was insufficient for growing crops, so early farmers devised ways to divert water from the rivers to support agriculture. Regulating the waters of the Tigris and Euphrates appears to have been an informal activity until the Mesopotamia city-states mustered skills and labor to build structures that allowed control of floodwater and water diversion for irrigation (circa 3000-4000 BC) (Hnouch n.d.; Willcocks 1911; Lee and Falcon 1952). This had social and political effects because sophisticated irrigation systems require management of the waterworks. Hence, from the historical record it is evident that the water of the Tigris and Euphrates has been manipulated for a very long time (USGS 2007).

Gaining control over the waters of the Tigris and Euphrates through irrigation canals and flood protection was vital to the settlement in ancient Mesopotamia as it is in present-day Iraq. In modern times, understanding and gaining control of soil salinization associated with irrigated agriculture is equally important. In the first decade of the 20<sup>th</sup> century, the Ottoman government set about gathering information on the ancient irrigation systems of the Tigris and Euphrates basins and the salinity of the region's soils (Hnouch n.d.; Willcock 1911). After the First World War and at the end of Ottoman rule<sup>43</sup>, the British, French, and Americans were called on to modernize the region's irrigation networks on a large scale (Pearce 1993). To provide an understanding of the situation and to begin to frame out solutions, a study was commissioned in 1951 to analyze the soil salinization<sup>44</sup> of farmland, which historically was and remains to be the

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<sup>43</sup> Iraq's modern borders were demarcated in 1920 when the Treaty of Sevres divided the Ottoman Empire. It was placed under the authority of the United Kingdom as the British Mandate of Mesopotamia until it became a monarchy in 1921. The Kingdom of Iraq gained independence from Britain in 1932. In 1958, the monarchy was overthrown and the Republic of Iraq was created.

<sup>44</sup> Unlike rainwater, river water used for irrigation contains salt, and if not maintained, irrigated fields can become waterlogged with salty water. Evaporation of salt water from fields leads to soil salinization. Improvement of saline soils requires reduction

country's main agricultural problem (UNEP 2001; Richardson et al. 2005; USGS 2007). The 1951 study suggested a method of desalinization that required controlling the lower Tigris distributaries via regulators, diverting water from the marshes, and then sending it out to the sea (UNEP 2001).

As a result of the 1951 study, American and European engineers were contracted to design drainage systems, and in 1953 construction began<sup>45</sup> on the Main Outfall Drain (MOD) (later known variously as the Third River, the Leader River, and Saddam River). The 560-kilometre-long canal was designed to cleanse saline water from 1.5 million hectares of farmland. It carries water south from Al Mahmudiya, near Baghdad, crosses under the Euphrates riverbed via three large pipes, and then joins up with the Shatt al Basrah, which then guides water south past Khawr az Zubayr and Umm Qasr, before discharging it into the estuarine wetlands of the Persian Gulf (UNEP 2001). As construction of the MOD progressed through the 1970s and into the 1980s and '90s, its purpose shifted from one of irrigation system drainage to one of marshland reclamation. (Figure 8)

During the Iran-Iraq War in the 1980s, Iraqi leaders directed construction of causeways, which enabled the military to move armored units and supplies through the marshland. This construction caused drying of the eastern third of the marshes by 1991 (USGS 2007). However, the most destructive time for the marshland was period from 1991 to 2003 (CIA 1994; Richardson et al. 2005).

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of salt concentration, and this is typically done by leaching salt from the soil by moving water via subsurface drainage and requires an engineering solution (USGS 2007, FAO, n.d.).

<sup>45</sup> The projects were under construction from 1953-1992. "It took the government almost a year, 4,500 workers, and round-the-clock shifts to complete the Third River in December, 1992" (USGS 2007).



**Figure 8:** Marsh and Water Diversion Project Locations, Southeastern Iraq, 1994.  
(Source: Wikipedia commons)

In 1991, there was a post-Gulf War Shi'ia uprising in southern Iraq. As noted in an unclassified Central Intelligence Agency report from 1994, once Saddam Hussein's regime regained control of the region, insurgents retreated into the safe havens of the Al 'Amarah and Hawr al Hammar marshes to the north of Basra City. Baghdad's strategy for dealing with the

marsh-based insurgency was a large-scale water diversion project to dry the southern wetlands. Eventually dams and diversion canals made it so that water from the Tigris and Euphrates was redirected; by 1993, less than 10% of the former marsh area was covered by water. This had detrimental impacts on both the natural and human components of the ecosystem (Fisk 1993; North 1993; Pearce 1993).

It took the government almost a year, 4,500 workers, and round-the-clock shifts to complete the Third River in December 1992. They also dammed the Euphrates near where it passed over the Third River, so that most or all of its water was diverted into the Third River. Iraqi officials said this was to keep salty water from the marshes, but critics say it was to keep any water from the marshes. The marshes' other water source was the Tigris flowing in from the north, through a delta-like maze of distributaries. Apparently during 1992, these were either blocked at the Tigris or diverted into a long, wide canal.... This canal empties into the Euphrates near the old Tigris-Euphrates confluence. The Euphrates got a second dam, just upstream from the confluence, allegedly so that Tigris/canal water could not flow up the Euphrates bed and reach the marshes (USGS 2007).

From summer 1993 through spring 1994 implementation of a scorched earth policy<sup>46</sup> led to burning the dried marsh vegetation. Dry and denuded areas provided no sustenance or protection for insurgents and allowed for increased accessibility and unobstructed fields of view and fire to support the military response (CIA 1994).

Drying of the marshes prevented interaction of water, soils, and vegetation that sustained the habitat. As standing surface water evaporated, widespread destruction of indigenous

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<sup>46</sup> More than the Iraqi government's "scorched Earth" policy caused destruction of the ecosystem. In the 1970s Turkey dammed the Euphrates, reducing water to the marshes. During the Iran/Iraq War of the 1980s, the marshes became a frontline combat zone. And in 1985 the Iraqi government built levees and drained sections of the marsh to develop an oilfield.

vegetation and salinization of the soil followed, decreasing its fertility and making it unsuitable for agriculture (CIA 1994; UNEP 2001; USGS 2007). Desertification of the area led to the death of many animals and threatened others with extinction. By 1990, change in water chemistry, specifically increase in salinity, was noted as a cause for change in species and population number of fishes in the Shatt al Basrah (Al-daham and Yousif 1990). As noted in a USGS (2007) study of the region, there is little information on the Iraq marsh condition reported from 1994-1997. By 1997 the ecosystem was declared collapsed (UNEP 2001; USGS 2007).

Scientists involved in the Iraq Marshlands Restoration Program were fearful that only 15-20% of the marshes would be able to be restored because of the excessive salt build-up that occurred during the years when water was redirected (Richardson et al. 2005; UNEP 2006). However, UNEP satellite analysis confirms that as of December 2008 more than 55% of the original marsh had been reflooded or was covered by marsh vegetation (UNEP 2009a). “The overall recovery of ecosystem functions reached nearly 50% of historic values for three restored areas by 2006” (Richardson 2010).

### The Marsh Arabs

The Ma'dan, or Marsh Arabs, have inhabited the marshes for thousands of years, building reed houses on artificial floating islands of reeds, moving around by boat, selling reed mats, and living on fish, water buffalo, and rice and barley (Mohammad n.d.; Richardson 2010). They are Shi'ite, and for this reason, they have strong cultural ties with the Shi'ite population of Iran. And from the 1980s-2003 the Marsh Arabs maintained close ties with Iraqi dissidents who opposed Sadaam Hussein's ruling Sunni Ba'ath party. For this reason the Marsh Arabs found themselves in the crosshairs of military engagements for over twenty years. As the water in the marshland



diminished, as the reed beds died, and as fish populations vanished, so did their livelihoods and their culture.

*I'm sure we even saw evidence, but cannot recall from where, of water results that showed the gradual increase in salinity in both the Shatt al Arab and the Shatt al Basra. The physical effects were understood to be: (1) lowering of the water level; reduction in the surface area covered by water; areas dried out and ecosystem change as a consequence (different plant and animal life), (2) increase in salinity of the waterways that remained and more of the marsh land becoming tidal. According to information from local nationals, there was an ebb and flow of water, which had not existed before. The human aspects include: (1) increased level of pollution as sewage in the Shatt al Basrah was swept upstream on each tide, (2) change in livelihood of many people—these evaporated as the fish population changed and traditional freshwater species no longer could be caught. The vegetation change made it so that traditional reed houses could not be built and water buffalo could not be grazed. The area became increasingly depopulated as people left the waterways and looked to the city for a way of making a living. Out migration was to both Baghdad and to Basra.*

Col P.B. 2008-2009

After the fall of Hussein (2003), many of the water diversion and control structures were opened so that the region would flood once more. Uncontrolled release of water restored some former marsh. However, returning water to the marsh was much easier than returning people to the marsh. Many of the displaced Marsh Arabs who had been living as refugees in Baghdad and Basra resisted being returned to their homeland (*The Economist* 2005). According to one British officer who served in Basra in 2004, this was particularly true of the younger generation of Ma'dan who had developed aspirations beyond their traditional way of life.

*It seems that the Marsh Arabs were rapidly urbanized, even if they were discriminated against in the cities. When the marshes of Dhi Qar Province were reflooded in 2004, the Marsh Arabs bussed down from Baghdad apparently expressed no interest in returning to them. They had grown used to electricity and the limited comforts of Iraqi urban life. The Marsh villages I visited after the reflooding were extremely austere. Outside of Basra—even quite close to the city—conditions could be appalling. I visited one village less than 3km from the Baghdad Road, just north of Qarmat Ali that could have been in the 14th century. People with leprosy were living in mud huts using cattle dung for fuel. The main political commodity was oil, and these people lived literally on top of an oil field. Traffic from the highway was audible.*

Maj L.M.I. 2004, 2006, 2008

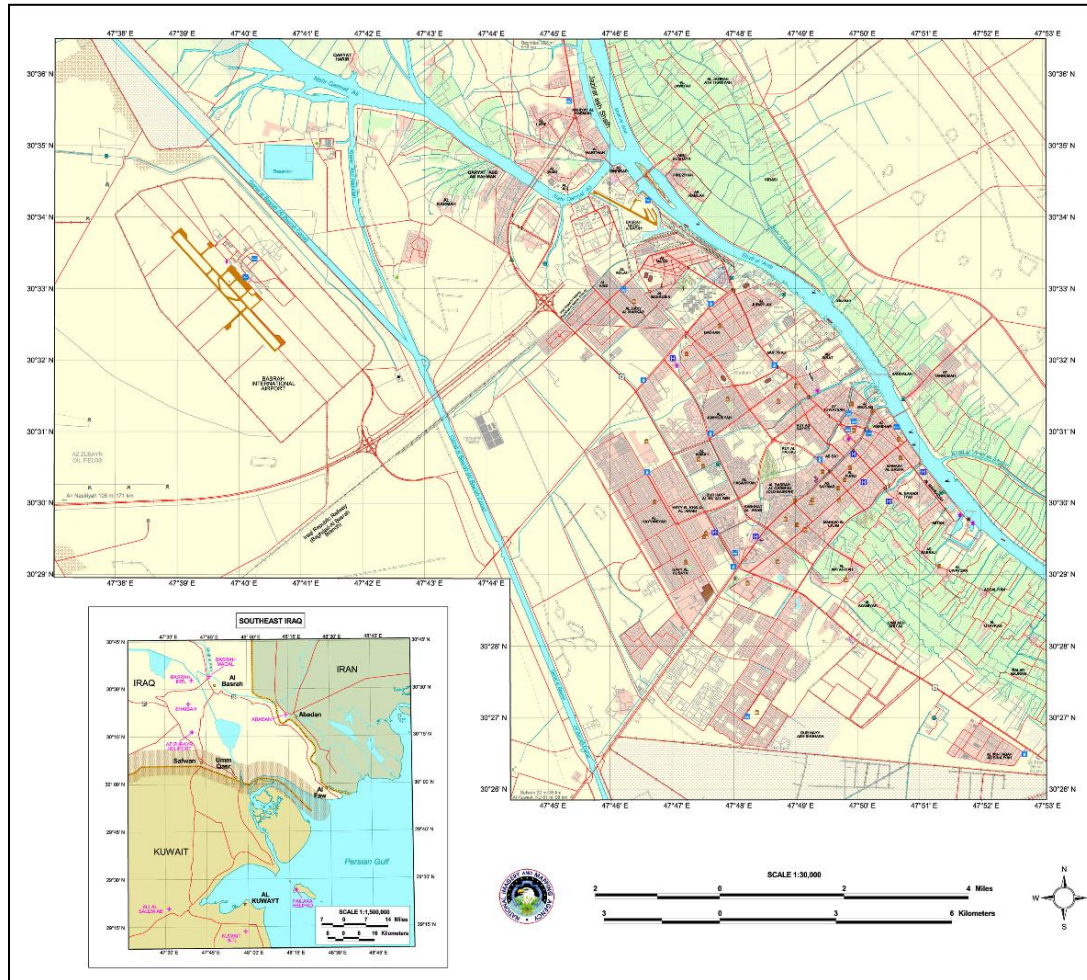
Scientists assisting in the marsh restoration determined that if the human component of the ecological system did not wish to return, then “it would not be possible to restore the marshlands to what they once were—however much significance that restoration may have to everyone else” (*The Economist* 2005). Environmental restoration efforts opened the possibility of restoring the animals and plants to the marsh, but it was left to the Iraqis to decide exactly for whom the marshes were being restored, and to what end (*The Economist* 2005).

By 2003-04, safe drinking water was the most critical need for those who did return to the marsh. Many inhabitants had no choice but to drink untreated, unfiltered marsh water that was contaminated by sewage, high levels of salinity, and pollution (from any number of sources, i.e., pesticides, fertilizer, industrial (oil field) waste) (Richardson et al. 2005). By 2004, Iraqi authorities included water quality and marshland management on the priority list for reconstruction under United Nations Development Group (UNDG) Iraq Trust Fund, and initiatives for water quality and marsh management received assistance from international donors (UNDG 2003). In response to the situation, the United Nations Environmental Programme (UNEP) “Support for Environmental Management of the Iraqi Marshland” initiative commenced in Aug 2004, which established the Iraqi Marshlands Observations System to carry out wetland and water quality management pilot projects in the region (IETC n.d., Iraq Ministries 2006).

UNEP and United Nations Educational, Scientific, and Cultural Organization (UNESCO) launched a joint project in 2009 to establish and implement a long-term sustainable management framework in the Iraqi Marshlands “...to build capacity and raise awareness among the local population to ensure their participation for the site preservation and ecosystem management” (UNEP 2009b). According to the website (last updated in 2009) UNEP provided assistance to marshland communities and Iraqi ministries by supporting community-level initiatives and

developing and implementing a long-term sustainable management planning and implementation.

### Basra and its Environs<sup>47</sup>



**Figure 9: Basra City Map**

Basra is an old port city with roots back to the 7<sup>th</sup> century AD. It grew up on the west bank of the Shatt al Arab, the confluence of the Tigris-Euphrates Rivers that drains along the northeast side of the Al Fawr Peninsula and into the Persian Gulf. It is critical to realize that prior to fighting associated with Operation Iraqi Freedom (2003), Basra was already damaged by

<sup>47</sup> Information for this section was taken from Ives' unpublished opus, *Basra City Study*, prepared for the Multinational Division South-East (MND(SE)) British Brigade Headquarters, 2004 unless otherwise noted. Comments taken directly from interviews conducted Jan-Feb 2012 are set in quotes; each is cited giving rank initials, and date of service of interviewee.

war. This was largely caused by Iranian artillery fire during the 1980s Iran/Iraq War, when the Al Fawr Peninsula was the scene of protracted, positional fighting much like WWI.

According to the *Basra City Study* (Ives 2004) and interviewee concurrence, Basra's climate is challenging. The cool temperatures and rains in February and March are followed by storms in April that are often torrential. Then there is a gradual rise in temperature through the summer and into September, with the daytime temperature often well above 45<sup>0</sup> C (113<sup>0</sup> F). ("It remains hot at night so there is little respite.") From end of September the weather cools rapidly into winter with a short period of extremely humid weather before the winter rains begin.

Basra is low lying, and large areas of the city flood during the winter and spring rains. At one time the city was surrounded by marsh. There were extensive deep marshes in the Qarmat Ali area to the northwest of Basra, fed by Qarmat Ali River. The semi-permanent shallow marshes immediately to west of the city are known to be heavily polluted with effluent and garbage that originate in the urban area.

Cholera and typhoid are endemic in the hot season, as is leishmaniasis. The health service was in crisis as a result of the legacy of international sanctions and post-1991 neglect. "It is worth remembering that after the 1991 Gulf War, there was an anti-Saddam rising in the south. Saddam crushed the rising and the south was consciously discriminated against, if not actively vandalized, for the next 10 years" (Maj L.M.I. 2004, 2006, 2008).

In terms of its urban geography, the city has three main designs: (1) the Old City (Al Qadiymah), situated at its core, away from the banks of the Shatt al Arab; (2) the Colonial City, built under British auspices in the 1920s/30s, which surrounds the old city core; and (3) the Modern City, built in the post-colonial period on a Western grid pattern. The most marginalized and disenfranchised district of Basra is known as Hayyanyah (a.k.a. the "Shi'ia Flats'). Built

on “cheap” undesirable real estate in an area with no topographic variation, Shi’ia Flats was designed to be a Western-style government housing project in the Modern City.

The condition of Hayyanyah’s infrastructure was never up to Western standards, and by 2004, after more than two decades of war and neglect, it was almost non-existent. The situation with sewage was appalling. “Though it had very basic sewage pumping facilities, they were invariably clogged with refuse. Hayyanyah had few or no main sewers under the houses, and domestic waste discharged into open gullies in the streets. The very flat land in this sector makes it so water and effluent tended to pool. The primary pumping station at the northwest corner of the Shi’ia Flats moved its discharge directly into the Shatt al Basrah, ironically known as the Sweet Water Canal” (Ives 2004, Maj L.M.I. 2004, 2006, 2008). (Figure 10)



**Figure 10: Pool of effluent in Shi’ia Flats, October 2008. (Source: Maj L.M.I.)**

The residents of Basra who lived to the east of the Baghdad Road generally treated the residents of the Shi'ia Flats as underclass. "Land tenure and property rights questions abound in Shi'ia Flats, and the municipality was loathe to spend money on essential services for its residents. The hope was that these residents would just go away. Given that there were up to 500,000 of them, this was perhaps an unrealistic aspiration" (Maj L.M.I. 2004, 2006, 2008).

The biggest concern for locals in Basra was power; everything else flowed from that (Maj R. P.; Col P. B. 2008-2009; Maj L.M.I. 2004, 2006, 2008). "Without electricity they could not pump water into the storage tanks and operate domestic systems. Nor could they operate their domestic air conditioners (if they had them), which made people sleep deprived and frustrated in the hot summer months. Mass unrest<sup>48</sup> always occurred during the hottest months" (Maj L.M.I. 2004, 2006, 2008).

The city's power supply was poor and unpredictable, mainly due to lack of capacity from the Al Maqil power station in the city, which had not been maintained and was in need of extensive repair or replacement. The electricity transfer network was also in very bad condition, and it was impossible to source power from the Kuwaiti grid. One interviewee noted that even though it improved from 2004-2008, electricity demand outpaced the production, leading to extensive power cuts, especially in poorer parts of the city (Maj L.M.I. 2004, 2006, 2008). Based on qualitative research conducted by the British mentor for the Police HQ in Basra City and from field observations of the Military Training Team Commander embedded with Iraqi Army units, residents of the poorer city districts who were without power held a common belief

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<sup>48</sup> According to Ives 2004, "Sadaam used to mobilize the army reserve for 'training' in the summer. The young unemployed males would thus be concentrated harmlessly in the deserts, preventing disorder in the cities during the unbearably hot times."

that the city's richer residents bribed the power authorities. As he noted, "an over-flight of the city at night would seem to bear this out" (Maj L.M.I. 2004, 2006, 2008).

Petrol was the next biggest issue and every summer (2004-2008 at least) there were petrol riots. "The petrol issue may have been caused by a shortage of petrol stations, not shortage of petrol itself. In 2004 there were only 6 petrol stations in Basra for a city of 1.5 million people. At least one of these was destroyed in the fuel protest that summer" (Maj L.M.I. 2004, 2006, 2008; Ives 2004).

Supplies of both electricity and petrol did improve during the Multinational Force mission, but the improved economy led to a surge in car and white good imports. Improvements in power generation and petrol supplies could not keep up the pace.

The city's drainage system was originally based on the tidal rise and fall of the Shatt al Arab. There is a complex network of canals running through the older parts of the city that terminate in a number of electrically operated lock gates on the banks of the Shatt al Arab. When the tide is high, these gates were opened to flood the canals. Then sewage was discharged into the canals, and at low tide, the gates would be opened again and the effluent flooded out. All interviewees noted that during their tours, most of these canal gates were inoperative.

Most of the city's domestic water was obtained from underground pipes running into a system fed from the Shatt al Basrah. The pipe infrastructure is very poor. According to estimates (Ives 2004), over 60% of water delivered into Basra was lost through leakages. Water could only be pumped at low pressure to prevent catastrophic failure of the pipes. "Domestic lift pumps, used to move water into roof mounted gravity tanks generate vacuums within the pipe system which helps to draw in contamination from the surrounding soil and groundwater."

The householders would take water from tanker trucks, and pump it up to storage cisterns on the roof using small electric pumps. These elevated tanks then provided the head pressure for domestic use. Unfortunately, the pipes used were clay and had become porous over time. The use of electric pumps to pull water into domestic cisterns created negative pressure in the pipes. As the pipes were often below the level of the water table in the unconfined aquifer, pollutants were thus drawn into the domestic supply. “Our shower water in the Shi’ia Flats was tested by a British Army Environmental Health Technician (EHT) who promptly had a fit and banned us from using it” (Maj L.M.I. 2004, 2006, 2008).

From 2004-2006, more than 120 public works and water projects were initiated to improve sewer systems or provide potable water to the residents of the southern provinces of Iraq. As part of an overall Iraqi water project plan, they were considered a high priority in the budget of the Iraqi Reconstruction Relief Funds (Bahrani 2006). As touted in one USACE report from 2006, “These projects are improving the overall living conditions and health issues of this impoverished country” (Fournier 2006). Regardless of the claim, the impact of such projects was overwhelmed by the magnitude of the need.

The Multi-National Division (South-East) attempted to deal with the city’s dreadful garbage problem by initiating numerous cleanup operations (MOD 2008). To support this, a landfill site was established west of the city. “Unfortunately, as the site was dug in, pollutants leached into the groundwater from it” (Col P.B. 2008-2009).

From the 1990s until 2009 (the end of the Multination Force engagement in southeast Iraq) “skilled labor and managers disappeared; most professionals who could move from Basra did so” (Maj R.P. 2008-2009). In the water, sanitation, and electricity sectors, many projects



were completed as part of the Iraq reconstruction effort, but they sustained damage or became inoperable due to problems in maintaining or properly running them (GAO 2006).

Basra circa 2009: The State of Stability Operations and Water-Sector Initiatives<sup>49</sup>

*In 2003 the Brits/MNF were seen as liberators; the Shi'iat population of Basra were optimistic. By 2006, people were running out of patience. There was a sharp rise in the number of times our bases were rocketed. The UK at the airport and the others at bases in town became easy targets...By November 2007 MND(S-E) had lost Basra, but militia control of the city was disastrous for the population. With the help of US Forces and the Iraqi Army, the city was retaken in April 2008. With that return came new hope and optimism from the citizens for MND (S-E) assistance.*

Wg Cdr C. A. 2006

Royal Engineers were aware of work being done to repair the sewage plants, to improve water treatment plants, and the projects planned to place new water mains throughout the city, often at enormous cost. "Over \$1 billion was spent in one financial quarter in southern Basra alone during 2006" (Maj L.M.I. 2004, 2006, 2008). Though the Major reporting this could not comment on the efficacy of the projects, he could vouch that they had not had an impact on the Shi'ia Flats by 2008, the time he was embedded there as Military Training Team Commander for district's Iraqi Army unit.

*I suspect this is because of discrimination against the residents by those who lived east of the Baghdad Road. In 2004 and 2006, the divide between the two sides of the city was not really noticeable. By 2008 it was stark. At night, the Shi'ia Flats went dark while the rest of Basra was brightly lit, to the extent of having illuminated promenades along the SAA. It is also true that the Flats was the hardest area of the city by a very long chalk, probably akin to Sadr City in Baghdad. Mobs numbering in the tens of thousands would pour out of the exits almost at the drop of a hat during the summer friction periods. It was considered a death trap. In 2006, the only way for MNF troops to get in there was by fighting their way in under armor; it was very rarely attempted. The residents of the flats suffered as a consequence in a downward spiral of violence and frustration.*

Maj L.M.I. 2004, 2006, 2008

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<sup>49</sup> Quotes from interviewees are cited giving rank, initials, and dates of service.

One of the infrastructure endeavors was the municipal project was to unblock the main drains in Shi'ia Flats. "Much of this was simply a question of (figuratively) holding a gun to the heads of the municipal council. Unfortunately, the Baswari attitude to litter made this a Sisyphean task, and the municipal authorities would not establish a regular program of clearances. At the time (2008) the sewage was up to the wheel arches of vehicles in the souk (market) next to our patrol base" (Maj L.M.I. 2004, 2006, 2008).

Another of the many infrastructure projects was one to refurbish the sewage pumping station at the northwest corner of Shi'ia Flats. "While superficially successful (it was nice and shiny), the station pumped raw effluent directly into the Shatt al Basrah" (Maj L.M.I. 2004, 2006, 2008).

Reverse Osmosis (RO) water was the "gold standard" of purified water and was determined to be the best way to boost the supply of potable water to the city (MOD 2003). Six RO plants were established in 2006 with the intent of dispensing RO water for free to the residents, but this was short-lived. The RO plants nearest the Shi'ia Flats were abandoned by 2008. However, the RO tanker trucks continued to be used, and water sellers would sell "RO" water from tankers around the city. Interviewees reported that the water in the tankers was usually drawn from the Shatt al Basrah and sold untreated.

- **COIN, Stability Operations, and the Saltwater Regulator Repair**

Why a COIN approach

Both the Shatt al Arab and the Shatt al Basrah were and are key to the prosperity and normalization of southern Iraq and Basra. Over a period of time (estimates vary, but at least 6 years) the sewage and the salt water in the Shatt al Basrah had seriously affected the ecosystem in the marshes such that the fish population and types of fish had altered, reed beds had begun to

die, and the people who relied on fishing and the marsh ecosystem for survival were forced to move into the city. “It is possible that these displaced people became susceptible to any influence (and could have become insurgent recruits) once they were homeless and living in Basra. Many had resorted to illegal activity as a way of earning cash—i.e., placing IEDs on roadsides for money. So if the saltwater regulator could be repaired, then this might help, over time, to restore the natural habitat and the ecosystem and facilitate a return to normality” (Col P.B. 2008-2009).

*We were well on the way to restoring diplomatic governance through provincial elections as well as re-establishing the rule of law with the Police assuming overall primacy from the military. However, in 2009 Basra’s infrastructure was still quite desperate and water played a key role in that. During our tour of duty we repaired the major crossing over the Shatt al Basrah twice, which enabled commerce to continue and link the major trade route from Iran into Iraq. Of course this was a double-edged sword as this route was also used for criminal activity. Likewise the Shatt al Arab, with its major waterway was also a favorite route for criminals.*  
(Col P.B. 2008-2009)

### The Significance of the Saltwater Regulator

The Shatt al Basrah runs directly into the Gulf and is tidal. It links the sea with the freshwater marshes northwest of Basra City. Its saltwater regulator—a series of sluice gates and a lock to allow boats to pass through it—is located approximately 75 km upstream from the Umm Qasr (Iraq’s modern deepwater port). “The sluice gates had been controlled by hydraulic rams as had the massive lock gates. Originally they acted as a one-way valve. When it was working, the saltwater regulator on the Shatt al Basrah was designed to perform four main functions: (1) prevent saltwater ingress upstream; (2) maintain a steady water level upstream; (3) provide a bridge for vehicles and pedestrians; and (4) provide a fish ladder to enable migratory fish to reach their spawning ground and thereby help to feed Basra.

Jenkins notes that nearly 20 km upstream there was dramatic saltwater contamination of the water of the facility, which poisoned adjacent farmland, made the water unsuitable for the production of drinking water using normal Reverse Osmosis plants, and killed the freshwater fish (2009). He also states that the unstable water level had effectively destroyed two very large established fishing areas (covering approx. 175 km<sup>2</sup>), and that there was a twice-daily beaching—and consequent baking—of a significant amount of Basra’s raw sewage output that was left on the banks of the Shaat al-Basrah, less than 3 km from the city. Lastly, the Shatt al Basrah was unusable as a commercial waterway; the only boats that could pass through safely were the size of a large canoe (Jenkins 2009).

The Commanding Officer working with the Specialist Team Royal Engineers understood the saltwater regulator’s link to other Basra city sewage system projects. He realized that “without repairing the regulator, any repair to the city’s sewage system (that dumped effluent into the Shatt al Basrah) would only exasperate the situation in the marshes as more sewage would be washed in on every new tide” (Col P.B. 2008-2009). But the Colonel left in May of 2009 along with the rest of the Royal Engineers; unfortunately, with him went the big-picture connection back to *Op League*.

#### The Royal Engineers and *Op League*

From September 2008-March 2009 the 523 Special Team Royal Engineers (STRE) arrived in Basra expecting to “take on a variety of tasks aimed at completing existing construction works in good order, winding the theater down, and handing the Contingency Operating Base (COB) over to US forces” (Jenkins 2009). The outgoing British engineer team had just been tasked with providing technical advice and support to the Joint Force Engineer Group by doing a recce on an Iraqi facility on the Shatt al Basra waterway. The facility in

question was a saltwater regulator, and fixing this hydraulic mechanism was a technical, mechanical, problem that fell within the bailiwick of the theater's professionally qualified electrical and mechanical engineers.

In short, the engineers faced this situation: The Shatt al Basrah—the “drain of Iraq”—was supposed to take agricultural run-off, sewage, and stormwater from the central and south of the country out to sea. The human-made channel had a planned steady flow rate of 250 cms, but the actual flow rate varied according to the tide, from dead still to torrential (Maj R.P. 2008-2009). A rough approximation of peak flow rate was 700 cms, considerably higher than intended (Jenkins 2009). The regulator, located in the tidal zone, and consisted of a large (16m wide) lock gate, five regulator gates (each 5m wide), and two larger emergency regulator gates (each 7m wide). A reinforced concrete pivot bridge bridged the lock gate section. “All of this, bar the emergency gates, was supposed to be operated by massive hydraulics” (Jenkins 2009).

The initial engineer recce revealed the causes of malfunction:

*Upon field inspection it was seen that the regulator had been “systematically and thoroughly looted. Every meter of hydraulic pipe had been removed, together with all attendant machinery, all electronics and controls, large chunks of hardware from gates, all duct and manhole covers, and, naturally, the hydraulic pump and generator...When the original operators of the facility abandoned their posts, they raised the regulating gates, preventing the flooding of large tracts of farmland upstream. The consequence of this was that the tidal surge was able to rage through the regulator unchecked.*

Jenkins 2009

To repair the equipment back to original state would cost approximately \$10 million pounds Sterling. Subsequent recces later, the Royal Engineers designed a less costly, less technically sophisticated way to fix the saltwater regulator. Once identified and set to a plan of action, this initiative became known as *Op League*.<sup>50</sup> Royal Engineers met and briefed their

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<sup>50</sup> For complete discussion of the engineering and the technical situation and decisions, see Jenkins's 2009 article.

design plan to the Chief Engineer of Canals and Waterways in Basra region; initially, it had been he who had called attention to the problem. Because of the technical complexity of work to be done in addition to equipment needed, the work was beyond the capacity of the Iraqi contractors and could not be turned over to them (the typical counterinsurgency approach). However, Iraqi engineers and contractors did participate in the effort, and in the end, the saltwater regulator was repaired and operational.

When the mechanical and engineering tasks were completed a handover pack needed to be written in English, translated to Arabic, and distributed to the controllers of the regulator so that they would be able to operate and maintain their newly functional facility. “Everything was going well until Eng. Ali arrived, and asked us to leave every gate in the facility open, as he had not managed to employ anyone to operate the gates. In truth, he was understandably nervous of being asked to assume responsibility for operating the facility after it had lain dormant for so long” (Jenkins 2009).

Success required key leader engagement and compromise. In the end, the saltwater regulator was reactivated to a degree that did not require constant supervision. Once an operator was hired and trained, the facility could be brought to full effectiveness.

- **Discussion–Lessons Learned**

Beyond its ecological roles, water can play various military roles (USGS 2007). During Operation Iraqi Freedom, water was overlooked by many of the troops in Multinational Division (South-East); “it was just there” (Wg Cdr P.B. 2004). To some, it represented the infrastructure debacle that was Basra. For others, water, such as Shatt al Basrah, was a literal barrier from mortar attack, keeping insurgents at arm’s distance. Waterways were choke points in the

transportation network that could lead to injury and/or death. Waterways were the transportation paths used for patrolling, and for smuggling arms from Iran.

Water infrastructure projects were an obvious win for COIN, but “when operating in Multinational Force environment doing stability ops, you need to look beyond the obvious” (Wg Cdr C.A. 2006).

(1) **Success is tied to the background and expertise of those working the problem.** The Commanding Officer/Chief Engineer of the STRE during *Op League* saw the canal improvement as potentially a “life changing success” for the people living in the rural areas outside of Basra (Maj R. P. 2008-2009). Stopping saltwater infiltration from the Gulf would freshen the water used to irrigate the subsistence farms in the small villages to the northwest of the city and could help improve quality of life for the families living there. The engineers who worked to support *Op League* realized that the Commanding Officer (CO) “understood the interconnection of the human and physical aspects of the place” because of the leader’s academic background in geography and his prior combat experiences (Maj. R.P. 2008-2009). Another CO may well have missed making connections between the physical and human geographies of the area and understanding the significance of *Op League*.

(2) **Under-promise, over-produce, and work within realistic timelines.** It is far better to please a population with the unexpected than to quell the anger and disappointment of their dashed expectations. This goes with expectation management that should be practiced by of all those involved in joint forces and/or multinational coalition projects.

The saltwater regulator operation was a bit of an anomaly. The request came from the population, and it turned out that with the right group of engineers on hand and with

circumstances aligned to accomplish it, the repair was achieved! The impact, however, remained to be seen. A quick COIN win may or may not be a sustainable solution to root causes of unrest.

The solution to the saltwater regulator repair required design development within a compressed time frame that did not allow for the long process time needed for research and non-standard problem solving. Because this repair was tackled in 2009, there were issues caused by drawdown of forces. Many bits of equipment that could have expedited the work, such as a combat support boat, had already been withdrawn from theater. Nevertheless, at least the short-term goal of the operation was achieved.

(3) **Water-relevant counterinsurgency stability operation endeavors are inevitably ad hoc, lacking coordination and integration of programs.** None of the military officers interviewed for this study believed that there was an overall plan being utilized for water in Basra and the surrounding area.<sup>51</sup> None of the water infrastructure projects reviewed seemed to dovetail into a greater water management goal or vision, but this is seen frequently in Stability Operation COIN (Palmer-Moloney 2012). A cursory review of water projects for Basra (2004-2011) support this:

- In numerous reports, US Army Corp of Engineers promised that by May 2006, two million Iraqi citizens in Basra and the surrounding area would have a constant and reliable source of water when the Basra Sweetwater Canal (Shatt al Basrah) system upgrade was completed—at the cost of \$2 million USD (Bechtel n.d.; Bahrani 2006; Investors Iraq 2004).

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<sup>51</sup> This is not to say that there was no plan for water, for one key British source noted that there was a plan of sorts on file (Maj. L.M.I. 2004, 2006, 2008). This plan, however, was not utilized to consider how independent projects affected water and one another in a collective sense.



- A 2008 report from the British Ministry of Defence claimed that improved security in Basra was dependent on improved essential services (“sewage, water, electricity, and rubbish collection”) and on enabling the right conditions for investment (MOD 2008).
- In 2009, the US Embassy report *Basrah PRT: January 2010* claimed that 2010 was the year to focus on obtaining better public service and improved quality of life for Basrawis. The Basrah Provincial Reconstruction Team was to begin a 15 months to complete four-phase \$41.3 million project for Basrah to supply “adequate water free of salt and pollution” (US Embassy 2010).
- The 2011 report *Iraq 2012: Discovering Business* points out that saltwater reaches up beyond Basra with loss freshwater fisheries, farmland, and date groves. It states that any business venture with ideas for solving the problems was encouraged to take on the challenge (Iraq Business 2011).

None of the projects referenced demonstrate their relationship to other projects, completed or planned. None refer to how work done on one project might affect another. In many ways the different funding mechanisms used cause this to happen. Interconnections among project goals and objectives are not stated openly if they are recognized at all, particularly if the outcome of one is a prerequisite for the successful completion of another.

**(4) It is difficult to plan and to gauge a coordinated stability operations “effect.”**

Transition to local authorizes is always tied to a “hand-off” that implies that someone is at the receiving end to catch. Frequently those in leadership positions are appointed, and they, particularly those positions who work with water and infrastructure, are not necessarily individuals with the scientific or technical prowess and experience or expertise to handle the

jobs. “Plant operating crews that we trained often lacked the leadership, resources, or motivation needed to run and maintain their facilities. Local ministry staff either did not exist or did not attend training sessions to support such facilities, nor did they budget for or purchase essential supplies and spare parts to run them” (Col P. B. 2008-2009).

Once they are completed, endeavors like *Op League* seem to have little if any long-term cross-project dialogue, project accountability or long-term oversight. Most are “handed over” to host nation government leaders—at the local, provincial, or national level, depending on the scale of the project—as Multinational Forces transition responsibility and withdraw. Yet, successful hand-off depends on intellectual, technical, and governance capacities of those receiving. And if hand-off is not achieved, if the ball is dropped, then discontent and associated insurgent opportunities will continue as machinery falls into disrepair and the economic and quality-of-life dimensions of unrest continue in their downward spiral. Generally, Iraq had an educated populace under Sadaam Hussein. However, most of the educated and trained workers to whom infrastructure project management, as well as upkeep and maintenance, could be transitioned had fled Basra during the times of unrest, from approximately 1991-2009 (Maj. L.M.I. 2004, 2006, 2008; Maj. R.P. 2008-2009).

Metrics to measure COIN effect are quite difficult, especially if results are only viewed over a short timeframe. In the case of *Op League*, the COIN effect was determined on an intuitive basis. “We felt that it was the right thing to do! We justified it because anything that would help return the area back to how it was that restored people’s livelihood and way of life was a good thing. Earning money through fishing and agriculture was better than a criminal alternative” (Col. P.B. 2008-2009).

(5) **Liaison with local users is essential.** Local nationals must “buy-in” stabilization projects or they will not use them; all efforts and money spent will have been wasted. “It must be expected that they (the local nationals) will be disappointed with any “expedient” solution to their problems. They’ll want, and continue to ask for, the best solution possible—irrespective of cost or difficulty” (Col. P.B. 2008-2009).

Repair of the saltwater regulator was something that the Basrawis asked to have help with; the engineers did not generate the idea. “So once we had been asked for help and had taken a look at the saltwater regulator, we could see the potential benefits and were very keen to do what we could” (Col P.B. 2008-2009).

(6) **The military’s ability to repair/restore infrastructure is limited.** The key function of the military in stabilization operation is to ensure the essential elements of infrastructure are deliverable as quickly as possible and to create a secure environment for specialist and/or local organizations to undertake the work. Ideally, the saltwater regulator would have been taken on by a civilian mechanical construction company with the skills to rebuild the whole thing. But this would have cost a significant amount of money and time. “Our strength was being able to see beyond the millions needed to rebuild it and to determine a low-cost/ low-tech solution that would have the same effect” (Col P.B. 2008-2009). [Of note, *contribution of local contractors should not be a critical component to any stability operations endeavor.* While local contractors are “a potential force multiplier, and their expertise can be developed as part of the J-9 effort, they can also be catastrophically unreliable, and their failure can make the difference between success and failure of the whole task” (Jenkins 2009). ]

(7) **It takes control of the government to “do” effective counterinsurgency (COIN) operations.** COIN is by nature a military activity, if an insurgency is defined as an armed

resistance against the extant authority. COIN is a type of war, and it has had numerous names. Where the edges get blurred is in the idea of 'full spectrum' COIN where the impetus for revolt is undermined by enacting social / political change. This is given various names, such as grievance amelioration. Full spectrum COIN fits nicely with Maoist theory where there is a gradual evolution towards all out armed struggle. The evolution can also be reversed if conditions dictate and insurgent operations can slide back down the scale to agitation or propaganda activity.

*The point is that the hard core, ideologues can very rarely be bought off with new schools and clinics. Fortunately they are rarely a majority. These irreconcilables need to be either contained or killed. You can compare this situation with the US or the UK where there are active Communist Parties, in theory implacably opposed to the current system of government. But are either of these countries in the grip of insurgencies?*

Maj. L.M.I. 2004, 2006, 2008.

By 2005, and Multinational Forces were no longer an occupying power with the authority to run the city or the country as they wished. Iraq was, on paper at least, a sovereign state to which MNF were supplying assistance. “Bremmer’s constitution caused real issues by making the provincial governors almost independent of central authority. When the provincial governor was *badmash* (translated loosely as “naughty”, “crook,” or “thief”) those he supposedly governed suffered accordingly” (Maj. L.M.I. 2004, 2006, 2008). COIN money and efforts were easily derailed to support those who supported those in power.

**(8) “Winning” in and around Basra was not COIN relevant, because unrest in Basra was not intended to overthrow the established government.**

*I am not aware of the insurgency having a water focus, unless it was for the transport of weapons and munitions. Oddly, the urbanized Iraqis viewed the marshes and their inhabitants with distrust and distain. We were frequently regaled with stories of the exploits of terrorists operating along the canals... most of which were pretty farfetched to the point of fantasy. Searches of marsh villages (by the Iraqi Army units) were usually conducted with a degree of contempt and*

*some casual brutality. This attitude might have parallels in the fear of the forest common in east European /Russian folklore.*

Maj. L.M.I. 2004, 2006, 2008

The insurgents<sup>52</sup> were thought to be mainly young men, and from 2003-2009, unemployment for young men ran at a 40%. There was lots of rubbish in the streets of Basra and the Multinational Division (S-E) had lots of money. “Lots of unemployed young Arabs + big piles of rubbish in the streets + lots of MNF money = rubbish clear up operations. Right? As a result of money spent, the rubbish would move from one district to another or be piled into heaps where it poisoned the water table” (Maj. L.M.I. 2004, 2006, 2008).

Maj. L.M.I.’s insurgent equation was modified slightly by *Op League’s* Commanding Officer: “We felt that it (repair of the saltwater regulator) was the right thing to do! We justified it because anything that would help return the area back to how it was that restored people’s livelihood and way of life was a good thing. Earning money through fishing and agriculture was better than a criminal alternative” (Col P. B. 2008-2009). Better for whom? The host nation government in Basra? Nevertheless, “criminal activity” and “insurgency” are distinctly different.

Did moving rubbish or moving sewage by fixing the saltwater regulator improve the quality of life in Basra to the point of removing a potential recruiting base and source of support for insurgents? Few projects, the saltwater regulator repair being one of them, appear to have been sustained long enough to have measurable result in this regard (Bechtel n.d.)

Also, restoring a way of life for the rural Marsh Arabs is a goal that might not have been a goal of the people involved. The Western vision of simple, pure life invoked by Mozart’s

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<sup>52</sup> According to sources that were embedded inside Basra, there were no insurgents in the strict sense of the word, but there was “unrest.” Of note one officer stated, “None of the groups we faced wanted to overthrow the Iraqi government. Unemployment for young men was roughly at 40% across the Arab Middle East in 2004-2008, a function of an explosion in population some 20 years ago.”

pastoral symphonies or by an episode of *Green Acres*, may be a modern myth. Globally, rural to urban migrations of young people are common, many deciding that they do not want to live the rural life of their forefathers. Living off the land is challenging; there are no modern conveniences. “Even worst circumstances in the city are a step above conditions in traditional setting in the marsh” (Maj. L.M.I. 2004, 2006, 2008).

- **A Coastal Resources Management Course of Action**

*Our water strategy was just not lined up. We did not understand the system in use, and often projects in a different field would have a negative impact on water.*  
Col P. B. 2008-2009

In a coastal setting, water is a key natural resource and determining how to manage it is critical. As a coastal resource, water ties to local, regional, and national people, economy and power dynamics. In a combat zone, water cuts across all lines of operation and is clearly associated with security and stability (Palmer-Moloney 2011a, 2011b, and 2012; Dehgan et al. 2012; Palmer-Moloney and Duckenfield 2012). Failure to address water concerns from a watershed perspective has the potential to increase tensions explosively, to prevent stability gains, and to interfere with the success of development projects (Dehgan et al. 2012; Palmer-Moloney and Duckenfield 2012).

As shown in the Basra and *Op League* case study, a coastal resources management course of action (COA) is needed to monitor, to coordinate, and, ultimately, to mitigate misalignment amongst COIN stability operations in coastal environments. Hence, a COIN Stability Operations Coastal Resource Management approach is proposed. It should be a mechanism for systematically vetting proposed stability operations projects—from short-term quick impact to longer-term initiatives—to analyze and evaluate their independent and combined significance. To be effective, it requires a strategic partnership between the multinational military forces, the science community (civilian and military; basic and applied research), international donors

(cash), and government (at all levels—international, national, regional, and local). And it requires an Integrated Water Resource Management<sup>53</sup> approach to provide a comprehensive understanding for decision-makers at all levels (strategic, operational, and tactical). As a military course of action, a COIN Stability Operations Coastal Resource Management approach should focus on the following tasks:

1. **Civilian-Military Science Coordination.** On April 9, 2012, Secretary of State Hilary Clinton announced the U.S. Water Partnership (USWP) program aimed at “leveraging the vast capabilities of U.S. expertise, knowledge and resources and applying these capabilities to water challenges around the globe, especially in the developing world” (USACE 2012). The USWP plan is to connect people and resources, making information easily accessible and leveraging the capabilities of partners to offer a range of solutions tailored to priority water needs. Though this is precisely the type of plan advocated here for a COIN Stability Operations Coastal Resource Management Program, the USWP agenda does not demonstrate a connection to active military operations. Without explicit direction, such a connection will not happen.

During times of COIN military engagement (such as Operation Iraqi Freedom), there should be a Military Liaison Officer (LNO) for Coastal Resources Management deployed from NATO’s Emerging Security Challenges Division<sup>54</sup> to each relevant Joint Command or Coalition Forces Stability Operations staff office. This Coalition Force billet would be in support of NATO’s Science for Peace and Security key priority: “Counter other threats to Security: Defence

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<sup>53</sup> “Integrated Water Resource Management (IWRM) is a process, which promotes that coordinated development and management of water, land and resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems” (United Nations University, n.d.).

<sup>54</sup> The North Atlantic Council (NAC) established the NATO Science Committee (SCOM) in 1958 and the Committee on the Challenges of Modern Society (CCMS) in 1969. By 2009 NATO’s awareness of combined science and society challenges to security led to the Science for Peace and Security (SPS) programme. Since November 1, 2010, SPS has been housed in the Emerging Security Challenges Division (NATO 2011).

related to Environmental Issues, Environmental Security, and Management of Water” (NATO n.d., 2011).

## 2. **Proposal Vetting and Project Monitoring.**

*From the military perspective, speed and security are of the essence; nothing more. To be honest, we didn't really have a full system view or understanding of all the water projects in Iraq. We recognized the need for it, and we attempted to obtain it, but at that time, the focus was more on transitioning out of Iraq.*

Col P.B. 2008-2009

Vetting and monitoring of stability operations projects tied to water require a watershed scale cause/effect situational awareness of the area of military operation. This situational awareness should be reinforced as part of traditional military “intelligence preparation of the battlespace” (IPB), which occurs at the start of operations and continues throughout the military engagement. The Coastal Resource Management LNOs should serve as a civilian-military operations link to the IPB, and should be involved in intelligence preparation. The Coastal Resources Management LNOs should not be expected to have the scientific background or prowess required to provide the called for vetting and monitoring. Where, then, are those who can take on this challenge, and how should they be accessed?

Neither military scientists nor military science and technology findings are actively incorporated into stability operations because military scientists and their science and technology products are typically connected to the kinetic fight, not to development activities. Academic scientists along with the algorithms, models, and reports they develop to explain and to evaluate coastal resources are missing from stability operations because models and reports are cumbersome and often seem irrelevant to the staff officers who may have no background or experience in the subject matter.

Stability Operations should serve as a clearing house for data collection, data sharing, and data analysis, with the Coastal Resources Management LNO reaching back to permanent body of



scientists from the international science community (i.e., UNEP or UNESCO) for project analysis and evaluation. Information collected from the military would feed the scientific community otherwise unavailable data, and in return get advice and recommendations regarding stability operations projects that could be given to military decision-makers. Financial support for the scientific analysis and evaluation should come from both international donors financing development projects and from multinational (NATO) defense budget.

3. **Facilitate partnerships for long-term, transitional solutions.** Stakeholder dialogue is a critical component of IWRM, yet security situations in a combat zone make it difficult to coordinate necessary stakeholder discussions. Though the military is set up neither to design nor to implement scientific analysis and evaluation of COIN stability operations projects, it is set up to deal with security and the mobilization of people. The Coastal Resources Management LNO should orchestrate logistics to provide a location, transportation, and life support assistance (food and accommodation) to encourage collaboration and critical dialogue.

4. **Mitigate Project Misalignments.** Any water-based stability operations project should take into account its relationship to water across a variety of spatial and temporal scales. Hence, each project should be placed in context of the watershed and considered from strategic, operational, and tactical perspectives. Local initiatives should be well placed in the setting, considering upstream and downstream rights and obligations imposed by international law, bilateral treaties, and stated practice on the use of water from shared basins (Dehgan et al. 2012). Misalignment mitigation requires cross-cutting and on-going interaction with various aspects of initiatives, i.e., project identification, prioritization, execution, and management. This is critical information for military decision-makers at all levels—strategic, operational, and tactical.

Possibly under the direction of the World Bank, the UNDP, the UNEP, and/or UNESCO, the international role should be in support of building a bridge between the science (data collection, data sharing, and data analysis) and the NATO Science for Peace and Security priority for water management. The international community should look beyond aid delivery at the national level and should incorporate regional water strategies into policy development and aid programming (Dehgan et al. 2012). Funding from the international donor community should support the cadre of scientists tasked to analyze and evaluate stability operations projects and to coordinate military project alignment with water-relevant civilian efforts. Coastal resource management should be added to the priority list of the United Nations Development Group and should receive assistance from international donors (UNDG 2003).

Private sector solutions as well as public/private partnerships (similar to those modeled in the South Bay Salt Pond restoration effort (SBSP 2012)) should also be examined as sources of funding for a COIN Stability Operations Coastal Resources approach (Iraq Ministries 2006; Iraq Business News 2011). But throwing money at a problem does not necessarily solve it.

- **Conclusion**

Any Commanding General looking at a foreign intervention will have to look at water as part of his planning. His engineers will study hydrology to identify obstacles. There will be some assessment of water in the very early stages. Connecting IPBs to water as it relates to coastal resources management would depend on the experience and expertise of the general and his command staff. This should not be left to happenstance.

Military and civilian decision-makers need to be aware that in a time of climate change and uncertainty, the potential for tension and conflict over coastal resources is increasing (Kucera et al. 2011). Recent data on water budgets for Iraq's water resources—along with

Iranian, Turkish, and Syrian water resource demands—indicate a water shortage for Iraq and for the Mesopotamian marshes. National and international demands for Tigris and Euphrates water, as well as the current drought, severely threaten the future water supplies for the marshes and their inhabitants (Richardson 2010). Nevertheless, the adroit management of coastal resources, particularly water, could encourage cooperation, stability, and development. If counterinsurgency and stability operations doctrine continue to be used in military engagements in coastal settings, a coastal resources management course of action should be incorporated to monitor, coordinate, and align stability operations projects.

As illustrated in this paper, the water-relevant COIN stability operations in and around Basra during Operation Iraqi Freedom were not placed in the context of the greater watershed. Their interaction with the greater coastal ecosystem was not considered. Did the COIN stability operations projects provide water to Basra and surroundings, thereby lessening insurgent support? There is no concrete evidence to indicate that this was the case. Basra and its environs remain under water stress. Lack of available water and lack of potable water can lead to population instability and to insurgent opportunities to recruit or to garner support. The degree to which Baswaris' water needs tie to desire to overthrow the established government is a subject for future research.

From the perspective of the engineers doing the repair and rehabilitation of the saltwater regulator on the Shatt al Basrah, it was an engineering problem that was solved by an engineering solution. It was one of the last projects undertaken by the British forces before they were withdrawn from country. Was it a success? This is hard to determine beyond the immediate repair. Ad hoc solutions to water problems in an estuarine setting may do more long-term harm than good. Because of repair to the saltwater regulator, *Op League* helped move

sewage downstream from the Shi'ia Flats. The successful movement of effluent into the estuary may be associated with change in the system's ecological diversity and productivity. This, too, is a topic for future study. ♦

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## Chapter 5: Conclusion

This dissertation is fundamentally a study of *human-environment interaction*, involving the study of how people adjust their lives to fit various environmental conditions and how people alter the natural environment to meet their needs. As research in human-environment interaction, this study emphasizes *water* and its complex relationship to people and their environment. Furthermore, this research is focused on *counterinsurgency*—a military doctrine that aims to get the people of a country to accept its governance or ruling authority as legitimate. Finally, as research that includes a case study of a watershed that empties into the sea, this is a study of *coastal resources management*. COIN in the coastal zone requires tactical, operational, and strategic responses across a watershed, incorporating a coastal resource management understanding and approach to achieve enduring solutions to the problems.

The approach used in this dissertation links the coastal resources management background and experience I gained as a student in the East Carolina Coastal Resources Management (CRM) Program to my research agenda with the U.S. Army Corps of Engineers at the Engineer Research and Development Center (USACE ERDC) in Alexandria, Virginia and to my work as Senior Advisor on water to Commanding Generals during Operation Enduring Freedom. As a result of this dissertation research, I found that several tenets of coastal resources management apply to counterinsurgency operations in coastal watersheds. First, to have a rich contextual understanding of a situation, those coordinating COIN activities in watersheds that terminate at the sea need to consider human as well as environmental factors in their areas of operation. Second, in order to understand cause and effect of water-relevant counterinsurgency projects, the commanders need to be aware that the population living within a watershed affects and is affected by the surface water and the groundwater resources, which are interconnected.

Finally, scientific analysis at the local, national, and regional levels needs to inform policy and decision-making in water-relevant counterinsurgency operations at the tactical, operational, and strategic levels.

- **Reflecting on the Method**

The research objectives that guided the study and dealt with the various aspects of the research problem were: (1) determine water's significance to U.S. national security, (2) address environmental resource (water) security/stability "data gap" in counterinsurgency military operations, and (3) develop a coastal resource management approach for counterinsurgency operations in watersheds that have a terminus in the sea. Each of the three objectives was achieved through production of a research article that was submitted to a peer-review journal for publication. The first two articles provided foundation information, establishing the baseline necessary for the third and final article, which discussed the application of a coastal resources management perspective to counterinsurgency operations.

Water's significance to U.S. national security via ties to environmental security, water resource challenges, and human-environment interaction is critical for evaluating both the U.S. national security interests and Department of Defense policy and procedures. The first article examined the importance of environmental security and water resource challenges in the U.S. national security agenda and scrutinized the Department of Defense response to national security mandates with regard to environmental security and stability of Partner States. Results of this research showed that a holistic understanding and incorporation of natural and social systems in areas of operation is missing in military doctrine and at all scales of military command and control. I made the case that the U.S. military needs to expand its definition of threats to include environmental security, considering security and stability connections to water resources, which

from a CRM perspective would encompass actions and activities within a watershed as well as on the coastal fringe.

For an area of operation to achieve security after the initial “*clear*” phase of COIN, it needs water to stabilize population movement, to support agriculture, to ensure food security, and to support public health. To meet these objectives, a suite of complex water issues (dealing with water quantity, quality, availability, and accessibility) must be incorporated into the “*hold, build, transition*” decision-making. The second article relates to these points as water’s significance to counterinsurgency operations was examined via ties to stability operations from 2010-2012 in Operation Enduring Freedom. This research identified an environmental “data gap” in water-relevant counterinsurgency operations. The effectiveness of interagency collaboration on COIN initiatives was reviewed and the situation of water resources in the dialogue and decision-making in the midst of combat was examined. After I addressed the processes in counterinsurgency environments, current assumptions about causes and effects of insurgency, and progress to date on water’s role in security and stability operations, I introduced the CMO-HEI water complexities approach.

The “success” of water-relevant COIN operations is subject to interpretation. In Basra, Iraq, 2004-2009, counterinsurgency efforts linked to such projects were designed to counter unrest rooted in the political, economic, social, cultural, and security dimensions of their area of operation. In the third and final research paper, I examined one specific COIN initiative in Basra from a human-environment interaction perspective, highlighting the cause and effect of the engagement in context of the watershed and estuarine setting. The upstream activities in the Tigris-Euphrates basin were not linked to downstream effects, or vice versa, which literally and figuratively moved back and forth with the changing tides of the Persian Gulf. In conclusion, I

outlined a coastal resource management course of action for future water-relevant COIN operations in similar coastal settings. The key component for “success” hypothesized is tied to mustering scientific knowledge and know-how along with military boots-on-the-ground data collection, security and situational awareness understanding, and ability to execute.

- **COIN and Water in Future Military Operations?**

The effectiveness of advancing counterinsurgency objectives has yet to be operationalized or well documented in modern military engagements. To date, the relationship between assistance and counterinsurgency is increasingly challenged in academic and practitioner fields with only unsubstantiated assertions and occasional anecdote (“atmospheric” reporting) offered as counterargument; desired effects are not well defined, measurable, or standardized across projects (CAAT 2011).

Insurgency is the most obvious indicator of weak government legitimacy...The population through either commission (active or passive support of the insurgent forces) or omission (remaining neutral or indifferent) does not support the government enough to make insurgency an untenable solution...(When an insurgency is “winning”) the host government lacks the ability to either force or invite compliance and similarly is incapable of generating cooperation through actual delivery of assistance in ways that are considered fair and just. (CAAT 2011)

Development projects—and most, if not all water-relevant COIN projects are considered in the Development Line of Operation—consist of picking winners and losers when distributing scarce resources. And development project management is focused almost exclusively on project quality rather than on how a project supports government legitimacy. To be successful, a

COIN project must be clearly and honestly attributed to government participation for the objective of improved legitimacy to be reached (CAAT 2011).

Though there are those calling for project management to be supportive of and to track “COIN effect,” they miss the critical need to coordinate projects so that the implementation of one does not destroy or undermine the work of another. Commanders in project management positions need to be evaluated not by how much money or effort was expended, but on the effect of a project from a COIN perspective. Because commanders are judged by the amount of funds committed, obligated, or spent over actual measures of effectiveness, breaking this paradigm will be a challenge. Flawed projects remain on the books as few want to be the one to cancel a contract and thus to lose credit. (Hence there are many “self-centered” aspects of modern COIN warfare.)

In terms of the socio-economic development LOO, distribution projects (i.e., distributing chicks to help locals set up chicken farms) are problematic because managing distribution can be, and usually is, a logistics challenge! Projects tied to building something, such as many water-relevant projects, are easier to monitor. Infrastructure projects, for instance, inject money and jobs into a community, are harder to steal once completed, and should have impact on the community as a whole. Unfortunately, quick impact infrastructure water projects can have detrimental, unintended second and third order consequences.

- **Integrating Human-Environment Interaction and Water Complexities into a Coastal Resources Management Approach for COIN**

Human actions affect and are affected by the natural environment. In military operations, whether troops are involved in kinetic maneuvers or in civil-military engagements with local populations, both sides of human-environment interaction must be considered to gain a rich

contextual appreciation and awareness of the situation. This is particularly true in contemporary asymmetric (counterinsurgency) warfare.

From a military perspective, there is no coastal resources management logistics officer tasked to handle the details required for such an approach. There is no “Tactics, Techniques, and Procedures” (TTP) guide that clearly states the “who, what, when, where, and how” to determine what resources need to be rallied. There is no predetermined value chain that clarifies why one resource over another should be considered mission critical in a counterinsurgency coastal zone type of fight. The research presented here was carried out to address this gap.

There are numerous interests, patronage networks, and hidden agendas that affect water-relevant COIN operations that—for the outsider—are difficult to know. The more complex a project is, the greater the complexity of the network that is tied to extortion and profits and to hidden power relationships. The ability of the military to influence this dynamic while continuing to execute complex water projects is questionable. Though challenging to unravel, water complexities, not merely the acknowledgement of water as an essential service, need to be factored into the suggested Coastal Resources Management approach to COIN. This could be accomplished by developing a Tactics, Techniques, and Procedures training curriculum that uses SMART questions for water. The CRM Liaison Officer would work between the data collectors and the science community, to facilitate data collection, sharing, and analysis. The utility of such an approach will depend on continued use of COIN doctrine, which is currently under revision by the U.S. Department of Defense.

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# Appendix A

## Letter of Commendation from RC(SW) Commanding General

**United States Marine Corps**



*Certificate of Commendation*  
COMMANDER, REGIONAL COMMAND (SOUTHWEST)  
COMMANDING GENERAL, I MARINE EXPEDITIONARY FORCE (FORWARD)

*takes pleasure in commending*

DR. LAURA- JEAN PALMER-MOLONEY

*for*

OUTSTANDING ACHIEVEMENT IN THE PERFORMANCE OF HER DUTIES AS THE WATERSHED MANAGEMENT ADVISOR TO THE COMMANDER, REGIONAL COMMAND (SOUTHWEST), AFGHANISTAN, FROM JULY 2011 TO MAY 2012. DR. PALMER-MOLONEY'S DEDICATION, LEADERSHIP, AND STEADFAST DEVOTION TO DUTY WERE INSTRUMENTAL TO THE SUCCESS OF THE STABILITY OPERATIONS SECTION AND DIRECTLY CONTRIBUTED TO MISSION ACCOMPLISHMENT FOR REGIONAL COMMAND (SOUTHWEST) IN SUPPORT OF OPERATION ENDURING FREEDOM. HER SUBJECT MATTER EXPERTISE EARNED HER THE RESPECT OF THE ENTIRE COMMAND STAFF AS SHE CONTINUALLY PROVIDED TIMELY INFORMATION DURING ALL PHASES OF PLANNING. SHE ROUTINELY TRAVELED TO KINETIC AREAS WITHIN THE BATTLE SPACE TO CONDUCT DISCUSS, ASSESS, AND RESOLVE HIGHLY COMPLICATED WATER USE ISSUES. SHE ROUTINELY TRAVELED TO KINETIC AREAS WITHIN THE BATTLE SPACE TO CONDUCT STUDIES FOR BOTH SURFACE WATER AND GROUNDWATER. SHE WAS INSTRUMENTAL IN SETTING UP AND LEADING A SERIES OF WATER EDUCATION MEETINGS, INFORMING BOTH COALITION FORCES AND GOVERNMENT OFFICIALS ON THE TIME AND SPACE IMPLICATIONS OF WATER USE. THIS ENDEAVOR RESULTED IN BOTH HELMAND AND NIMROZ PROVINCIAL OFFICIALS AGREEING TO CONTINUE TO WORK ON WATER RESOURCE MEASURING AND MANAGEMENT. DR. PALMER-MOLONEY'S OUTSTANDING MOTIVATION, DEDICATION, AND TIRELESS EFFORTS TO ADVANCE THE UNDERSTANDING OF WATER ISSUES AND COUNTERINSURGENCY OBJECTIVES REFLECT CREDIT UPON HER AND ARE IN KEEPING WITH THE HIGHEST TRADITIONS OF THE MARINE CORPS AND THE UNITED STATES NAVAL SERVICE.

25 APRIL 2012

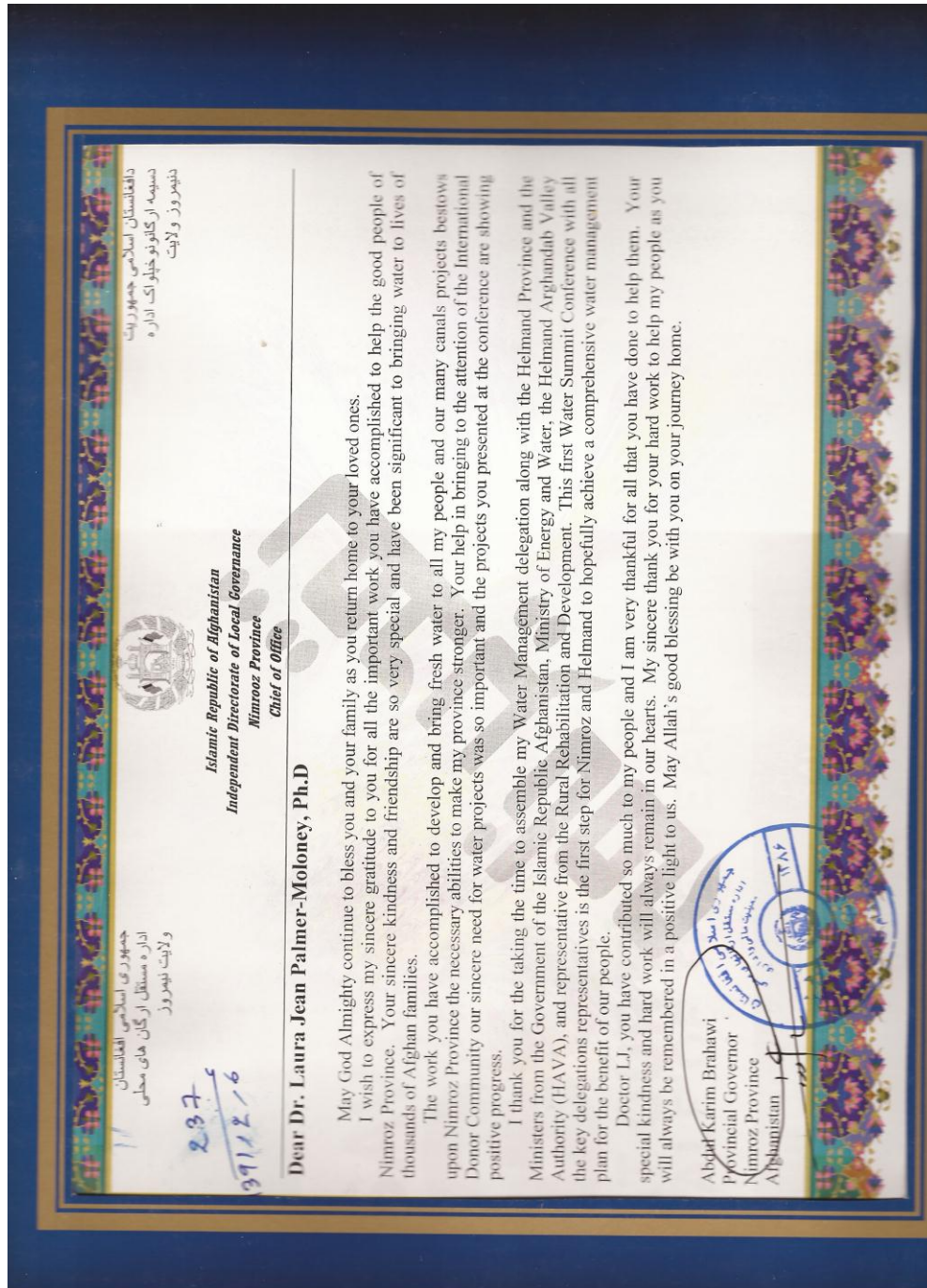
*Date*

*Charles M. Gurganus*  
CHARLES M. GURGANUS  
MAJOR GENERAL, U.S. MARINE CORPS  
COMMANDING

NAVMC 10631 (REV. 8-89) S/N0109-LF-064-0200

# Appendix B

## Letter of Commendation from Governor Brahawi, Nimruz Province, Afghanistan



# Appendix C

## Water Smart Card for Civil Affairs Teams

### Advising and assisting GIROA

"People pursue essential needs until they are met, at any cost and from any source." FM 3-24

### Water's tie to security and stability

### Groundwater Depletion and Contamination

Groundwater mining:  
 -Removal of groundwater faster than it is replenished  
 -Over-exploitation of aquifers  
 -Cause grievances and lead to instability  
 -Eventually causes depletion of aquifers  
 -Drying of karstzes  
 -Wells have to be drilled deeper  
 -Wells require electric or diesel pumps to withdraw water

**Monitoring the Groundwater**  
 Reducing access to groundwater water for drinking water supply and irrigation

Continuing measurement and observation of groundwater situation can be accomplished by:  
 -Observation wells at set locations.  
 -Water level measured at regular time intervals  
 -Water level using electric tape or tape with a rock at the end

### Water Quality

Most local regions in the AO drink untreated, unfiltered water that is contaminated by sewage, high levels of salinity, and non-point source pollution from fertilizer.

Pollution plumes can migrate from surface sources to contaminate well water.

In the AO, drilling deeper wells does not mean finding "sweet" water. In most AO, deep well water has more total dissolved solids (TDS) than shallow well water.

### Conclusions

It is critical to be aware of water's ties to security and stability in the Area of Operations in order to make smart and informed decisions.

**To understand water in the AO, all factors have to be considered.**

Four characteristics of water must be described to fully understand the source of water for a given area of interest:

- 1) Water Quantity;
- 2) Water Quality;
- 3) Water Availability; and
- 4) Water Accessibility

All characteristics are interrelated; changes in any one factor often affect the other factors.

When considering or planning any water relevant operation, seek guidance on how to appropriately proceed and carry out the mission.

## Water Smart Card

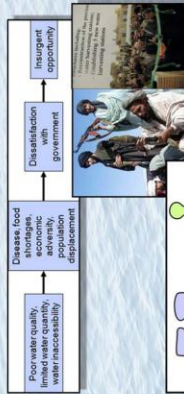
by  
 L. J. Palmer-Mooney, Ph.D. Senior Advisor/Water Resource Management, RC(SW) C-9  
 Jean Jolicœur, Ph.D. Infrastructure & Development Advisor/Water Resources Specialist  
 USAID Regional Platform (SW)

Stephen Fischer, MD, MPH, LCDR MC USN

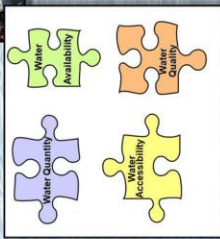
Dr. Jean Jolicœur  
 JEAN.JOLICOEUR@AFS.USMIL

FOR MORE INFORMATION ON DRINKING WATER QUALITY:  
[HTTPS://WWW.HHO.INT/WATER\\_SANITATION\\_HEALTH/dw/qw/](https://www.hho.int/WATER_SANITATION_HEALTH/dw/qw/)  
 AND GENERAL COMMENTS ON WATER, SANITATION & HEALTH:  
[HTTPS://WWW.HHO.INT/WATER\\_SANITATION\\_HEALTH/eh/](https://www.hho.int/WATER_SANITATION_HEALTH/eh/)

### Advising and assisting GIROA



"People pursue essential needs until they are met, at any cost and from any source." FM 3-24



### Water Quality

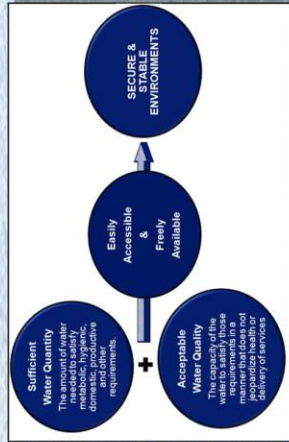
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### Water's tie to security and stability



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 Continual measurement and observation of groundwater situation can be accomplished by:  
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- 2) Water Quality;
- 3) Water Availability; and
- 4) Water Accessibility

All characteristics are interrelated; changes in any one factor often affect the other factors.



When considering or planning any water relevant operation, seek guidance on how to appropriately proceed and carry out the mission.

# Water Smart Card

by  
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FOR MORE INFORMATION ON DRINKING WATER QUALITY:  
[HTTPS://WWW.WHO.INT/WATER\\_SANITATION\\_HEALTH/DWQ/EN/](https://www.who.int/water_sanitation_health/dwq/en/)  
 AND GENERAL COMMENTS ON WATER, SANITATION & HEALTH:  
[HTTP://WWW.WHO.INT/WATER\\_SANITATION\\_HEALTH/EN/](http://www.who.int/water_sanitation_health/en/)

## Appendix D

### Interview Questions

Case Study IRAQ: COIN and Coastal Resources Management  
Interviews, UK Officers- Basra

Case Study IRAQ: COIN and Coastal Resources Management  
Interviews, UK Officers, Basra service 2003-2009

Open-ended interviews with key military leaders will be conducted 15 January – 01 February 2012 in the Stability Operations office of II Marine Expeditionary Force Headquarters, Camp Leatherneck, AF. Interviews are scheduled to take approximately 90 minutes each. Due to security restrictions, interviews will not be taped (audio or video); the interviewer will transcribe responses. Prior to use by the interviewer, transcripts will be made available to the interviewee for review of accuracy.

**Goal:** To analyze a key COIN engagement set in an estuarine setting on the Shatt al Basra Canal in southern Iraq during Operation Iraqi Freedom.

Initials/Rank: \_\_\_\_\_

Branch of Service: \_\_\_\_\_

Date(s) of service in Basra: \_\_\_\_\_

Questions:

1. Describe the natural environment in your AO.
2. How would you describe water's role in socio-economic and cultural power structures in and around southern Iraq/Basra during your time of service?
3. Were you aware of any water-related stability operations undertaken in the AO? If so, please describe. If so, would you determine them to be a success or failure? Explain.
4. Describe the connection(s) between water, control, and insurgent opportunities tied to land tenure and property rights in the area of operation.
5. Reflecting on your time in Iraq, what water-related or coastal issue(s) do you recall that was (were) (1) relevant to military stability operations? (2) relevant to the local population?
6. Were questions as to how work on the Shatt al Basra would affect or be affected by the physical and human characteristics of the watershed considered? If so, in what way(s)? If not, why not?

7. How was “COIN effect” determined for completed work on the canal?
8. When working on the Shatt al Basra Canal project, how were water complexities--supply, quality, availability, and accessibility--considered?
9. What geospatial technologies were used to assist military personnel with data collection and data sharing related to the Shatt al Basra Canal project?
10. What was the most significant lesson learned regarding COIN and coastal resource management in the estuarine setting of the canal project?
11. What do I need to consider that I have not asked of you regarding COIN and coastal resources management in southern Iraq, circa 2009?
12. What else would you like to share regarding water/security/stability, coastal ecology, military stability operations in estuarine setting, or the fight against insurgents in and around Basra?

## Appendix E

### Institutional Review Board Exempt Certification



**EAST CAROLINA UNIVERSITY**  
**University & Medical Center Institutional Review Board Office**  
1L-09 Brody Medical Sciences Building · Mail Stop 682  
600 Moye Boulevard · Greenville, NC 27834  
Office 252-744-2914 · Fax 252-744-2284 · [www.ecu.edu/irb](http://www.ecu.edu/irb)

#### Notification of Exempt Certification

From: Social/Behavioral IRB  
To: [Laura Palmer-Moloney](#)  
CC: [Derek Alderman](#)  
Date: 12/13/2011  
Re: [UMCIRB 11-001355](#)  
Human-Environment Interaction, Water Complexities, and COIN

I am pleased to inform you that your research submission has been certified as exempt on 12/13/2011. This study is eligible for Exempt Certification under category #2.

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The UMCIRB office will hold your exemption application for a period of five years from the date of this letter. If you wish to continue this protocol beyond this period, you will need to submit an Exemption Certification request at least 30 days before the end of the five year period.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

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IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418  
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418 IRB00004973  
East Carolina U IRB #4 (Behavioral/SS Summer) IORG0000418

## Acknowledgements

Most of this dissertation was written while I was deployed. There are numerous advantages to being confined to life on a military base in a combat zone—including few distractions to keep one from writing. Thanks to my husband and sons for supporting my adventure in Central Asia.

Special thanks also go out to Mr. Matt Chisholm, Leatherneck’s C-9 Stability Operation Information Manager. His cheerful smile and positive “No worries, Lj” encouragement helped massively as I struggled with formatting and MS Word 2007.

Finally, this dissertation could not have been completed without the support and assistance from numerous British officers with whom I served in Regional Command Southwest from July 2011-May 2012. However, Major Lawrence M. Ives deserves special recognition. His 20+ years in the British military, which included numerous tours in Iraq as well as two tours in the counterinsurgency fight in Afghanistan, made his insight invaluable. Our chats extended well beyond three cups of tea. “Thank you” is not enough, Sir.





## Dedication

This work is dedicated in loving memory of Master Sergeant Scott E. Pruitt, who was killed in combat on 28 April 2012, while on a water-related Stability Operations mission in Zaranj, Nimruz Province, Afghanistan.

