REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
05-04-2017	Master's Thesis	October 2016 – April 2017

4. TITLE AND SUBTITLE
Climate Change: A Threat to Global Security and a Military Reluctant to Respond

5a. CONTRACT NUMBER
N/A

5b. GRANT NUMBER
N/A

5c. PROGRAM ELEMENT NUMBER
N/A

6. AUTHOR(S)
Salisbury, Rhett, D., GG-13, MCIA

5d. PROJECT NUMBER
N/A

5e. TASK NUMBER
N/A

5f. WORK UNIT NUMBER
N/A

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
USMC Command and Staff College
Marine Corps University
2076 South Street
Quantico, VA 22134-5068

8. PERFORMING ORGANIZATION REPORT NUMBER
N/A

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)
N/A

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for public release, distribution unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

Climate change is a force multiplying influence that threatens safety, security, and stability. Though climate change is not a new phenomenon, its impacts are increasingly noticeable due to population growth, urbanization, and globalization. It is predicted that 21st century climate changes will cause sea-rise, reduced rainfall, and more frequent natural disasters, which could lead to violent interstate conflict, terrorism, and mass-migrations, and other conditions that threaten safety, security, and stability. As impending climate changes weigh on the future operating environment, military planners should consider the issues related environmental change as a complex obstacle to any future operation, as sea-rise, desertification, conflict, and mass-migration will alter the physical and human geography. In response to these threats, U.S. policymakers and defense leaders, should avoid debating the causes of climate change and give the same priority to climate-related crises as given to an adversarial threat. However, a divergence between national strategy and defense strategy has left military commanders reluctant to conduct operations in response to natural disasters and climate-related crises.

15. SUBJECT TERMS
Climate Change, Defense, Strategy, U.S. Military, Stability, Operations, Marine Corps, Expeditionary, Environment, Natural Disaster, Globalization, Sea Rise, Desertification, Mean Sea Level, Low Elevation Coastal Zones, Littoral, Global Warming

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
					USMC Command and Staff College
a. REPORT	**b. SUMMARY**	**c. THIS PAGE**	UU	38	**19b. TELEPHONE NUMBER** *(include area code)*
UNLASS	UNCLASS	UNCLASS			(703)784-3330 (Admin Office)

United States Marine Corps
Command and Staff College
Marine Corps University
2076 South Street
Marine Corps Combat Development Command
Quantico, Virginia 22134-5068

MASTER OF MILITARY STUDIES

Climate Change:
A Threat to Global Stability and a Military Force Reluctant to Respond

SUBMITTED IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF MILITARY STUDIES

AUTHOR:

Salisbury, Rhett D.

AY 16-17

Mentor and Oral Defense Committee Member: Dr. Matthew Slater
Approved: /Matthew Slater/
Date: 5 Apr 17

Oral Defense Committee Member: Dr. Alexandra Kindell
Approved: Alexandra Kindell
Date: 4/5/17

EXECUTIVE SUMMARY

This paper was written under the assumption that in anticipation of future climate changes, U.S. federal and state agencies will remain capable of contending with domestic natural disasters, and without significant assistance of U.S. active military forces. This paper also assumes that future climate changes will not prohibit the employment of U.S. military forces globally, as an instrument of national power to achieve objectives and interests abroad.

Climate-related issues are an undeniable force multiplying influence that threatens safety, security, and stability. In anticipation of future climate changes, the U.S. military's expeditionary forces are better suited than other governmental entities to confront natural disasters, and should prepare for impending climate changes, wherever change threatens national interests and objectives. Though climate change is not a new phenomenon, its impacts are increasingly noticeable due to population growth, urbanization, and globalization. It is predicted that 21st century climate changes will cause sea-rise, reduced rainfall, and more frequent natural disasters, which could lead to violent interstate conflict, terrorism, and mass-migrations, and other conditions that threaten stability. In response to these threats, U.S. policymakers and defense leaders, should avoid debating the causes of climate change and give the same priority to climate-related crises as given to an adversarial threat, as it was said that the dangers associated with climate change are no less serious than guns or bombs.

A divergence between national strategy and defense strategy has left military commanders reluctant to conduct operations in response to natural disasters, and thus has caused forces to be unprepared for the types of missions that address the underlying factors related to climate change before they threaten safety and security. As impending climate changes weigh on the future operating environment, military planners should consider the issues related to climate change as a complex obstacle to any future operation, as sea-rise, desertification, conflict, and mass-migration will alter the physical and human geography. In anticipation of future climate changes, COCOM commanders should plan to simultaneously conduct the range of military operations in response, and prepare forces to operate in an environment that is plagued by climate-related issues.

DISCLAIMER

THE OPINIONS AND CONCLUSIONS EXPRESSED HEREIN ARE THOSE OF THE INDIVIDUAL STUDENT AUTHOR AND DO NOT NECESSARILY REPRESENT THE VIEWS OF EITHER THE MARINE CORPS COMMAND AND STAFF COLLEGE OR ANY OTHER GOVERNMENTAL AGENCY. REFERENCES TO THIS STUDY SHOULD INCLUDE THE FOREGOING STATEMENT.

TABLE OF CONTENTS

Introduction

The purpose of this paper is to move beyond the polarized debates that dominate the current climate change dialogue and consider the issue in a more pragmatic way, specifically as a force multiplying influence that threatens safety, security, and stability. This paper will demonstrate climate change as a threat to security environments, and contends that expeditionary military forces, such as the U.S. Marine Corps (USMC), are best suited to confront natural disasters and climate induced crises. However, the divergence between national strategies and defense strategies has resulted in an apparent reluctance to conduct missions in response to natural disasters. This hesitancy has left forces unprepared to conduct the types of operations that address climate-related issues, before they lead to violent conflict, terrorism, and humanitarian disaster.

Throughout the 21st century, climate change as a natural or manmade phenomenon, is predicted to cause sea-rise, altered precipitation patterns, and increased storm surges, which have the potential to exacerbate preexisting social, political, and economic crises, while instigating new conditions that threaten safety, security, and stability. It is these secondary and tertiary effects of climate change that will require military forces, to operate in increasingly austere and complex environments. To be successful under these conditions, Combatant Command (COCOM) commanders will need to plan to conduct operations that simultaneously fight wars, keep peace, and provide humanitarian assistance, and will need to be able to maneuver through complex and altered terrain that may hinder mobility.

Reinforced by the most recent U.S. National Security Strategy (NSS), the challenge of climate change is recognized as an urgent and growing threat to national security, and while the contributions from increased natural disasters, sea-rise, and storm surges directly threaten coastal

regions and infrastructure, climate change also serves as an underlying contributor to global economic degradation, increased refugee problems, and conflicts over life-sustaining resources such as food and water.[1] As a reflection of nation strategy, defense and service strategies should also recognize climate change as a credible threat to security environments, and give priority to the types of missions that address climate-related issues as underlying factors that contribute to global instability. In response to these urgent and growing threats, U.S. policymakers and defense leaders should avoid debating the causes of climate change, remain focused on understanding climate change as an underlying source of conflict and human insecurity, and plan for environmentally induced crises with the same energy and analytical rigor as an adversarial threat.

As scientists converge on a consensus for the timing and extent of climate change, countries likely to be most affected are the already volatile and disaster prone areas in the Middle East, Africa, and Asia Pacific. These are areas of the world that the USMC is most adept at operating within. As a force that is inherently uniquely qualified by that nature of its mission to expeditiously confront the challenges associated with natural disaster, the Marine Corps should expect to be called on more frequently, as the predictions for environmental change are increasingly ominous. Though the extent and timing of climate change is unclear, the force multiplying influences will likely reshape operating environments and influence future military operations.

Reflecting on the topic of climate change and the military's call to action in lieu of ambiguity, former U.S. Army Chief of Staff, General Gordon Sullivan poignantly noted that, "We never have 100% certainty. If you wait until you have 100% certainty, something bad is going to happen… You have to act with incomplete information. You have to act based on the

trend line."[2] Though the extent and timing of climate change is unclear, the trend line is evident; climate change is an urgent and growing threat that will require an increased and uniquely qualified response from the U.S. military and its expeditionary forces, to protect and defend national security interests wherever climate change may threaten safety, security, and stability.

Climate Change: An Enduring Variable

Climate change is not strictly a modern phenomenon, and though recent human activity has likely contributed, the earth's changing climate is a reoccurring phenomenon that has plagued mankind for thousands of years. Approximately 100,000 years ago, long before globalization, and prior to civilizations creating permanent settlements along coastal and inland waterways, the temperature was on average 3.5°F warmer and the sea-level was at least 16 feet higher than today's current mean sea-level (MSL).[3] As the earth's climate eventually stabilized, human populations bourgeoned, and soon permanent settlements were established where food could reliably grow. Climate stability remains important for human success, and whenever the earth's temperature fluctuates or climate changes occur suddenly, invariably humanitarian crisis and societal instability ensue.

Comparatively more recent examples of climate deviations demonstrate how environmental factors can quickly lead to humanitarian disaster and societal annihilation. Geological records and ancient writings from approximately 4,000 years ago, recorded a sudden climate change in the form of a prolonged drought that likely contributed to the undoing of the Akkadian Empire, which would have been in what is now modern day Syria. An ancient lamentation provides a written perspective for the Akkadian collapse, "For the first time since cities were built and founded, the great agricultural tracts produced no grain, the inundated tracts produced no fish,

the irrigated orchards produced neither wine nor syrup, the gathered clouds did not rain, the masgurum did not grow… He who slept on the roof, died on the roof, he who slept in the house, had no burial, people were flailing at themselves from hunger."[4] Though it is unclear what really happened to the Akkadians, climate change induced drought and famine were likely underlying factors that lead to societal collapse. Reinforcing this narrative are more recent examples that demonstrate how climate changes contributed to societal unrest, political instability, revolutions, violence, and governmental collapse.

During the mid-17th century, worldwide climate changes and environmental disasters occurred because of a prolonged period of global cooling. Often referred to as the mini ice-age, this era of climate change was caused by a combination of intensified geological activity and reduced solar activity, which increased the incidence of natural disasters, such as droughts, famines, and other hydrological disasters.[5] This conglomeration of climate changes and environmental crises occurred at the same time as a series of revolutions, governmental collapses, and humanitarian disasters transpired throughout Europe and Asia. During this mini ice-age, the number of armed uprisings in China and Japan steadily increased; also during the era, the Ming Dynasty collapsed, which was at the time the world's most populous state.[6] In the west, similar problems abounded. The largest European state disintegrated, deaths increased, and rebellions occurred in Scotland, Ireland, England, Russia, and France (to name a few).[7]

Though environmental factors were probably not the sole reason for dynastic collapse or revolutionary reformation, the prolonged period of climate change likely triggered or exacerbated the societal and political unrest. The correlation between climate changes and human stability is evident, and will likely continue to affect populations and governments in the 21st century. Reflecting on the history and future challenges of climate change, the 24th U.S.

Secretary of Defense, Chuck Hagel said, "The challenge of global climate change, while not new to history, is new to the modern world. Climate change does not directly cause conflict, but it can significantly add to the challenges of global instability, hunger, poverty, and conflict. Food and water shortages, pandemic disease, disputes over refugees and resources, more severe natural disasters – all place additional burdens on economies, societies, and institutions around the world."[8]

The trend line for climate change in today's increasingly globalized, complex, and over-populated world presents ominous challenges for many regions, but especially for those densely populated littoral and water scarce parts of the world. The future effects, extent, and timeline of climate change is uncertain, but many scientists and climate experts predict that the effects of climate change during the 21st century will likely include more frequent natural disasters, altered weather patterns, and sea-rise along many coastal regions, and that these conditions have the potential to cause flooding, drought, famine, and disease, which in turn could disrupt human security by causing displacement, tension, and hostility.[9]

Resulting from the longest period of concurrent scientific and metrological measurements, climate experts and scientists from the Intergovernmental Panel on Climate Change (IPCC), an international organization that evaluates the science of climate change for policymakers, unanimously agreed that the majority of the earth's surface has experienced continuous and uniform warming since the beginning of the 20th century.[10] In addition to the IPCC assessment, independent measurements from the National Aeronautics and Space Administration (NASA), the National Oceanic and Atmospheric Administration (NOAA), and other international governmental meteorological organizations, show that the past three years have been warmer than any other time in recorded history, culminating with 2016 being the warmest year on

record.[11] This global warming trend is projected to continue, as the IPCC predicts that by the end of the 21st century the earth's average temperature will be between 2.7°F and 3.6°F warmer than it is today.[12] Though a few degrees in temperature change may not seem significant, the result of this warming trend is likely to increase the frequency and magnitude of sea-rise, droughts, and extreme weather related events.[13]

In the polar regions, where glacial-ice is most plentiful, by the end of the century the average temperature is predicted to be 18°F warmer than it is today.[14] As global warming continues, the thick polar ice-sheets could be reduced by as much as 60%, which would clearly add to sea-rise, but would also contribute to existing strategic and economic concerns within the highly contested Arctic region.[15] As the warming trend and sequential melting continues, the IPCC assesses the global MSL could increase by as much as three feet by the end of the century.[16] As the earth's MSL increases, sea rise will not occur uniformly: tides, currents, seasonal weather, gravitational pulls, and the earth's inertia all contribute to varying sea-levels globally.[17]

As sea-levels inherently fluctuate, sea-rise will not affect coastal areas proportionately. Low elevation coastal zones will be most affected by future sea-rise and storm surges. These coastal zones are defined as contiguous littoral areas that are less than 30 feet above MSL, and include deltas, rivers, and flood plains that often extend over 60 miles inland from the coast.[18] As currently defined, low elevation coastal zones only account for about two percent of the world's cumulative land area, but 10 percent of the earth's population and two-thirds of the largest cities are within these high risk – low elevation coastal zones.[19] Making matters worse, nations with the largest share of people living in these zones tend to be underdeveloped, and may not have the adequate resources to deal with the issues of sea-rise and more frequent storm surges.[20]

Probably the Asia-Pacific region will be most affected by future sea-rise and storm surges, due to the large populations living in coastal zones and in cyclone prone areas.[21] Nations likely to be most affected by these issues are the many island nations throughout the Asia Pacific, where even a shallow two-foot rise would threaten the livelihood and welfare of millions of people.[22] In addition to global warming induced sea-rise, the IPCC has determined that the incidence of coastal storm surges, tropical cyclones, and heavy rainfall, are very likely to increase over the world's mid-latitude and tropical regions.[23] The result of an increased incidence of weather related events would likely exacerbate issues related to sea-rise and the concerns of extreme flooding in low elevation coastal zones.

The IPCC assesses that in many other parts of the world, changing weather patterns will lead to intense and more frequent heatwaves and droughts.[24] Throughout the Middle East and North Africa, rising temperatures and reduced rainfall could expose between 80 and 100 million people to added water stresses.[25] Water scarcity, kills more people than any type of natural disaster. Between 1900 and 2004 over 11 million died as the result of droughts, which is more deaths than the combined deaths from all other natural disasters that occurred during the same time period.[26] If the predictions for future droughts are correct, deaths associated with this type of natural disaster could increase significantly.

Climate stability remains important for human success, and whenever changes occur suddenly, invariably humanitarian crises and societal instability ensue. As COCOM commanders develop plans and procure equipment for the actions of future forces, it is important to consider the reoccurring phenomenon of climate change, as a destabilizing obstacle and force multiplying factor that threatens safety, security, and stability. Though climate change and environmental disaster are not a new phenomenon, the effects of climate change in an

increasingly globalized, complex, and over-populated modern world will present unique challenges for many regions, but especially for those already volatile and disaster prone regions throughout the Middle East, Africa, and Asia Pacific.

Disjointed National and Defense Strategies

Climate change is an enduring factor that continues to threaten safety, security, and stability. Post-World War II, throughout much of the 20th century, and into the 21st century, U.S. security interests have been focused on bolstering, encouraging, and maintaining global stability.[27] But while the U.S. remains focused on these issues, the effects of predicted climate change will challenge future diplomatic and military efforts by creating an environment that exacerbates the conditions for instability, which often lead to conflict, terrorism, migration, and humanitarian disaster.

Recognized by the past five U.S. Presidents as a matter of national security, climate and environmental issues have been featured prominently in multiple national security strategies, and though President Donald Trump has not yet published a NSS, if he chooses not to address climate or environmental issues, it would break nearly 30 years of continuity. Climate-related issues have historically been bipartisan, as Presidents Reagan, Bush 41 and 43, Clinton, and Obama all highlighted climate issues in their own respective national security strategies. President Ronald Reagan first highlighted environmental related issues in his 1988 NSS with the following: "The dangerous depletion or contamination of the natural endowments of some nations-soil, forests, water, and air – will add to their environmental and health problems, and increasingly to those of the global community."[28] Despite his other public statements that were

not as supportive of environmental issues, President Reagan recognized that climate degradations threatened national security and American interests in cultivating global peace and prosperity.[29]

President George H.W. Bush, in his 1991 NSS, noted that environmental stresses are "raising a host social, economic, political and moral challenges."[30] President Bush may have been referring to host of natural disasters that occurred in the U.S. and abroad in the decade preceding his NSS; which in the U.S., caused over 154 billion dollars in economic losses.[31] In the year following his 1991 NSS, a historic drought in Somalia resulted in a devastating famine, which preceded the overthrowing of the Somalian President and the beginning of a decades long civil war that has since resulted in persistent violence, increased terrorism, and the displacement of millions of people to countries throughout East Africa, Europe, and in the U.S.[32] Possibly reflecting on the correlation between drought, famine, and the ongoing situation in Somalia, President Bill Clinton's 1997 NSS emphasized that environmental stresses have the potential to instigate new crises, exacerbate existing conflicts, and that the factors related to climate change did not heed national or international borders.[33]

Between 1980 and leading through to the end of President Barrack Obama's administration, the world experienced an uptick in the occurrence of deadly natural disasters. Between these years, the number of catastrophic geophysical, meteorological, hydrological, and climatological events increased from around 150 to 400 annually.[34] During this same time-period, while adjusting for inflation between the decades, the total number of economic and insurance losses increased at nearly the same rate as the incidence of natural disasters. In some instances, the difference in economic losses between the 20th and 21st century was a net loss of between 100 and 200 billion dollars annually.[35]

This worsening trend line for climate change and the subsequent increase of natural disasters likely influenced President Obama's two National Security Strategies. In his first NSS, President Obama pressed climate-related issues more than any other U.S. President, by citing the term 'climate change' 23 times.[36] In his 2015 NSS, President Obama reaffirmed that climate change is a threat to safety, security, and stability by ominously listing the issues as follows: "Climate change is an urgent and growing threat to our national security, contributing to increased natural disasters, refugee flows, and conflicts over basic resources like food and water."[37]

It is clear, and agreed upon by the past five U.S. Presidents who have published a NSS; U.S. national security interests and objectives are challenged by a host of climate and environmental issues, which have the potential of causing humanitarian disaster, violent conflict, and economic degradation. While the White House has repeatedly acknowledged climate change as a threat to U.S. interests, Department of Defense (DoD) has also recently acknowledged that changing weather patterns, rising sea-levels, and an upsurge in extreme weather related events, have the potential to intensify preexisting security challenges by causing food and water scarcities, migrations, and competition over resources.[38] Although national security strategies and the DoD acknowledge and understand these issues, current defense strategies have not set the conditions or given the precedence that would allow U.S. COCOM commanders to give priority to the types of missions that often address the underlying issues that threaten safety, security, and stability.

President Obama's security strategies emphasized the threats posed by climate change, but his strategy was not reflected in guidance drafted by the DoD. The 2012 document, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense,* was intended to be a reflection of the President's first NSS, but it failed to correlate climate change as an influence of more frequent natural disasters, and as a factor that threatens safety, security, and stability.[39] The DoD

defense strategy did however recognize the importance of responding to natural disaster and that the military forces are uniquely qualified to provide humanitarian and disaster relief (HADR), but it made these types of missions secondary to other military operations that include: counter terrorism, irregular warfare, security maintenance, and nuclear deterrence.[40]

Likewise, the 2015 document, *The National Military Strategy of the United States*, neglects to mention climate change, and prioritizes HADR and stability operations below other military missions.[41] By not correlating climate-related issues as a factor that threatens safety, security, and stability, and by not giving precedence to types of missions that respond to environmental crises, gives the appearance that national strategies and defense strategies are disjointed from each other. Also, by making HADR and stability type operations secondary to counter terrorism, irregular warfare, security maintenance, and nuclear deterrence, could communicate to policymakers that DoD is reluctant or uninterested in conducting HADR and stability operations. This divergence between national strategy and defense strategy could leave forces unprepared and ill-equipped to conduct missions that address the effects of climate change and the underlying factors that contribute to violent conflict, terrorism, and humanitarian disaster.

DoD leaders should strive to match defense strategy, planning, and procurement with national strategy and guidance, especially as it pertains to climate-related issues and natural disasters. Once national and defense strategies are aligned, military planners should consider how future climate change will shape military actions in the future operating environment. To help develop plans for future operations, military intelligence analysts should pragmatically monitor the scientific predictions for climate change, collect the indications and warnings that reveal how and when climate change will affect the physical or human geography, and form predictive assessments that better inform leaders of how climate change will affect the future

operating environment. Likewise, military commanders should routinely test and evaluate operational plans, force constructs, and military equipment against variables related to predicted climate change. Tests and evaluations need to be accurate to each COCOM commander's area of responsibility, as climate predictions and associated factors will not affect each operating environment uniformly.

Impacts to The Operating Environment

All indications point to the exacerbating effects of climate change most adversely affecting the water scarce and volatile regions within Africa and the Middle East, as well as the disaster prone and over populated Asia-Pacific region. In these parts of the world, the U.S. military remains actively engaged in efforts to bring safety, security, and stability, but the predicted effects of climate change could further complicate ongoing and future operations within these regions. A recent DoD response to a congressional inquiry identified climate-related issues for each COCOM, and characterized arid environments, like those found in parts of U.S. Africa Command (AFRICOM) and U.S. Central Command (CENTCOM), as being most susceptible to drought, and warned that competition in these areas could become more dangerous as groups compete over already limited water resources.[42]

In the Middle East, where U.S. forces have been engaged in over 15 years of near continuous conflict, future climate changes will predominately involve issues related to water scarcity; an issue that over the years has nearly brought Iraq, Syria, and Turkey to war over their respective shares of the region's limited water supply.[43] Former Commander of CENTCOM, retired Marine Corps General, Anthony Zinni, noted that many cultures in the Middle East were built around single water sources, and that even mild environmental stresses or climate changes such

as changing precipitation patterns, can be a cause for future conflict.[44] In some areas of this arid region, predicted climate changes may reduce rainfall by 60 percent, and as global warming continues to dry the region's limited water supply, continued desertification is likely to exacerbate ongoing conflict and hostilities.[45] U.S. forces in this region should be focused on issues that involve water scarcity, as these issues have already contributed to regional conflict, terrorism, and mass migrations.

In Syria, evidence indicates that climate changes prompted the country's descent into civil war, and thus promoted the growth of new terrorist and insurgent groups. In the years preceding the Syrian Civil War, in the northeastern sector of the country, a prolonged and unprecedented drought caused 75 percent of the country's farms to fail and 85 percent of the livestock to die.[46] This drought forced 1.5 million Syrians to leave their homes for the cities of Homs and Damascus, where the protests that the led to civil war first erupted.[47] Syrian populations most affected by the drought, is also where rebel groups claimed, and currently hold vast territories, and is also where the Islamic State of Iraq and Syria (ISIS) established the capital of its self-proclaimed caliphate.

Though drought and famine were one of many contributing factors that led to the Syrian Civil War and the advancement of ISIS. This vignette serves as one reason for why the U.S. military should focus more on climate-related issues, as they can often lead to broader operational and strategic concerns. In retrospect, had the U.S. military identified the indications and warning that drought could become an underlying factor that led to the Syrian Civil War and advancement of ISIS into Iraq, CENTCOM could have taken preemptive measures to prevent or control those early actions that have since led to today's reinvigorated U.S. involvement in Iraq and Syria. In future environments where drought and famine emerge, U.S. forces should conduct

missions that bolster stability and provide humanitarian relief, before conditions deteriorate and lead to mass-migrations, civil unrest, violent conflict, and the spread of terrorist organizations.

Supporting this correlation between the climate issues that preceded the Syrian Civil War and renewed instability in Iraq, was the 2014 National Intelligence Strategy, which asserted that climate changes can create the conditions that enable terrorist activity and other violent actions.[48] On climate change and terrorism, General Zinni succinctly stated, "It's not hard to make the connection between climate change and instability or climate change and terrorism."[49] As climate change challenge government's ability to manage drought, famine, and other disasters, terrorist groups use the degraded physical environment, social instability, and humanitarian insecurity as an opportunity to gain a territorial foothold. As CENTCOM fights the continued Global War on Terror, commanders should consider the link between the region's water scarcity, conflict, and counter insurgency operations. Although terrorism is the region's most prevalent threat, military planners should not discount the possibility for state-on-state conflicts over the limited and shrinking water supply.

In AFRICOM, similar issues of drought, famine, and weak governance, have already contributed to migrations, terrorism, and conflict. Future climate changes in Africa will likely further deteriorate unstable governments, displace more people, and serve as a cause for more violent actions.[50] In Somalia for example, droughts and famine that first coincided with governmental collapse and the preceding decades long civil war, have recently worsened. Because of drought, the UN recently said that over 20 million people in Somalia and in three other East African nations are at risk of starvation and are in desperate need of aid.[51]

As the situation, has worsened, climate change in East Africa is apparent. The most recent drought has been named *Odi Kawayn*, which is Somali for "something bigger than the elders," a

reference to the fact that tribal elders have never seen a worse drought.[52] To make matters worse, as drought, social unrest, and other climate related issues persist, a setting has been created that has allowed terrorist organizations like al-Shabaab to flourish. This terrorist group is complicating humanitarian relief operations in Somalia, as they routinely conduct attacks, and prevent relief aid by blocking roads and stealing food. Resulting from the climate induced turmoil, displaced persons from Somalia have since become a concern for many other East African countries, where host nations, like Kenya, house roughly half a million refugees, and struggle with their own water shortages, terrorist activity, and civil unrest.

In other areas of Africa, similar issues also exist and are likely to be exacerbated by predicted climate changes. In Libya, following the Arab Spring, a lack of legitimate governance, terrorism, and continued violence has forced migrants to more frequently flee affected areas in search of safety and security in Europe. These preexisting conditions in North Africa are likely to be worsened, as studies have found that the region's temperature will increase, drinking water will decrease, and 80-90 percent of some North African populations are at high risk of desertification.[53] As climate change induced problems aggravate conditions in this region, security issues will continue to cross COCOM boundaries to affect U.S. European Command (EUCOM), where the refugee population and incidents of terrorism have created social and political angst. As AFRICOM deals with instability, migrations, terrorism, and their own respective role in the Global War on Terror, commanders may also consider the link between the region's water scarcity and counter insurgency operations. Likewise, EUCOM commanders may consider the second order impacts related to climate change in neighboring regions as a potential threat to Europe.

When planning for future operations within CENTCOM and AFRICOM, commanders need to plan for how drought, famine, and desertification will have affect safety, security, and stability within their respective areas of responsibility. The continued decline in the available water in areas of Africa and the Middle East give commanders an indication that shared resources may soon become an underlying source of future state-on-state competition that could lead to hostility and interstate conflict. Future forces operating in CENTCOM and AFRICOM will need to be capable of simultaneously offering humanitarian assistance, providing security, and fighting opposing forces that destabilize these two regions.

Although other regions are more volatile, it is PACOM that is likely to be the most directly affected by future climate changes. The predicted climate changes for the Asia Pacific is ominous, and while current trends show natural disasters are increasing around the region, the DoD has acknowledged sea-rise, natural disasters, and seasonal water shortages will affect populations in already unstable environments.[54] As the most populated COCOM, with the most people living in low elevation coastal zones, on islands, and in cyclone prone areas, the dangers associated with climate change have been said to be no less serious than those nations whose peoples are threatened by guns or bombs.[55]

Currently, 60 percent of the world's natural disasters occur within the Asia Pacific region, where there has been an increasing trend in the number of climate related deaths.[56] Spanning a 10-year period, between 1994 and 2004, one-third of the world's hydrological disasters and half the those killed by such disasters happened in Asia.[57] Since 2004, deaths attributed to similar types of natural disasters have continued to increase. The Indian Ocean and Japanese tsunamis alone killed more people than ten consecutive years of flood related disasters, and displaced more people than the decades long Somalian civil war.[58] As a result of a changing climate and

the concentration of large populations situated along many of Asia's low lying littoral regions, PACOM operating forces could be engaged in more frequent operational deployments throughout the region.

As the frequency and intensity of natural disasters have increased, concurrently operational deployments to the region have risen. Over the past couple of decades, the U.S. military participated in over 40 HADR operations within the PACOM area of responsibility, which is an average of two missions per year.[59] The current trend line and predicted climate changes, indicate that these types of military operations will likely increase. Further emphasizing the need for humanitarian relief is the prediction for sea-level rise throughout the Asia Pacific. As floods and extreme weather events have caused increased turmoil throughout the region, the effects of predicted sea-rise will exacerbate flood related issues that already threaten the region's low elevation coastal zones and island nations. Few countries are more susceptible to sea-rise than Bangladesh, Vietnam, and China where over 100 million people could be exposed to a relative sea-level rise of just over two feet.[60]

In China, five of the country's largest cities are situated along the coast; Shanghai, Beijing, Guangdong, Tianjin and Shenzhen are all in close proximity to China's eastern coast and account for roughly 78.5 million of the country's population.[61] As sea-levels rise along China's coast, a two foot increase could inundate roughly 57,000 square-miles, which is an area that is equal to the size of Portugal.[62] And though the U.S. military is unlikely to respond to natural disasters in China, sea-rise in the country could have dire effects on global markets. Despite defense strategy not providing the precedence for HADR type operations, as climate changes worsen, military forces stationed in the Pacific should be prepared to conduct more frequent HADR and stability type operations.

Though PACOM forces may be engaged more frequently in those types of operations, they should remain capable and ready to deter aggressions and bolster stability. Climate change induced drought and famine, and the underlying connection to conflict and instability is not limited to Africa and the Middle East, countries in Asia could also experience conflict due to water shortages, as midway through the century, nations within PACOM are predicted to experience a significant decline in water and agricultural yields.[63] And as the trend line for global warming continues, many Asian countries dependent on glacial sources, could experience a significant reduction in their available water supply.

Currently, ice-melt from China's Tibetan Plateau feeds over 10 major river systems that carry water to approximately two billion people in over seven countries.[64] During the first half of the century, scientists project that the Tibetan Plateau's glaciers will decrease by over 27 percent, and though initially water may increase by 20-30 percent along rivers and streams, the long-term effects will intensify existing water shortages throughout much of the Asian continent.[65] As water becomes scarce, competition over access to dwindling resources, may lead to future interstate conflicts.

In China, over 25 percent of the largest 600 cities do not have adequate access to drinking water.[66] As climate changes and urbanization makes matters worse, Chinese officials have begun diverting water away rivers that flow from the Tibetan Plateau, to favor populations in coastal mega-cities, like Beijing and Tianjin.[67] Chinese officials have suggested additional river diversion projects to supply more water to cities that need it most, but these diversion plans may put the China at odds with its downstream neighbors in India, Bangladesh, Burma, Thailand, Laos, Cambodia, and Vietnam.[68] These lower riparian countries rely on the rivers that flow from China's Tibetan Plateau for drinking, irrigation, fishing, and hydro-powered electricity, and by

diverting water away from these countries could cause serious water shortages that may lead to social instability and civil unrest.

Chinese river diversion projects and predicted global warming could result in future conflicts between China and its southern neighbors, but most worrisome would be a water scarcity induced conflict between China and India. Both nations are nuclear powers, have preexisting territorial disputes, and now compete with each for the ignominious status as the region's most water-stressed nation.[69] Global warming, glacial ice-melt, and China's proposed water diversion projects could lead to future interstate tensions and may pose significant challenges to diplomacy and maintaining regional stability. This issue may require PACOM to deploy forces to bolster stability and deter aggressions between these two Asian nuclear powers.

Future military forces operating in the region will need to simultaneously perform activities that provide humanitarian assistance, deter aggression, and provide stability, while also maneuvering across increasingly austere and complex terrain, especially in and around Asia's littoral and coastal regions. Despite defense strategies that have not provided the priority for future HADR type operations, PACOM commanders need to plan and prepare forces to conduct operations that respond to the force multiplying effects of climate change. These types of operations will remain especially important for the Asia Pacific, as they often address the underlying factors that threaten the region's safety, security, and stability.

Climate change induced insurgencies, environmentally failed states, mass-migrations, and interstate conflicts will undoubtedly challenge each COCOM in numerous ways. Though this will not be the first-time people have fought because of environmental trepidations, the predictions for climate change in a globalized, complex, and over-populated future operating environment will dwarf all past conflicts in both scale and complexity. The worsening

predictions of future climate change and its possible effects on COCOM operating environments will require the U.S. military to simultaneously fight wars, reinforce safety and security, and provide stability through HADR type operations.

Differing geography, preexisting conditions, as well as social, political, and economic variables will determine how and where future military forces will operate. If climate trends and global security environments continue their current trajectories, U.S. forces will likely be most heavily engaged in the PACOM, AFRICOM, and CENTCOM areas of responsibility. The problems that weigh on these areas of the world will require a military force that is expeditionary, and adaptively prepared to fight wars, keep the peace, and provide humanitarian assistance, while being able to maneuver through an austere operating environment and across climate changed terrain.

A Reluctant but Qualified Expeditionary Force

As climate change significantly adds to the challenges of maintaining global security, the military must remain steadfast in its inherent abilities to protect and defend American interests at home and abroad. Different than most governmental departments, the DoD is inherently postured to fight wars, but is also uniquely qualified to respond to the effects of climate change in ways that other departments cannot. The U.S. military poses ample funding and personnel, as well as rapidly deployable, logistical, surveillance, medical, and communication capabilities that can be invaluable when responding to contingency crises and natural disasters. When not engaged in combat operations, military forces should leverage its wide range of capabilities and employ its unique qualified forces to address climate related factors that threaten safety, security, and stability.

The military's unique qualifications are not by accident. The DoD mandates forces to be prepared to conduct stability operations with the same tenacity and vigor as combat operations. The DoD also directs military forces to simultaneously conduct various military missions and activities that include maintaining or reestablishing security, offering essential services, rebuilding infrastructure, and providing humanitarian relief.[70] In performing these missions, the USMC, above all other service components is postured and uniquely qualified to respond to the force multiplying effects of climate change.

Just as the DoD mandates forces to be prepared to concurrently respond to a range of contingency crises, the *USMC Operating Concept*, which outlines how the USMC will operate in the 21st century, necessitates Marines to be prepared to, "simultaneously fight wars, keep the peace, and provide humanitarian assistance."[71] However, aside from this one vague reference to providing humanitarian assistance, the mention of HADR and stability operations have been auspiciously omitted from the Marine Corps' strategy for how an expeditionary force will operate in the 21st century. This omission could undermine mission readiness, as increasingly Marines have become relied upon by COCOM commanders for their expeditionary design, and proven ability to conduct stability operations and provide humanitarian assistance in areas affected by environmental disasters.

The Marine Corps, as an expeditionary force in readiness, is persistently forward deployed, and task organized to simultaneously conduct the range of military operations. In responding to natural disaster and humanitarian crises, it has been found that in most cases, a speedy response will improve the overall success of the mission.[72] In partnership with the U.S. Navy, the Marine Corps is an amphibious force that is postured to provide an immediate response to natural disasters and humanitarian crises, especially within the disaster prone littoral regions. To

provide expeditionary support to both coastal and inland regions, the USMC has a combination of forward deployed forces, rapidly deployable forces, and prepositioned forces that are based on land and sea.[73]

For these reasons, the USMC remains the COCOM commanders best option for confronting the effects of climate related disasters. However, if Marines are unwilling to conduct these types of missions, as eluded to in the *USMC Operating Concept*, the joint force commanders may choose another service to conduct HADR and stability operations. Though some Marines may rejoice at this notion, by choosing not to conduct these types operations, the force could be reduced due to fiscal reconsiderations. When an inflated military force is not needed to fight wars, policymakers may choose to downsize a Marine Corps that is exclusively biased for combat operations.

While the Marine Corps is predisposed to fight wars, it is just as qualified and capable of responding to climate change induced natural disasters and humanitarian crises. When not exclusively engaged combat, the Marine Corps should prioritize activities that keep its forces engaged conducting other types of missions that bolster safety, security, and stability; even if they include missions that are not a part of *USMC Operating Concept*. However, if the USMC maintains its preference for other mission types unrelated to HADR or stability operations, its commanders will still need to overcome the various ways that climate change will affect maneuver within the operating environment.

Climate changes and natural disasters will inevitably alter the physical and human geography, in ways that will complicate Marine Corps operations. Rising sea levels, environmental disasters, urbanization, shifting demographics, and violent conflicts all make mobility more difficult, especially within the world's densely populated coastal regions. Marine

Corps leaders recognize the difficulty associated with maneuvering through complex terrain, and assess surface and aerial movements will become more difficult, especially in and around the world's littorals.[74] As climate change exacerbates the complexity of the world's littoral regions, the DoD assesses that sea-level rise may impact the execution of amphibious landings.[75] As sea levels rise, invariably coastlines will change, and obstructions once on-land will become obstructions underwater. As the coastlines change, Marines will find it more difficult to traverse the littoral regions to reach inland objectives.

These factors will likely affect the planning and execution of future Marine Corps operations; therefore, operational planners should consider changing coastlines as a complex obstacle to future amphibious landing operations, and because of this, commanders should actively seek new ways to overcome or bypass climate changed terrain to reach inland objectives. Items to explore for overcoming the changing coastlines may include innovative maneuver concepts, the development of new technologies, or procurement of more adaptive amphibious vehicles. To help inform these actions, military planners and intelligence analysts should closely monitor the scientific projections for climate change, and collect the indications that reveal how climate change will alter the physical operating environment.

As climate changes reshape the environment, maneuver will become more complicated; especially within the littorals. As leaders seek new ways to maneuver through this space, the Marine Air Ground Task Force (MAGTF) remains an adaptable force to confront many complex issues related to climate change. As sea-rise and other natural disasters reshape the operating environment, the MAGTF's amphibious landing craft, ground vehicles, and helicopters make expeditionary points of entry possible in many disaster prone and contested areas of the world. However, even though the MAGTF is capable of navigating through complex terrain, it is not a

holistic solution in lieu of research and development, as the unexpected nature of climate change will likely re-shape the environment in ways that challenge today's equipment and force constructs. Therefore, it is critical for leaders to consider even the worst-case climate change scenarios and develop new solutions that enable forces to maneuver through even the most complex climate changed terrain.

Though defense strategies and operating concepts do not provide the precedence for the USMC to conduct the type of missions that often mitigate the underlying factors that threaten security and stability, the Marine Corps must remain ready to execute the DoD mandate that requires military forces to remain steadfast in their abilities to conduct HADR and stability type operations. Planning and preparing for these types of operations with the same energy and rigor as a combat operation is paramount to maintaining global stability and protecting U.S. interests at home and abroad. Marine leaders should routinely update operational plans and development new capabilities to contend with a physical and human geography that may be changed by climate-related factors. Regardless of disjointed defense strategies and reluctant expeditionary force, the USMC remains the right force for responding to the underlying factors and threat multiplying effects of future climate change.

Conclusion

Throughout the 21st century, climate change is predicted to cause sea-rise, reduced rainfall, and increased natural disasters, which have the potential to worsen preexisting social, political, and economic conditions, while instigating new crises that threaten safety, security, and stability. Climate change is an undeniable threat, and though it is not a new phenomenon, it is new to a world that is increasingly interconnected, urbanized, and resource scarce. In consideration of

these threats, policymakers and defense leaders, should avoid debating the causes of climate change, move beyond the polarizing biases that dominate the current climate dialogue, and consider the issues in a more rational way, specifically as a force multiplying influence that threatens U.S. security interests of bolstering, encouraging, and maintaining global stability.

Climate change and environmental issues, as agreed upon by the past five U.S. Presidents, are recognized as underlying causes of humanitarian disaster, violent conflict, and economic degradation. DoD senior leaders also recognize the threats related to climate change; as a former Secretary of Defense once said, "Climate change does not directly cause conflict, but it can significantly add to the challenges of global instability, hunger, poverty, and conflict."[76] Yet a divergence between national strategies and defense strategies has left military commanders reluctant to conduct missions in response to natural disasters, and thus has caused forces to be unprepared for the types of operations that address the underlying factors related to climate change before they threaten security environments.

Climate change predictions and current security conditions indicate that the exacerbating effects of changing climate will likely most negatively affect the already volatile regions within the Middle East, Africa, and the Asia-Pacific. Though climate change may seem like a distant threat, recent climate issues that preceded the crises in Somalia and Syria, should serve as warning signs for things to come. Likewise, throughout the Pacific, where sea-rise and more frequent storm surges are likely to threaten over 100 million people and the dangers associated with climate change are said to be no less serious than those nations threatened by guns or bombs, natural disaster in the region have killed and displaced hundreds of thousands of people.

As scientists reach a consensus for the extent and timing of climate change, the disasters that have already plagued the Middle East, Africa, and Asia Pacific, should serve as an indication

and warning for the impending threats related to future climate changes. To understand the precise effects of climate change on the future operating environment, military planners and intelligence analysts should monitor the scientific predictions for climate change, collect the indications and warnings that reveal how climate change will affect the physical and human geography, and form predictive assessments for the future.

As climate changes weigh on the future operating environment, military commanders should consider how forces will operate in a modern world that is affected by climate changes. The U.S. military is uniquely qualified to respond to the effects of climate change in ways that other governmental departments cannot. Though the U.S. military is altogether qualified, it is the adaptable and expeditionary minded USMC that is better suited to respond to the force multiplying effects of climate change.

Despite a Marine Corps operating concept, that auspiciously omitted climate-related issues and the types of operations that would be conducted in response to natural disasters, Marines should remain steadfast in its inherent and unique abilities to provide expeditionary support to regions affected by climate induced disasters. However, if the USMC maintains a bias against conducting future HADR or stability operations, its forces will still need to overcome the various ways that climate change will affect maneuver within future operating environments.

Climate changes are likely to reshape the operating environment in ways that may challenge current force constructs and military equipment. In the littorals, where rising sea-level will inevitably change the coastline, Marines will find it more difficult to transverse the littoral regions to reach inland objectives. Commanders should therefore should seek innovative maneuver concepts, new technologies, and more adaptive amphibious vehicles to contend with a physical and human geography that is increasingly changed by climate change.

BIBLIOGRAPHY

Abraham, John. *Global Warming Continues; 2016 Will Be the Hottest Year Ever Recorded.* The Guardian, 2016. https://www.theguardian.com/environment/climate-consensus-97-per-cent/2016/oct/21/global-warming-continues-2016-will-be-the-hottest-year-ever-recorded

Department of Defense Instruction. *Stability Operations: Reference Number 3000.05.* Washington, DC, September. 2009. http://www.dtic.mil/whs/directives/corres/pdf/300005p.pdf

CNA Military Advisory Board. *National Security and the Threat of Climate Change.* Alexandria, VA: CNA, 2007. https://www.cna.org/cna_files/pdf/national%20security%20and%20the%20threat%20of%20climate%20change.pdf.

Espach, Ralph, David, Zvijac, and Ronald Filadelfo. *Impact of Climate Change on U.S. Military Operations in the Western Pacific.* Marine Corps University Journal, Special Issue: Climate Change and Policy, Quantico, VA, 2016. https://www.cna.org/cna_files/pdf/MCUJ_si2016_CCP-1.pdf

Executive Office of the President of the United States. *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense.* Washington, DC: White House. 2012. http://archive.defense.gov/news/Defense_Strategic_Guidance.pdf

Ferris, Elizabeth, and Daniel Petz. *The Year That Shook the Rich: A Review of Natural Disasters In 2011.* The Brookings Institution – London School of Economics Project on Internal Displacement. 2011 https://unchronicle.un.org/article/greatest-threat-global-security-climate-change-not-merely-environmental-problem

Goldstein, Natalie, Dale Williams, and Melissa Ericksen. *Global Warming.* New York: Checkmark Books, 2010.

Hagel, Chuck. *"Address before the Halifax International Security Forum"* Speech. DoD Arctic Strategy, Halifax, Nova Scotia, November 22, 2013. http://archive.defense.gov/speeches/speech.aspx?speechid=1821

Headquarters United States Marine Corps. *Marine Corps Operating Concept: How an Expeditionary Force Operates in the 21st Century.* Department of the Navy, Headquarters United States Marine Corps. Washington, DC. September, 2016. http://www.mcwl.marines.mil/Portals/34/Images/MarineCorpsOperatingConceptSept2016.pdf?ver=2016-12-02-073359-207

Joint Chiefs of Staff. The *National Military Strategy of the United States.* Washington, DC.

2015. http://www.jcs.mil/Portals/36/Documents/Publications/2015_National_Military_Strategy.pdf

Intergovernmental Panel on Climate Change. *Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.* Cambridge University Press, Cambridge, United Kingdom and New York, NY, 2013. https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_Final.pdf

Intergovernmental Panel on Climate Change. *Working Group II: Impacts, Adaptation and Vulnerability*. Reports – Assessment Reports: Executive Summary, N.d. http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=593

Karimi, Faith. *20 Million at Risk of Starvation in World's Largest Crisis Since 1945, UN Says.* CNN. March 2017. http://www.cnn.com/2017/03/11/africa/un-famine-starvation-aid/

Kolbert, Elizabeth. *Field Notes from a Catastrophe: Man, Nature, and Climate Change.* New York: Bloomsbury, 2015.

Mcgranahan, Gordon, Deborah Balk, and Bridget Anderson. *The Rising Tide: Assessing the Risks of Climate Change and Human Settlements in Low Elevation Coastal Zones.* Environment & Urbanization Copyright. International Institute for Environment and Development. Sage Publications, Vol 19(1): 17–37, 2007. http://unfccc.int/files/adaptation/application/pdf/nwpexpert_mcgranahan_balk_anderson_2007.pdf

Moran, Daniel. *Climate Change and National Security: A Country-Level Analysis.* Washington, D.C.: Georgetown University Press. 2011.

Moroney, Jennifer, Stephanie Pezard, Laurel E. Miller, Jeffrey Engstrom, and Abby Doll. *Lessons from Department of Defense Disaster Relief Efforts in the Asia-Pacific Region.* RAND Corporation: National Security Research Division. 2013. http://www.rand.org/content/dam/rand/pubs/research_reports/RR100/RR146/RAND_RR146.pdf

National Oceanic and Atmospheric Administration, *Billion-Dollar Weather and Climate Disasters: Table of Events*, NOAA National Centers for Environmental Information, 2017, https://www.ncdc.noaa.gov/billions/events

National Oceanic and Atmospheric Administration. *Tide and Water Levels - Gravity, Inertia, and the Two Bulges.* NOAA Ocean Service Education, 2008. http://oceanservice.noaa.gov/education/kits/tides/tides03_gravity.html

Office of the Director of National Intelligence. The *National Intelligence Strategy of The United States of America.* McLean, VA. 2016. https://www.dni.gov/files/documents/2014_NIS_Publication.pdf

Office of the Secretary of Defense. *2014 Climate Change Adaptation Roadmap.* Washington, DC: DoD, 2014. http://www.acq.osd.mil/eie/Downloads/CCARprint_wForward_e.pdf

Pak, Jin. *China, India, and War over Water,* U.S. Army Strategic Studies Institute. 2016. http://strategicstudiesinstitute.army.mil/pubs/parameters/issues/Summer_2016/8_Pak.pdf.

Parker, Geoffrey. *Global Crisis: War, Climate Change and Catastrophe in the Seventeenth Century.* New Haven: Yale University Press, 2013. http://ahr.oxfordjournals.org/content/113/4/1053.full.pdf+html

Parry, Emyr. *The Greatest Threat to Global Security: Climate Change Is Not Merely An Environmental Problem.* United Nations Chronical, Vol. XLIV No. 2, 2007. https://unchronicle.un.org/article/greatest-threat-global-security-climate-change-not-merely-environmental-problem

Pearce, Fred. *Mideast Water Wars: In Iraq, A Battle for Control of Water.* Yale School of Forestry and Environmental Studies. August 2014. http://e360.yale.edu/features/mideast_water_wars_in_iraq_a_battle_for_control_of_water

Redden, Jack. *Dadaab - World's Biggest Refugee Camp 20 Years Old.* The UN Refugee Center - News and Stories. February, 2012. http://www.unhcr.org/en-us/news/makingdifference/2012/2/4f439dbb9/dadaab-worlds-biggest-refugee-camp-20-years-old.html

Sieff, Kevin. *Report says East African Countries Face Increasing Threat from al-Shabab.* The Washington Post. August, 2016. https://www.washingtonpost.com/world/report-says-east-african-countries-face-increasing-threat-from-al-shabab/2016/08/15/1f392038-62f5-11e6-b4d8-33e931b5a26d_story.html?utm_term=.ea683e6da190

Shalizi, Zmarak. *Addressing China's Growing Water Shortages and Associated Social and Environmental Consequences*. World Bank Policy Research Working Paper - Vol. 3895. Washington, DC: The World Bank, 2006.

Stokes, Elaisha. *The Drought That Preceded Syria's Civil War Was Likely the Worst in 900 Years.* Vice News. March 2016. https://news.vice.com/article/the-drought-that-preceded-syrias-civil-war-was-likely-the-worst-in-900-years

The White House, *A National Security Strategy for a New Century.* Washington, DC, 1997. http://nssarchive.us/NSSR/1997.pdf

The White House, *The National Security Strategy of the United States of America.* Washington, DC, 1988. http://nssarchive.us/NSSR/1988.pdf

The White House, *The National Security Strategy of the United States of America,* Washington, DC, 1991. http://nssarchive.us/NSSR/1991.pdf

The White House. *The National Security Strategy of the United States of America*. Washington, DC, 2010. http://nssarchive.us/NSSR/2010.pdf

The White House. *The National Security Strategy of the United States of America*. Washington, DC, 2015. http://nssarchive.us/wp-content/uploads/2015/02/2015.pdf

ENDNOTES

[1] The White House, *The National Security Strategy of the United States of America* (Washington, DC, 2015), 12, http://nssarchive.us/wp-content/uploads/2015/02/2015.pdf

[2] CNA Military Advisory Board, *National Security and the Threat of Climate Change*, (Alexandria, VA: CNA, 2007), 10 https://www.cna.org/cna_files/pdf/national%20security%20and%20the%20threat%20of%20climate%20change.pdf.

[3] Intergovernmental Panel on Climate Change, *Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change,* (Cambridge University Press, Cambridge, United Kingdom and New York, NY, 2013), 11. https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_Final.pdf

[4] Elizabeth Kolbert, *Field Notes from a Catastrophe: Man, Nature, and Climate Change,* (New York: Bloomsbury, 2015), 95.

[5] Geoffrey Parker, *Global Crisis: War, Climate Change and Catastrophe in the Seventeenth Century*, (New Haven: Yale University Press, 2013), 1068, 1071, & 1073. http://ahr.oxfordjournals.org/content/113/4/1053.full.pdf+html

[6] Ibid, 1053.

[7] Ibid.

[8] Chuck Hagel, "Address before the Halifax International Security Forum" (speech, DoD Arctic Strategy, Halifax, Nova Scotia, November 22, 2013). http://archive.defense.gov/speeches/speech.aspx?speechid=1821

[9] CNA Military Advisory Board, *National Security and the Threat of Climate Change*, (Alexandria, VA: CNA, 2007), 6 https://www.cna.org/cna_files/pdf/national%20security%20and%20the%20threat%20of%20climate%20change.pdf.

[10] Intergovernmental Panel on Climate Change, *Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change,* Cambridge University Press, Cambridge, United Kingdom and New York, NY, 2013), 5. https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_Final.pdf

[11] John Abraham, *"Global Warming Continues; 2016 Will Be the Hottest Year Ever Recorded,"* The Guardian, 2016. https://www.theguardian.com/environment/climate-consensus-97-per-cent/2016/oct/21/global-warming-continues-2016-will-be-the-hottest-year-ever-recorded

[12] Intergovernmental Panel on Climate Change, *Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change,* Cambridge University Press, Cambridge, United Kingdom and New York, NY, 2013), 20. https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_SPM_Final.pdf

[13] Ibid, 7.

[14] Ibid, 20.

[15] Intergovernmental Panel on Climate Change, *Working Group II: Impacts, Adaptation and*

Vulnerability," Reports – Assessment Reports: Executive Summary, N.d. http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=593

[16] Intergovernmental Panel on Climate Change, *Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change,* Cambridge University Press, Cambridge, United Kingdom and New York, NY, 2013), 26. http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf

[17] National Oceanic and Atmospheric Administration, *Tide and Water Levels - Gravity, Inertia, and the Two Bulges,* NOAA Ocean Service Education, 2008. http://oceanservice.noaa.gov/education/kits/tides/tides03_gravity.html

[18] Gordon Mcgranahan, Deborah Balk, and Bridget Anderson, *The Rising Tide: Assessing the Risks of Climate Change and Human Settlements in Low Elevation Coastal Zones,* Environment & Urbanization Copyright, International Institute for Environment and Development, Sage Publications, Vol 19(1): 17–37, 2007, 21. http://unfccc.int/files/adaptation/application/pdf/nwpexpert_mcgranahan_balk_anderson_2007.pdf

[19] Ibid, 17.

[20] Ibid.

[21] Ibid, 24.

[22] Emyr Parry, *The Greatest Threat to Global Security: Climate Change Is Not Merely An Environmental Problem,* United Nations Chronical, Vol. XLIV No. 2, 2007, https://unchronicle.un.org/article/greatest-threat-global-security-climate-change-not-merely-environmental-problem

[23] Intergovernmental Panel on Climate Change, *Summary for Policymakers. In: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change,* Cambridge University Press, Cambridge, United Kingdom and New York, NY, 2013), 6. http://www.climatechange2013.org/images/report/WG1AR5_SPM_FINAL.pdf

[24] Ibid.

[25] *Water is Focus of Climate Change in Middle East and North Africa,* The World Bank 2013, Accessed March 2017, http://go.worldbank.org/87GRZ8H4B0

[26] Elizabeth Ferris and Daniel Petz, *The Year That Shook the Rich: A Review of Natural Disasters In 2011,* (The Brookings Institution – London School of Economics Project on Internal Displacement, 2011) 99 https://unchronicle.un.org/article/greatest-threat-global-security-climate-change-not-merely-environmental-problem

[27] CNA Military Advisory Board, *National Security and the Threat of Climate Change,* (Alexandria, VA: CNA, 2007), 13 https://www.cna.org/cna_files/pdf/national%20security%20and%20the%20threat%20of%20climate%20change.pdf.

[28] The White House, *The National Security Strategy of the United States of America,* (Washington, DC, 1988), 6. http://nssarchive.us/NSSR/1988.pdf

[29] Ibid.

[30] The White House, *The National Security Strategy of the United States of America,* (Washington, DC, 1991), 2 & 22. http://nssarchive.us/NSSR/1991.pdf

[31] National Oceanic and Atmospheric Administration, *Billion-Dollar Weather and Climate*

Disasters: Table of Events, NOAA National Centers for Environmental Information, 2017, https://www.ncdc.noaa.gov/billions/events

[32] Elizabeth Ferris and Daniel Petz, *The Year That Shook the Rich: A Review of Natural Disasters In 2011*, (The Brookings Institution – London School of Economics Project on Internal Displacement, 2011) 103 https://unchronicle.un.org/article/greatest-threat-global-security-climate-change-not-merely-environmental-problem

[33] The White House, *A National Security Strategy for a New Century*, (Washington, DC, 1997), 14 http://nssarchive.us/NSSR/1997.pdf

[34] Insurance Information Institute, *Number of World Natural Catastrophes, 1980-2016*, Copyright 2017, Insurance Information Institute, Inc. Accessed March 2017, http://www.iii.org/fact-statistic/catastrophes-global

[35] Insurance Information Institute, *World Natural Catastrophe Overall and Losses, 1980-2016*, Copyright 2017, Insurance Information Institute, Inc. Accessed March 2017, http://www.iii.org/fact-statistic/catastrophes-global

[36] The White House, *The National Security Strategy of the United States of America* (Washington, DC, 2010) http://nssarchive.us/NSSR/2010.pdf

[37] The White House, *The National Security Strategy of the United States of America* (Washington, DC, 2015), 12 http://nssarchive.us/wp-content/uploads/2015/02/2015.pdf

[38] Office of the Secretary of Defense, *2014 Climate Change Adaptation Roadmap,* (Washington, DC: DoD, 2014), 2 http://www.acq.osd.mil/eie/Downloads/CCARprint_wForward_e.pdf

[39] Executive Office of the President of the United States, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense* (Washington, DC: White House, 2012) http://archive.defense.gov/news/Defense_Strategic_Guidance.pdf

[40] Ibid, 6.

[41] Joint Chiefs of Staff, The *National Military Strategy of the United States,* (Washington, DC. 2015) http://www.jcs.mil/Portals/36/Documents/Publications/2015_National_Military_Strategy.pdf

[42] Executive Office of the President of the United States, *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense* (Washington, DC: White House, 2012) http://archive.defense.gov/news/Defense_Strategic_Guidance.pdf

[43] Fred Pearce, *Mideast Water Wars: In Iraq, A Battle for Control of Water,* Yale School of Forestry and Environmental Studies, August 2014, http://e360.yale.edu/features/mideast_water_wars_in_iraq_a_battle_for_control_of_water

[44] CNA Military Advisory Board, *National Security and the Threat of Climate Change*, (Alexandria, VA: CNA, 2007), 31, https://www.cna.org/cna_files/pdf/national%20security%20and%20the%20threat%20of%20climate%20change.pdf.

[45] Ibid, 30.

[46] Elaisha Stokes, *The Drought That Preceded Syria's Civil War Was Likely the Worst in 900 Years,* Vice News, March 2016, https://news.vice.com/article/the-drought-that-preceded-syrias-civil-war-was-likely-the-worst-in-900-years

[47] Ibid.

[48] Office of the Director of National Intelligence, The *National Intelligence Strategy of The United States of America,* (McLean, VA. 2016), 5.

https://www.dni.gov/files/documents/2014_NIS_Publication.pdf

[49] CNA Military Advisory Board, *National Security and the Threat of Climate Change*, (Alexandria, VA: CNA, 2007), 31, https://www.cna.org/cna_files/pdf/national%20security%20and%20the%20threat%20of%20climate%20change.pdf.

[50] Ibid, 20.

[51] Faith Karimi, *20 Million at Risk of Starvation in World's Largest Crisis Since 1945, UN Says*, CNN, March 2017, http://www.cnn.com/2017/03/11/africa/un-famine-starvation-aid/

[52] *UN Migration Agency Launches $24.6 Million Appeal for Drought-Hit Somalia*, UN News Centre, March 2017 http://www.un.org/apps/news/story.asp?NewsID=56286#.WMQcyI-cHIV

[53] Daniel Moran, *Climate Change and National Security: A Country-Level Analysis*, (Washington, DC: Georgetown University Press, 2011), 193-194

[54] *National Security Implications of Climate-Related Risks and a Changing Climate*, Report submitted in response to a request contained in Senate Report 113-211, accompanying H.R. 4870, the Department of Defense Appropriations Bill, 2015. (Washington, DC, 2015) http://archive.defense.gov/pubs/150724-congressional-report-on-national-implications-of-climate-change.pdf?source=govdelivery

[55] Emyr Parry, *The Greatest Threat to Global Security: Climate Change Is Not Merely An Environmental Problem*, United Nations Chronical, Vol. XLIV No. 2, 2007 https://unchronicle.un.org/article/greatest-threat-global-security-climate-change-not-merely-environmental-problem

[56] Jennifer Moroney, Stephanie Pezard, Laurel E. Miller, Jeffrey Engstrom, and Abby Doll, *Lessons from Department of Defense Disaster Relief Efforts in the Asia-Pacific Region*, RAND Corporation: National Security Research Division, 2013, 1 http://www.rand.org/content/dam/rand/pubs/research_reports/RR100/RR146/RAND_RR146.pdf

[57] Gordon Mcgranahan, Deborah Balk, and Bridget Anderson, *The Rising Tide: Assessing the Risks of Climate Change and Human Settlements in Low Elevation Coastal Zones*, Environment & Urbanization Copyright, International Institute for Environment and Development, Sage Publications, Vol 19(1): 17–37, 2007, 19 http://unfccc.int/files/adaptation/application/pdf/nwpexpert_mcgranahan_balk_anderson_2007.pdf

[58] CNN, *Tsunami of 2004 Fast Facts*, CNN Library, Updated December 2016, Accessed March 2017, http://www.cnn.com/2013/08/23/world/tsunami-of-2004-fast-facts/; CNN, *2011 Japan Earth Quake- Tsunami Fast Facts*, CNN Library, Updated March 2017, Accessed March 2017, http://www.cnn.com/2013/07/17/world/asia/japan-earthquake---tsunami-fast-facts/

[59] Jennifer Moroney, Stephanie Pezard, Laurel E. Miller, Jeffrey Engstrom, and Abby Doll, *Lessons from Department of Defense Disaster Relief Efforts in the Asia-Pacific Region*, RAND Corporation: National Security Research Division, 2013, 1 http://www.rand.org/content/dam/rand/pubs/research_reports/RR100/RR146/RAND_RR146.pdf

[60] *Working Group II: Impacts, Adaptation and Vulnerability*, Intergovernmental Panel on

Climate Change, Accessed March 2016 http://ipcc.ch/ipccreports/tar/wg2/index.php?idp=446

[61] Central Intelligence Agency. *The World Factbook.* China. 2016. https://www.cia.gov/library/publications/the-world-factbook/geos/ch.html

[62] Daniel Moran, *Climate Change and National Security: A Country-Level Analysis,* (Washington, DC: Georgetown University Press, 2011) 11

[63] CNA Military Advisory Board, *National Security and the Threat of Climate Change,* (Alexandria, VA: CNA, 2007), 24-27 https://www.cna.org/cna_files/pdf/national%20security%20and%20the%20threat%20of%20climate%20change.pdf.

[64] Jin Pak, *China, India, and War over Water,* U.S. Army Strategic Studies Institute, 2016, 57 http://strategicstudiesinstitute.army.mil/pubs/parameters/issues/Summer_2016/8_Pak.pdf.

[65] Daniel Moran, *Climate Change and National Security: A Country-Level Analysis,* (Washington, DC: Georgetown University Press, 2011) 11

[66] Jin Pak, *"China, India, and War over Water,"* U.S. Army Strategic Studies Institute, 2016, 10, http://strategicstudiesinstitute.army.mil/pubs/parameters/issues/Summer_2016/8_Pak.pdf.

[67] Ibid, 58-59.

[68] Ibid, 58-59.

[69] Zmarak Shalizi, *Addressing China's Growing Water Shortages and Associated Social and Environmental Consequences*, World Bank Policy Research Working Paper - Vol. 3895 (Washington, DC: The World Bank, 2006), 5.

[70] Department of Defense Instruction, *Stability Operations: Reference Number 3000.05,* (Washington, DC, September, 2009), 1 http://www.dtic.mil/whs/directives/corres/pdf/300005p.pdf

[71] Headquarters United States Marine Corps, *Marine Corps Operating Concept: How an Expeditionary Force Operates in the 21st Century,* (Department of the Navy, Headquarters United States Marine Corps, Washington, DC, September 2016), 5 http://www.mcwl.marines.mil/Portals/34/Images/MarineCorpsOperatingConceptSept2016.pdf?ver=2016-12-02-073359-207

[72] Ralph Espach, David, Zvijac, and Ronald Filadelfo, *Impact of Climate Change on U.S. Military Operations in the Western Pacific*, Marine Corps University Journal, 2016 Special Issue: Climate Change and Policy (Quantico, VA, 2016), 100 https://www.cna.org/cna_files/pdf/MCUJ_si2016_CCP-1.pdf

[73] Headquarter United States Marine Corps, *"Marine Corps Operating Concept: How an Expeditionary Force Operates in the 21st Century,"* (Department of the Navy, Headquarters United States Marine Corps, Washington, DC, September 2016), 13 http://www.mcwl.marines.mil/Portals/34/Images/MarineCorpsOperatingConceptSept2016.pdf?ver=2016-12-02-073359-207

[74] Ibid, 5.

[75] Office of the Secretary of Defense, *2014 Climate Change Adaptation Roadmap,* (Washington, DC: DoD, 2014), 4 http://www.acq.osd.mil/eie/Downloads/CCARprint_wForward_e.pdf

[76] Chuck Hagel, "Address before the Halifax International Security Forum" (speech, DoD Arctic Strategy, Halifax, Nova Scotia, November 22, 2013). http://archive.defense.gov/speeches/speech.aspx?speechid=1821