REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED** *(From - To)*
25-03-2013	Master of Military Studies Research Paper	September 2012 - April 2013

4. TITLE AND SUBTITLE

Water as the future clash for civilization: a fresh conceptual approach for a Global Trinity?
Water security and future conflict: the case for water scarcity to become a primary cause of conflict in the future requiring an adjusted approach to the consideration of threats.

5a. CONTRACT NUMBER
N/A

5b. GRANT NUMBER
N/A

5c. PROGRAM ELEMENT NUMBER
N/A

6. AUTHOR(S)

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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)
N/A

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

12. DISTRIBUTION / AVAILABILITY STATEMENT

Approved for public release; distribution is unlimited.

13. SUPPLEMENTARY NOTES

N/A

14. ABSTRACT

Western powers have effectively been focused on ideological threats since World War Two, with this ideological disposition reinforced through the last decade's necessary conflicts. Meanwhile, popular acceptance of theories such as Samuel P. Huntington's "Clash of Civilizations" has distracted from other security threats. Amongst these threats is water scarcity, which is likely to present a future environmental security threat. Potentially requiring military intervention, the international community must consider future conflict within an environmental context, in a shift from the predominant ideological focus. This leads to consideration of the requirement for bespoke environment-based security architectures, requiring a re-adjustment of understanding, commitment, and force readiness. Primarily though, this requires the creation of a willingness within Clausewitz's Trinity of the government, military, and people to potentially use force to ensure another nation's water security; a readiness to use force in the name of humanity, rather than necessarily in pursuit of obvious national interest. In considering the implications, there is clearly not yet a conceptual readiness for such a move. Therefore, a military-led debate that results in just such a development across the body politic would indicate achievement of a new balance within the contemporary Trinity, and possibly result in a Global Trinity.

15. SUBJECT TERMS

Clash of Civilizations; water scarcity; future conflict; security architecture; Global Trinity; nature and character of war.

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON**
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			Marine Corps University/Command
Unclass	Unclass	Unclass	UU	68	**19b. TELEPHONE NUMBER** *(include area code)* (703) 784-3330 (Admin Office)

United States Marine Corps
Command and Staff College
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2076 South Street
Quantico, VA 22314-5068

MASTER OF MILITARY STUDIES

TITLE:

Water as the future clash for civilizations: a fresh conceptual approach for a Global Trinity?

Water Scarcity and Future Conflict – consideration of water scarcity as a primary cause of conflict in the future requiring an adjustment to the Western approach to threats.

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

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Approved: 3/25/13

Date: 25 March 2013

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Date: 25 March 2013

Executive Summary

Title: Water as the future clash for civilizations: a fresh conceptual approach for a Global Trinity?

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Thesis: Whilst the ideological conflicts of the last decade have been necessary, they have also served as a delay to full consideration of some of the alternative threats. Western powers need to reconsider the post-Cold War pre-occupation with ideological threats, and consider the requirement and significant implications for water scarcity to become a basis for future commitment of military force within the context of environment-based security architectures.

Discussion: Western powers have effectively been focused on ideological threats in the period since the Second World War, with this ideological focus reinforced through the necessary conflicts of the last decade. Meanwhile, wide popular acceptance of theories such as Samuel P. Huntington's proposed "Clash of Civilizations" has acted as a distraction from other potential threats to security. There has consequently been little open discussion of the potential requirement to use a military force for a purpose that, rather than dealing with an ideological threat, will need to address conflict within an environmental context. Amongst the environmental threats water scarcity is already a reality for many and is increasingly becoming a security risk that cannot be ignored. A significant quantity of international work has been undertaken to address water scarcity, and this work continues. However, experience has demonstrated that this work continues to be technologically and conceptually challenging, slow in delivering progress, uneven in its achievements, and politically complex to address. In the meantime, the impact of water scarcity continues to be exacerbated by the multiple pressures created by an increasing global population, urbanization, industrialization, and climate change. That poverty, displacement, deprivation, social breakdown, and criminality, amongst many other issues, are caused by water scarcity is proven; that such factors provoke conflict is acknowledged. However, whilst the international community is clearly applying its efforts to mitigate the effects, evidence indicates that water scarcity will become increasingly critical before the required progress may be delivered; the potential for conflict is a likely result.

Conclusion: The international community must consider the potential for future conflict within an environmental context, in a shift from the ideological focus of recent years. As such, in parallel to the continued delivery of 'soft effects' to address water scarcity impacts, the requirement to use military force to ensure future water security should be considered. In doing so, it becomes evident that an environment-based security architecture may be required to address the requirements for military force to be utilized effectively. Such a move will require a re-adjustment of understanding, commitment, and force readiness. Primarily though, it will require the creation of a willingness within the Trinity of the government, the military, and the people to potentially use military force to ensure another nation's water security; a readiness to use force in the name of humanity, rather than necessarily in the pursuit of clear national security objectives.

DISCLAIMER

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Preface

There has been a necessary pre-occupation with ideological threats in the period since the Second World War. Consequently there has been little open discussion of the potential requirement to use a military force that, rather than dealing with an ideological threat, addresses conflict within an environmental context, with no direct threat necessarily posed to the homeland. There is significant precedence of potential and actual conflict where water resources have been a factor, particularly in the Jordan and Nile River basins. Consideration of the example presented by the Nile River Basin highlights the potential for conflict in an area other than the more obvious Euphrates-Tigris or Jordan River Basins. When considered in conjunction with global water scarcity issues and wider energy resource constraints, which are of great significance to the developed world and increasingly the developing world, there is considerable potential for conflict throughout the world, over the diminishing critical resource, water.

These are actual factors with real impact that threaten the very survival of individuals and potentially states. This differs significantly from Samuel P. Huntington's popularized conceptual "Clash of Civilizations" based on culture, which ignores the more practical causes of conflict such as territory, poverty, population migration/growth, and resources. Fundamentally, all groups require access to resources to ensure survival, and in an age of diminishing resources no state or group will likely commit socio-economic or actual suicide where force remains an option.

Therefore, the requirement exists for the international community to consider the use of military intervention in support of the range of other ongoing activities to ensure water security, as a predominant threat to security in the global operating environment of the future. This may require action to prevent or intervene in inter or more likely intra-state conflict arising over or provoked by water scarcity. The questions that remain are whether the military has evolved to a point where it is able to lead this debate and whether western society is capable of taking the required conceptual step to consider and successfully undertake such action in a divergence from the conceptual ideological focus of the last decade's necessary conflicts?

I close this preface with full acknowledgement of the guidance and encouragement provided by Professor Matthew Flynn and Dr. Edward Erickson of the Command and Staff College Faculty. Both have provided vital assistance in developing my understanding of the significance of water within the operating environment, and in supporting my analysis of the implications for Western society in addressing the potential threats to be presented by water scarcity.

Introduction

In 1993 Samuel P. Huntington proposed a new post-Cold War, multi-polar, global context where distinctions between peoples would no longer be based upon ideology, economics, or politics, "but rather…their culture or civilization". Huntington considered that conflict was more likely to result from the differences between those major civilizations perceived to have emerged in the post-Cold War world, rather than other particular causal factors.[1] However, as NATO begins to withdraw from Afghanistan consideration of this conflict and its predecessors provide evidence of causal factors based upon ideology, the balance of power, and resource access, amongst other reasons, rather than civilization or culture especially. Whilst Huntington's theory provided a convenient concept by which to rationalize a number of the post-Cold War experiences, it has perhaps missed the fundamental point. There are other pre-existing, proven, and increasingly significant causal factors that will motivate individuals, groups, and even states towards conflict that are rooted in issues even more fundamental than perceptions of culture or civilization: environmental issues rooted in human security and survival. Some of these factors will become of critical relevance in the coming years, ahead of Huntington's "civilizations".[2]

Consider global resources, particularly water: already in crisis in certain regions; a factor within conflict past and present; and potentially an increasingly significant factor within intra-state conflict, failed states, and inter-state conflict of the future. This requires the government, the military, and the people (in the context of Carl von Clausewitz's concept of the Trinity and the "tendencies" of policy, probability, and passion that shape the conduct of war) to review the post-Cold War period, and particularly the last decade's pre-occupation with ideological threats, and consider the requirement and significant implications for water scarcity to become the basis for a future commitment of military force; as the mechanism through which to provide water

security across the global community into the future.[3] As to the associated significance of such a re-balance, this would reflect a great shift within the thinking, understanding, and relationship within the Trinity if it were possible to re-assess the threat, the use of the military, and the approach to conflict, especially if done so on a global basis.[4]

Ideological Conflict: The Legacy of Huntington's "Clash of Civilizations"

Whilst Huntington considered that power and wealth remained key elements determining national objectives, rather than ideology or economic-based systems it would be the "clash of civilizations" that would dominate global politics and conflict in the Post-Cold War period. In defining a number of civilizations he argued that their cultural basis would become the pre-eminent factor in their future interactions. In citing such examples as the support provided to the Bosnians by Libya, Saudi Arabia, Turkey, and Iran, and the re-unification of Germany, he argued that the unifying forces of cultural similarities would overcome ideology or "historical circumstance", bringing like cultures together. Whilst identifying this unifying force, however, he also identified natural "cultural fault lines" between the peoples of different civilizations.[5]

Based upon differences between history, language, culture, tradition, and religion, the cultural differences were considered more difficult to resolve than those of a more reconcilable political or economic nature. He also proposed that the increasing interactions resulting from globalization invigorated "differences and animosities", whilst social and economic developments weakened identities of both the individual and state. Predominantly based upon cultural and religious similarities the resultant unification could only lead to conflicting interests, beliefs, and activities between the founding civilizations thereby creating a destabilizing effect.[6]

Francis Fukuyama was one academic amongst a number who proposed an alternative theory for the post-Cold War paradigm, which he perceived to have "consecrated the victory of

liberalism" over communism, thereby presenting an unchallenged ideology for the future. The New York Times' Thomas Freidman focused on economic globalization in "The One Big Thing", whilst Robert Kaplan centered on population excess. Huntington's theory was a counter to these, presenting a less optimistic perspective than Fukuyama particularly, and one perhaps mirrored by world events in the years following publication. These years did not reflect the emergence of one relatively harmonious world, which Huntington considered "too divorced from reality to be a useful guide to the post-Cold War world".[7]

On reflection, it is understandable that Huntington's proposal gained such prominence in both academic analysis and popular discussion. The collapse of the Soviet Union changed the bi-polar paradigm through which the world sought to comprehend conflict, yet it was not clear what was to follow this period of chiefly ideological conflict. The academic world sought to explain and predict this altered environment; would it be a uni-polar world dominated by the USA, or a multi-polar paradigm with new, emergent centers of power and influence?[8]

The "clash of civilizations" concept provided a relatively straightforward context that fulfilled each of the *cognitive, practical,* and *aesthetic* schemas that Chiara Bottici and Benoît Challand argue people need to orient the world in which they live. Huntington conveniently enabled people to comprehend attacks such as 9/11, particularly given their associated symbolism, which acted as a credible catalyst for wide acceptance of Huntington's theory. Indeed, publication and acceptance of Huntington's theory peaked after 9/11, as people sought to rationalize a previously unimaginable terrorist attack that seemed to presage a new world.[9]

Huntington refers to a range of historical cases, including the 1956 Suez Crisis and 1990 Gulf War as particular examples of continued "conflict along the fault line" between the West and Islam. However, both more readily reflect military action taken to maintain the balance of

power, with strong economic undertones, rather than action taken for cultural or religious reasons. Whilst limited low-level clashes based on race, religion, or ethnicity issues will undoubtedly continue to occur and the requirement to combat terrorism will remain, are such clashes likely to be of the nature and at the level proposed by Huntington?[10]

The military action undertaken since the 9/11 attacks has been used in many quarters to validate Huntington's hypothesis, being described by some as a "clash of civilizations" between the West and Islam. However, this has not become a fully accepted view with a number of commentators having readily expressed doubt. Mohamed Sid-Ahmed described the theory as "shrouded in ambiguities", whilst Paul Wolfowitz, when US Deputy Secretary of Defense, described reality as "less a clash of civilizations…than a…misunderstanding between the Muslim and Western worlds" and much more optimistic than Huntington's prediction. Significantly, Al Qaeda's perceived desire to create a "clash of civilizations" has not been matched by a Western or Christian desire: a desire to eradicate terrorism, but not Islam. Equally, there has been no demonstration of a unified Muslim intent to enter into conflict against the West or Christianity.[11]

In fact, the post-9/11 military experience has essentially been one of ideological conflict in which the military has been required to fight for perceptions and imaginations: for peoples' *cognitive*, *practical*, and *aesthetic* schemas. Huntington argued that such ideological conflict would be replaced by a "clash of civilizations", but this has not been the case. Ideological conflict has remained, albeit in contesting an adversary that is no longer communism.[12]

Water: A Mainstream Issue?

Huntington's work has had wide reach and appeal, whilst the literature on environment and in turn water scarcity is not as developed or mainstream as it may have been, had there not been such an ideological distraction. Indeed the environment appeared to figure as merely a fringe

issue during the 2012 US Presidential campaign, perhaps demonstrating the limited reach of this issue in contrast to others in which there may be greater awareness, or national self-interest.

Even so, some important voices have sought to promote the topic. For example, in 1984 Thomas Naff and Ruth C. Matson considered the risk of conflict in the Middle East, noting that should water management be ineffective "several international conflicts over water may erupt in the region."[13] Thomas Homer-Dixon has engaged in a lengthy consideration of the relationship between environmental scarcity and security, commenting that environmental scarcity "will further inflame the competition between groups and societies," and that "policymakers will have less and less capacity to [prevent] serious social disruption, including conflict".[14] Arun P. Elhuance noted significant hurdles to cooperation and warned of the "potential dangers of escalating demands", but also reflected on encouraging signs for progress.[15] Elsewhere, Anne H. Ehrlich, Dr Peter Gleick, Ken Conca, and Aaron Wolf amongst others have debated hydro-politics, environmental and resource issues, and the history of (and potential for) conflict.[16]

As recently as March 2013, via his directorship of the Pacific Institute Dr Peter Gleick has continued to promote global understanding of the relationship between "water, climate, and security" with lectures at both King's College and the University of Cambridge in the UK, and a scheduled appearance at the 150th annual meeting of the US National Academy in Washington, DC in April 2013. The United Nations, meanwhile, has continued its decades of work to address water scarcity, with extensive discussion of the continuing threat of conflict over water.[17]

The remainder of this paper has therefore considered a range of academic assessments as cited above, whilst also analyzing a number of organizations' material, including UNESCO, the wider UN, World Health Organization, World Bank, and Nile Basin Initiative. Consideration has been given to other non-government organizations, such as the Pacific Institute, Global Water

Forum, and International Rivers; public commentary; and official publications and statements. The UN material consulted has been particularly significant, comprising the last decade's progressive work, from the International Year of Freshwater 2003 to the World Water Development Report 2012; this last document comprises some 800 pages of material concerning the water situation across the globe, and the work conducted in an effort to mitigate the lack of access to freshwater and associated water scarcity. However, this paper seeks to engage in an aspect of the debate not necessarily discussed in the wide variety of sources analyzed.[18]

Within the last three years both former Secretary of State Clinton and former Chairman of the Joint Chiefs of Staff Admiral Mullen publically commented on the potential threats presented to security by resource and water scarcity. The USMC Center for Emerging Threats and Opportunities (CETO) 2011 edition of Flashpoints considered water as a specific factor within analysis of the risk of conflict across 158 countries. Additionally, the U.S. Director of National Intelligence, the U.S. Quadrennial Defense Review Report, and the United Kingdom National Security Strategy have each publically commented on water scarcity and security. As such, water as a threat to security has recently begun to shift from being a long-standing academic (and technical and management) subject towards a position as a political and military consideration.[19]

Still, the debate remains skewed, and any suggestion that water scarcity is a key element in environmental factors shaping national security policy fails to make the main point as presented in this paper. This paper argues that such a focus requires a re-evaluation of the nature of warfare, in that national security threats will leave state borders a distant second in terms of the analysis needed to face a looming, global crisis that presents a fundamental threat to human security. As a result, from the western mind-set, Clausewitzian thinking of a relationship between the military, government, and populace comes under scrutiny since the military and

security services appear to be picking up the academic debate to currently lead within the domestic debate, perhaps dragging the civilian body with it. This presents a great divergence from the past: a reshaping of the Trinity or at least a military-led reconceptualization of this important interaction. In sum, what had been military license, and a possible threat to the state, is now its foremost defender in leading on a neglected issue, but one that can no longer be ignored.

Therefore, the primary issue is that a western, albeit necessary, pre-occupation with ideological conflict, and willingness to view Huntington's popularized theory of a "clash of civilizations" as a reality have risked over-looking greater, more fundamental challenges, which threaten stability and security, thereby introducing significant risk of potential conflict.[20] As such, resource and particularly water scarcity has only recently gained prominence in official considerations of developing threats, therefore almost certainly delaying appropriate analysis of the required responses to such threats, and the associated implications for western society.

The Fundamental Challenge

Current global demographic growth has been unequalled in human history, with population growing from under 3 billion in 1950 to an estimated 7 billion in 2012,with estimates of 8.5 billion by 2025, rising to 9 billion by 2050. Significantly, 95% of the growth has occurred in the developing world, accompanied by increased urbanization, industrialization, and globalization. Notably, approximately one quarter of the world's population currently lives in poverty. Despite notable reductions in overall poverty rates, the reduction can almost exclusively be attributed to China; the developing world demonstrates comparatively marginal reductions.[21]

Meanwhile, the developed and developing worlds have become increasingly resource dependent. The increasing demand has been "sharply evident in Asia and the Pacific Rim" reflecting the industrialization and economic growth rates in those regions; China has seen

significant growth, and an almost insatiable increase in appetite for resources. Global energy use has increased "some 20-fold" in the last century and is expected to rise by a further 50% by 2035, whilst evidence mounts of dwindling reserves with energy resources and water becoming increasingly scarce. Indeed, the world has never faced a comparable situation of "impenetrable limits [and] absolute deficiencies of land and energy."[22] The world is also experiencing increased agricultural constraints resulting from the expanding population and associated trends of urbanization and industrialization. Globally, population growth, dwindling land resources, energy requirements, environmental constraints, and water scarcity are impacting simultaneously and unlike ever before, without an existing spare capacity to exploit. Commentators increasingly refer to resource scarcity as a "precondition" for and likely source of future conflict.[23]

Scarcity, which can be defined as a diminishing resource and/or growing pressure on the supply available from an increase in demand, could arise from a depleted or degraded resource, which could result from population growth or greater per capita consumption, or through the unequal distribution of the resource.[24] These circumstances, which are increasingly evident across the range of global resource issues, impact upon each of the three key areas of individual, national, and international security. This is of particular significance, as any individual unable to provide for his needs will likely seek to address identified deficiencies through other means; where this is related to the resources required for basic human security this may result in displacement, but could also lead to an individual employing any means to ensure survival. Groups of people within a state, or a state itself could react in a similar manner where survival is actually or just perceived to be in question, particularly when required resources are available elsewhere, or when access to those resources is denied by another group or state.[25]

Water: a Finite Resource Approaching Crisis?

Water is a fundamental requirement for human life; without it there is no life. This is clearly of ultimate significance, but the complexity of a nation's relationship to water must also not be underestimated. Drinking, agriculture, food provision, industry, health, economic growth, waste disposal, sanitation, cooling, power, navigation, fire-fighting, flood control, recreation, national security, and an instrument of national power or influence: water intersects all aspects of a nation's social, economic, political, legal, and ecological structures, whilst remaining essential for human survival. The former Israeli Prime Minister Moshe Sharrett indicated water's significance to the Israeli nation when he asserted, "water is life itself".[26]

In theory there should be sufficient water available to sustain global life, but there are signs of shortage across the world. Of the total volume of water, of which the earth is not producing any more than already exists, approximately only 3% is fresh with 70% of this contained within ice or permanent snow, and nearly 30% held as groundwater, within shallow or deep basins, soil moisture, swamp water, or perma-frost. Just 0.26% is available in rivers and lakes, which constitute the bulk of the global supply, amounting to approximately 90,000 km^3. The hydrological cycle results in an estimated availability of just 43,000 km^3 of this fresh water, but this actually suggests an ample level of availability; a calculated average of 6498 m^3 per annum available for every person against a level of 1000 m^3 considered indicative of water scarcity, and 1700 m^3 indicative of water stress.[27] That said, distribution is uneven and when combined with population growth (and habitation patterns), industrialization, globalization, climate change, inefficient use, and wider resource issues, water scarcity is a reality for many and is becoming an increasingly important socio-political problem for both the individual and state.[28]

The Asia-Pacific is home to 60% of the global population, yet has only 36% of the world's water resources. North Americans use 2.5 times the water used in Europe, whilst the Intergovernmental Panel on Climate Change (IPCC) predicts that up to 44 million people will be suffering water stress in Central and Southern Europe by 2070. The majority of countries in the Near East and North Africa suffer from acute water scarcity, as do countries such as Mexico, Pakistan, South Africa, and large parts of Africa and India. The Global Water Forum has recently published papers on water pollution in Asia, the crisis concerning India's groundwater, water conflict in Costa Rica, and OECD calls for early and strategic action, whilst the UN continues to report on water resource concerns across the globe, providing an indication of the breadth of the issues and an increasing level of concern.[29]

One-fifth of the global population or 1.2 billion people are experiencing physical scarcity, with a further 500 million approaching that position. One quarter of the population or 1.6 billion people are experiencing economic water shortage, with a lack of infrastructure to extract water from rivers or aquifers. By 2025 it has been estimated that 1.8 billion people will be suffering absolute water scarcity, with two-thirds of the world's population suffering water stress. With the current rate of climate change, by 2030 it has been estimated that almost half the world's population will be located in areas of high water stress, with water scarcity in some arid and semi-arid places expected to displace up to 700 million people.[30]

Two hundred and sixty three watersheds cross the political boundaries of two or more countries, accounting for approximately 40% of the world's population, whilst 148 states include territory within international basins, of which 21 are entirely contained within an international basin. Approximately two billion people are reliant on groundwater supplies, including 273 trans-boundary aquifer systems. Yet despite 450 agreements on international waters being signed

between 1820 and 2007, still some 60% of the 276 international river basins have no water agreement framework on which to base the management of an increasingly finite resource.[31]

International efforts have sought to develop management of the situation, despite uncertainty in international water law. The UN Water Conference was held in 1977, the UN International Drinking Water Supply and Sanitation Decade was held between 1981-1990, the International Conference on Water and the Environment convened in 1992, and the period 2005-2015 is designated the UN International Decade for Action: Water for Life. Despite such prolonged efforts, the position for a significant proportion of the world's population remains serious, with uneven progress on global issues. The UN's Millennium Development Goals for water scarcity (Appendix 1) record undoubted progress, yet the UN acknowledges that the assessment of the proportion of the global population "using improved water sources is an overestimate of the actual number…using safe water supplies." The UN also acknowledges that Oceania and sub-Saharan Africa are not projected to meet the 2015 Millennium Development Goal, with 40% of the sub-Saharan population particularly without access to improved drinking water. Meanwhile, the UN Convention on the Law of the Non-navigational Uses of International Watercourses, adopted in 1997, took 27 years to develop and has still only been ratified by 24 countries. Despite significant progress in understanding water resource issues and considerable international efforts, progress is not keeping pace with the increasing problem, and the potential remains for water security to create instability, insecurity, and conflict.[32]

Improved access to water for the existing population does not necessarily improve the prospects for water availability to a much larger, increasingly urbanized, industrialized global population of the future. Water resources are finite, are not managed well, are unevenly distributed, and will inevitably come under increasing pressure. Therefore, it can be expected

that without an adequate water supply each of the individual, national, and international levels of security will be considerably affected, likely creating instability and insecurity; both are widely accepted as causal factors of conflict. In such a context, conflict would be environmental in nature, whilst also possibly having ideological, cultural, or civilizational characteristics, but such characteristics should not serve as a distraction from the environmental cause of the conflict.[33]

Whisky is for drinkin'; water is for fightin' – Mark Twain.

The UN World Water Development Report Number 4 details case studies across a wide range of regions with water management issues, demonstrating the global nature of the water scarcity problem. The report provides focus on the issues currently affecting regions of concern within the Chinese Yellow River Basin, Morocco, Korea, Australia, Pakistan, Czech Republic, France, Tiber River Basin in Italy, Mexico, Costa Rica, Florida in the USA, the Tagus River Basin in Portugal, the Mara River Basin affecting Kenya and Tanzania, and Ghana. Meanwhile, the 2011 Flashpoints analysis by the USMC Center for Emerging Threats and Opportunities (CETO) considered the threats posed to countries by water scarcity. CETO notably assessed that of the top 50 countries at risk of conflict due to water scarcity, 13 were within the Middle East, and 34 within Sub-Saharan Africa. The global nature of increasing water scarcity and the potential to create a destabilizing effect and insecurity should be evident.[34]

Whilst it is widely acknowledged that water "has rarely, if ever, been the sole source of violent conflict or war", contemporary examples of conflict over water do exist, with the UN having reported "37 acute disputes involving violence" concerning water resources within the last 50 years.[35] Meanwhile Dr Peter Gleick's chronology of water conflicts reports 41 violent development disputes between 2000-2010, and circa 30 other incidents where water was used as a political and/or military tool, or was a factor within a terrorist act. These incidents resulted in

fatalities numbering in the hundreds, whilst the period 2011-2013 already reflects 25 violent development disputes. In contrast, there are just six development disputes recorded in the preceding ten years, and just 12 in the preceding 45 years. Whilst there may be some allowance made for improved standards of reporting and data collection, the increased frequency of conflict over water appears evident.[36]

UNESCO former Director-General Klaus Toepfer has noted that "it is over water that the most bitter conflicts of the near future may be fought", and former Israeli Prime Minister Yitzhak Rabin stated that if water issues were not satisfactorily resolved "our region will explode." Arial Sharon cited conflict over tributaries of the Jordan River as a causal factor in the 1967 Arab-Israeli War, with air strikes launched against Syria when "Israel decided to act against the diversion of the Jordan." Sharon further stated, "while the border disputes between Syria and ourselves were of great significance, the matter of water diversion was a stark issue of life and death." More recently the then US Secretary of State Hillary Clinton stated that as "water becomes increasingly scarce, it may become a potential catalyst for conflict among, and within, countries," whilst as late as 2012 current UNESCO Director-General Irina Bokova stated that water "might tomorrow become a major source of conflict." Even so, as the Pacific Institute comments, elements of the international security community have effectively ignored the "complex and real relationships between water and security."[37]

Although the 1967 war is nearly forty years past, Jordan has since become one of the most water scarce nations. Increasing demand and a growing population have resulted in unsustainable consumption rates, with over-exploitation of groundwater resources that are extremely difficult to reconstitute. Jordan's water availability per person has reduced from $3600m^3$ in 1945 to just $145m^3$ in 2008, less than 15% of the $1000m^3$ level considered to define

water scarcity. The UN notes that Jordan has established a National Water Strategy containing appropriate priorities, but also that institutional change is required to achieve the much-needed progress; such change is likely to be much harder to achieve than simply designing a strategy. This strategy is of course national, although it recognizes Jordan's need for bi-lateral and multi-lateral cooperation with riparian neighbors. Nonetheless, it is calculated that even if the plan is effective Jordan will still have a water deficit of 457 million m^3 by 2022. The water scarcity issue for Jordan will have been reduced but not eradicated, and at a time when all other states reliant on the Jordan River will be experiencing similar water scarcity issues. The ability to reach multi-lateral, or even bi-lateral agreements meeting the requirements of all may be so difficult as to be near unachievable, particularly given the region's historical animosity and conflict.[38]

Israel will likely be chief amongst Jordan's riparian neighbors who will be pivotal within any regional plan or perhaps in its absence, regional conflict. There is wide acknowledgment that the majority of Israel's water security is provided via occupied territories secured through military action: the West Bank and the Golan Heights play key roles in providing water to Israel, but also in feeding the Jordan River, which is of great significance to Jordan. As de Villiers notes, "Israel controls the Golan Heights for its water as well as for reasons of military security", whilst he considers the Middle East as "the place where water wars are most probable."[39]

Elsewhere, Syria's 1975 actions in filling Lake Assad, resulting in a reduced flow of the Euphrates River, almost led to war with Iraq. The Euphrates was again at the center of a crisis in 1990 when Turkey blocked the flow in order to fill one of its own reservoirs. Dispute can also result from changes to land due to erosion and sedimentation as demonstrated by "the 1966 border war between China and the Soviet Union." More recently conflict over water privatization in Bolivia resulted in the internal deployment of the military on a limited scale,

action by the government in Botswana led to destruction of water sources to enforce the displacement of indigenous tribesmen, and internal local conflict continues to be reported in Kenya, resulting in multiple deaths as recently as December 2012. The UN has also reported on increased water conflict across the Asia-Pacific region, particularly over the past two decades, with conflicts within, rather than between, countries being more common; there have reportedly been over 120,000 water-related disputes in China alone during this period. In India, conflict management between states is reported, with direct conflict most likely at the local level. Overall, the allocation of increasingly scarce water resources has been cited by the UN as the principal cause of water conflicts, with the most significant issue being the ability to balance development against the different water uses and the economic, social, and environmental impacts; the competing interests encompass urban, industry, agriculture, and the ecosystems upon which livelihoods depend.[40] In short, the precedence exists for the use of military action to address water security issues between states, whilst there is increasing evidence of intra-state conflict as the issue of water scarcity becomes more severe and seemingly less manageable.

The Nile Basin – Cooperation or Conflict?[41]

Whilst water scarcity is evidently becoming a significant global issue, with historical cases of conflict, it is worth considering the specific issues in the Nile Basin, which presents a case that involves a river basin with great historical significance, multiple actors, and an initiative that has sought to develop the management of the available waters. In considering the issues, it is evident that the Nile Basin presents a complex case that, in addition to the more obvious Jordan or Euphrates-Tigris Basins, demonstrates a potential for conflict that would have African, Middle Eastern, and broader global implications; a regional resource issue of global significance.

Africa has suffered one-third of all water-related disasters, with 135 million people affected, 80% by drought. Africa is the second driest continent, but the most populous after Asia, and receives just 9% of the global renewable water resources. Some predictions place 22 countries at risk of water stress or water scarcity by 2025, with a current annual average of 4008 m^3 of water available per capita against the global average of 6498 m^3 (Figures 1 and 2). This of course is not distributed or utilized equally. Groundwater comprises just 15% of Africa's water, yet 75% of the population relies upon it, whilst "increases in access…are not keeping pace with population growth". In short, some areas of Africa face a perilous situation.[42]

The Nile Basin is occupied by eleven riparian states: Burundi, Democratic Republic of Congo, Egypt, Eritrea, Ethiopia, Kenya, Rwanda, Sudan, Tanzania, Uganda, and now South Sudan. Six of these states are amongst the poorest in the world, with annual per capita income of below $550, whilst the Basin region as a whole is characterized by poverty, instability, rapid population growth, environmental degradation, frequent natural disasters, and political turmoil.[43]

Whilst noting these particular causes of instability and potential insecurity, it is also important to recognize the dynamics amongst riparian states, particularly between upstream and downstream states. Within the Nile Basin, Egypt is the major downstream state, currently possessing the economic, political, and military strength to maintain dominance despite the upheaval of the 'Arab Spring', should Egypt wish to do so. However, Egypt is calculated to have a just 794 m^3 of total renewable water per person per year, with only 25 m^3 provided by internal resources; this is clearly below the 1000 m^3 water scarcity metric. Therefore, although the 1959 Nile River Agreement allocated Egypt the majority of the Nile waters, she remains very vulnerable to upstream states' actions, and particularly any on the part of Sudan or Ethiopia.[44]

Although there have been continued efforts in recent years to move beyond the outdated 1959 Nile Waters Agreement, which effectively allocated all available waters between Egypt and the Sudan, little true progress has been made. Whilst the 1959 Agreement made allowance for evaporation and seepage, none was made for water requirements of other riparian states, including those upstream that could become of major significance to Egypt. Control of the Nile and its headwaters is perceived as essential to Egypt's survival and wellbeing. Consequently, although the more moderate of the Middle Eastern nations in recent history, Egypt has proven as ready as any other to at least maintain her current position and to even use force to protect vital resources. Indeed, historical announcements of planned major water projects in other riparian states have provoked a threat of military retaliation. This has typically proven an effective tactic for Egypt, but the time has arrived where upstream states are not willing to acquiesce.[45]

A number of organizations have been established in order to address water scarcity in the region but have failed to deliver any practicable development or importantly lasting, acceptable change to the existing and inequitable agreement. The Nile Basin Initiative (NBI) was established in 1999 with a vision of "the equitable utilization" of water resources, endorsed by all riparian states. The upstream states have particularly wished for a more equitable arrangement than that provided by the 1959 agreement, but it has been acknowledged that the real goal has been to secure consensus "on the less controversial issues." Egypt has clearly demonstrated an unwillingness to give up the water upon which it is so reliant, whilst each of the other states concerned has a different perspective, differing needs to fulfill, and burgeoning external influences to balance with domestic requirements; nations such as India, Saudi Arabia, and China have all invested in African territory in order to sustain their own agricultural requirements.[46]

The latest efforts to address management of the Nile waters amongst the now eleven riparian states have not produced an agreement acceptable to all states, and are not encouraging. In fact, the efforts of 2010 again highlighted the fundamental challenges faced, including the willingness of riparian states to exploit political strengths and weaknesses, and the readiness to consolidate upon individual self-interests. As Carole Lamere has reported "relationships between NBI states deteriorated further…when Ethiopia, Rwanda, Uganda, Kenya, and Tanzania" reached a new agreement that notably included removal of Egypt's power to veto upstream projects; the downstream states of Egypt, Sudan, and South Sudan remain opposed to the new agreement.[47]

The 'Arab Spring' has introduced a further complicating factor and it remains unclear what position Egypt will take in future negotiations. However, in a further sign of likely friction for future development Burundi has reneged on a previous agreement with the now-deposed Hosni Mubarak and has joined with their fellow breakaway riparian states to sign the Nile Cooperative Framework Agreement. Burundi has likely calculated that the turmoil within Egypt has provided a moment of opportunity in which to act with minimal risk of retaliation; Burundi may not be the only state to take advantage of the contemporary situation with obvious risk of friction.[48]

Although marred by recent conflict, it is probable that relative political stability can be achieved within the region in the future. This would likely further promote pursuit of domestic agendas, and particularly increased agricultural and energy production. Such action will be necessary in order to respond to a continually increasing population, urbanization, and industrialization, all of which introduce water demands unequalled in the history of the region.[49]

Both Sudan and Ethiopia have maintained increased irrigation plans to support an expanding agricultural industry. Ethiopia has reportedly leased some 3.6 million hectares of land that will require irrigation, and since 2006 Sudan has reportedly leased 4.9 million hectares of

land. Such substantial increases are likely to impact on the quantity and quality of downstream water available to Egypt. Meanwhile, there are doubts, including within the United Nations Food and Agriculture Organization, that the basin actually produces enough renewable fresh water to satisfy the irrigation plans of both Ethiopia and Egypt, irrespective of Sudanese plans.[50]

Additionally, the Grand Renaissance Dam project undertaken by Ethiopia on the Blue Nile is designed to deliver an enormous enhancement to Ethiopian energy production capability, but with potentially severe consequences for downstream states. Described as an aggressive example of Ethiopian intent, Mohamed Nasr El Din Allam (Egypt's former Minister of Water) has also stated the project would result in "political, economic, and social instability" with the potential for an outcome that ranges from "bad to devastating." There are further early signs of the new Egyptian political leadership's concern over changes to their access to the Nile waters, whilst previous reactions indicate that Egypt would not be likely to acquiesce to an actual or perceived threat to their water security. The Ethiopian projects, in combination with a number of other Chinese-sponsored dam projects on Nile waters in Sudan, are undoubtedly causing concern within Egypt; the riparian states are now fulfilling previously unachievable development goals.[51]

The failure of the NBI to achieve a lasting solution on the major issue of water has been formerly described as likely to result in increased "mistrust and suspicion" that could be "a recipe for a conflict." However, the conflicting actions are understandable when one considers the relevance of water to the individual and to the state, the increasingly poor position in which a large number of states find themselves, the increasing complexity of the political dynamics, and the power imbalances that have prevented states from previously securing greater access to the Nile waters; an imbalance that these states are now seeking to redress. Equally, it is evident the issue has been complicated by the fact that the Nile Basin Agreement effectively viewed the Nile

as a single basin issue. The Agreement ignored the requirement to treat the Nile River as a dual basin issue, reflective of the different situations of the upstream states that provide the sources from which the White Nile and Blue Nile separately emanate. All the while, the water scarcity position is projected to get worse and unless an alternative approach is adopted, which is proving notably elusive, there is increasing risk of instability, insecurity, and potentially conflict.[52]

Historical example has demonstrated that Egypt would resist threats to her own water supply and thereby survival. Such action by other riparian states will become increasingly problematic, given the worsening water scarcity issues to be addressed. The fact that Egypt has previously threatened to use military force, coupled with increasing water scarcity across the region, indicates a potential for future inter-state conflict as the water scarcity problems become more extreme. However, whilst Egypt may in the future prove willing to engage in inter-state conflict to ensure water security, this would undoubtedly be with a view to the intra-state conflict that may arise amongst her own people if water resources are diminished. Other riparian states such as Ethiopia and Sudan, whose future actions could be critical to Egypt, are already in a more perilous situation when social, political, and military factors are considered, with a recent history of intra-state conflict that could be readily re-ignited or inflamed by water scarcity.[53]

An inability to take a position of strength against a dominant riparian state that results in water scarcity will likely create internal instability and insecurity, given the propensity for such water shortages to “lead to food shortages, increased poverty, and the spread of disease.” Homer-Dixon states such water shortages “make people poorer. They increase the migrations of peoples,” deteriorate living standards, and increase social unrest and violence, by definition leading to “water wars”. In short, internal turmoil is greatly exacerbated by water shortages, even

before a state or area may be officially water scarce, and the likelihood for conflict in areas of the world already marked by poverty, violence, and instability is likely to be increased markedly.[54]

Alternative results may also result from the dynamics amongst riparian states, as demonstrated by the recent agreement between six of the Nile's riparian states. Sudan, Ethiopia, or Eritrea could form an alliance on an economic and/or military basis in order to force and maintain an increase in their use of the Nile waters. Although creating a level of unity, this could risk a military response from Egypt and present considerable risk of inter-state destabilization within the region. Egypt and Sudan could form an alliance to block any move by other riparian states, particularly Ethiopia. Conversely, such action could be perceived as acting as a source of peace, rather than conflict, if it delivers water security (albeit perhaps not equitably across all parties) and actually prevent inter-state conflict. However, such action would likely be focused on maintaining or creating a balance of power that would probably result in a water security issue persisting in another area; there are likely to be destabilizing effects that are not mitigated by such actions. Alternatively, it could be possible to prevent a neighbor riparian state from gaining the strength to pursue increased claims over water through support of insurgent forces in that neighboring state. This would create certain conflict, leading to greater instability, population migration, and broader associated destabilization problems of food scarcity, disease, and criminality that would lead to yet greater potential for wider conflict.[55]

Clearly the 'Arab Spring' and other cases of political upheaval have had significant impact in the region, but the states affected could be expected to achieve political balance in time. Each state's circumstances will mature and as the position of individual states strengthens, so does the possibility of the riparian states securing an adjustment to the historical Nile Waters allocation, particularly if they strengthen at a rate greater than Egypt. If so, there could be lasting impact on

Egypt and it is difficult to imagine Egypt not responding forcefully. This could prove disastrous for the region in the immediate term, whilst putting at jeopardy any chance of achieving a meaningful management plan that addresses the water requirements of all the riparian states. The implication of this in simple human terms is clear; the risk of conflict is recognizable.[56]

The international community seemingly acknowledges this, if only in an implied sense rather than open discussion, hence efforts to identify ways and means by which to mitigate water scarcity. These efforts are focused on implementing technological solutions, management and efficiency measures, infrastructure development, capacity building actions, changes to demand, appropriate governance, and a range of other activities. But experience demonstrates that progress takes a considerable period of time, and may be unachievable in certain respects given the socio-political complexities and deficiencies. Consider the length of time the UN has been attempting to address water issues, the difficulties in agreeing change to a Nile waters treaty that was signed in 1959, and the continuing political differences that exist in key regions affected. Meanwhile, the population continues to develop a hugely increased requirement for water, food, energy, and industry that will expand to levels the world has never before been required to provide for, and with no greater quantity of water available than exists now.

The Implications Considered

The implications should be clear; water scarcity creates the conditions of insecurity and instability, and risks conflict. Whilst technological, scientific, and management strategies seek to address water scarcity, the progress is mixed. As such, the conditions for conflict are likely and in increasing breadth and depth as the global situation worsens, but especially in the developing regions of North Africa, sub-Saharan Africa, the Middle East, and the Asia-Pacific. The

increasing water scarcity problem has been recognized, but the full implications for defense, and the need for a change in perspective have yet to be fully acknowledged.

In his Small Wars Journal article, *Water Security Conflicts: A Regional Perspective,* Nelson E. Hernandez recognizes the ongoing technological and management options that can be pursued to address water shortages. He recommends inclusion of water scarcity within COCOM planning and consideration of an approach broader than just kinetic action. Of course, this aligns with the whole-of-government approach that is the norm for discussion and military education with regard the conduct of military operations in the round. However, he also notes the political, legal, and conceptual challenges in progressing to the required level to ensure water security.[57]

Former U.S. Secretary of State Clinton launched the U.S. Water Partnership, which seeks to mobilize public and private assets to address global water issues through the sharing of expertise, technology, and fostering of water management capacity; DoD representation is however merely informal and delivered via the U.S. Army Corps of Engineers. In April 2011, Admiral Mullen commented that "[S]carcity of water, food, and space could create…conditions that could lead to failed states, instability and potentially radicalization", potentially placing the U.S. at a strategic turning point in terms of military involvement. A DoD Whitepaper authored by Erik Fleischner offers insight into the relationship of the water scarcity issue to the U.S. National Security and National Military Strategies, matching Hernandez's call for incorporation of water security into DoD strategy and COCOM Theater Security programs. Despite this debate clearly demonstrating increasingly wide recognition of the problem, a common theme appears to be a focus on the 'soft' effects to either mitigate the potential for water scarcity, or to enable the delivery of water through humanitarian support provided via the military.[58]

The ability to incorporate capacity into planning structures or to build humanitarian

assistance capability is arguably the relatively simple aspect of the necessary evolution. Incorporating the "relevant scientific, engineering, economic, agricultural, and political disciplines" as appropriately recommended by Hernandez, is within the art of the possible. Indeed this would reflect the wider ongoing work discussed by former Secretary Clinton, and a whole-of-government and international approach is of course necessary to enable progress and readiness to provide such 'soft' effect humanitarian support. The difficulty lies in addressing the issues highlighted by Admiral Mullen; the resultant failed states and instability i.e. the conflict.

Conflict in which water scarcity is a causal factor could be either inter or intra-state, as previously highlighted. Whilst water scarcity has increasingly reflected in discussion of future conflict, such discussion appears more centered on concern for conflict scenarios where the resultant instability could pose a threat to the homeland. If this is the case, the current stance would reflect one that is, albeit with a significant element of necessity, fundamentally based on self-interested concern for the homeland's physical, psychological, economic, and energy security, amongst other elements. The public debate may reflect a western acceptance of the need for action to prevent a threat emanating to affect the homeland, but does not particularly reflect an acceptance of the need to provide for water security as the causal factor of that threat. Consider the US pivot towards the Asia-Pacific; whilst there are many foreign and domestic policy objectives that can be addressed by such a shift, the primary factor in this decision is likely to be a US preference for a forward-based defense against ideological, economic, and territorial threats and not an environmental threat within a region that is home to 60% of the world's population, but with access to approximately only third of the world's available freshwater.[59]

Both inter and intra-state conflicts are clearly not new concepts, yet the ability and readiness of western society to address both situations is questionable. The mechanisms exist to

mitigate the risk of inter-state conflict; the United Nations, the African Union, ASEAN and other international bodies should be capable of formulating a response to inter-state conflict scenarios, or to environmental concerns that create an humanitarian threat across a region. International norms exist for such scenarios and it is not unforeseeable that the international community could respond appropriately, if conceptually and physically prepared, to a situation that when centered on water security and therefore human survival would appear morally necessary. However, the international community does not yet indicate a conceptual readiness to respond with force to such a scenario; the conceptual step has not yet been taken.

The ability to intervene in intra-state conflict appears even less promising. International and especially western responses to crises in the former Yugoslavia, Libya, Syria, Egypt, and Mali have been mixed, ranging from forceful in some, to mute in others. The successful military action under Operation ODYSSEY DAWN was a contributory factor in the over-throw of the former leadership in Libya, yet such a response has not been reflected in Syria. Meanwhile, the international intervention in Mali to counter an Islamist threat reflects a continued ideological focus. Of course, the democratic concept of self-determination is naturally uppermost in discussions regarding responses to intra-state conflict, yet recent history indicates that western society is perhaps mixed in its beliefs on how self-determination should be achieved. This paper does not seek to engage in this debate, but simply uses the example to highlight a mixed conceptual and moral approach to intra-state conflict, and a continuing readiness to focus upon ideological threats and even old vengeances, whilst maintaining a minimalist approach to foreign policy. In short, recent examples indicate a lack of conceptual and moral readiness to intervene in intra-state conflict on a consistent basis, and a continued focus on ideological threats. Yet, an evolved approach to focus on environmental threats could move thinking beyond the state versus

state, or nation versus nation paradigm. This could lead to a new state of warfare that is less violent because it is not necessarily state on state, or focused on destruction of military capability per se, particularly if a pre-emptive approach is taken by western states with the powers to focus on mitigating environmental factors, and particularly on ensuring water security for others.

A need to address a direct threat to the homeland or its citizens overseas is relatively straightforward to conceptualize for all elements of the Trinity.[60] However, intervention with force as an humanitarian act, to ensure one nation's water security in advance of potential or in response to actual inter-state conflict, or to interject in the same manner with regards intra-state conflict, is a step which western society is arguably not yet conceptually or morally prepared to take. If the West is unable to reconcile itself to the use of military force to support self-determination, the bedrock of the democratic basis of western society, it is similarly unlikely to be able to reconcile itself to intervention (to prevent or halt intra-state conflict) as a necessary precursor to the primary requirement to ensure water security on an equitable basis.

Nonetheless, the West possesses the capacity to do just that and there is potential for this fundamental threat to actually force agreement, force peace, and mitigate the violence within conflict. However, this requires the international community to approach water scarcity appropriately, avoiding the political, ideological, and self-interested positions that have led to human conflict placing itself above the more basic environmental threats, as it seeks to remove the state on state approach to conflict that is arguably more violent, with increased destruction.

A Conceptual Shift: The Global Trinity

The conflicts of recent years have arguably become an ideological obsession for some, whilst perhaps fuelled as more than this as demonstrated by the ready acceptance of Huntington's civilizational theory. Whilst these conflicts have been virtually all encompassing for the military

forces involved, from the Cold War through to the post-9/11 operations, the responses have demonstrated a readiness to view the military as the appropriate primary response to crises. However, future military operations require a broader re-adjustment of perspective, preparedness, and willingness. Clausewitz's Trinity of the government, the military, and the people encompassing policy, probability, and passion will need to experience a conceptual re-balance.[61]

This re-balance is not possible until the ideological lens through which threats and conflicts are viewed has been adjusted. Of course, ideological threats remain and these will require a military response as part of the overall action to marginalize and neutralize such threats. However, an environmental threat to security will increasingly become established, particularly due to the destabilizing influence of water scarcity. Already, Western militaries are considering the relevance of desertification and water scarcity, whilst internationally it is evidently a concern. However, the threat will become greater in its severity, with a fundamental significance beyond ideology, culture, or civilization. As such, government, the military, and the people must evolve to view threats and this development via an environmental lens.[62]

Admiral Mullen's comments clearly reflect recognition of the consequent effects of water security; effects that experience indicates would require military action. However, it is not enough for the military alone to engage in an internal debate on the potential for intervention over water scarcity, nor to confine themselves to the requirement to enhance military planning and ground force capabilities to address water resource issues. The debate must seek to shift the broad understanding of the military, but also that of the government, and the people to not just recognize the severity of the issue, but to accept that military intervention will be necessary in the future in order to provide water security, and therefore the fundamental human security that

should be the right of all people. The focus on ideology must now recede to better gauge and respond to the environmental reality presented by water scarcity.

Consequently, in considering this requirement an analysis of the dynamics within the alignments and balances between states identifies that numerous reasons exist for constructing security architectures that govern responses to a range of scenarios on the international stage i.e. the "collection of organizations, mechanisms, and relationships through which…conflict, conflict prevention, and peacebuilding" are managed. The particular reasons then define the character of the design strategy adopted to provide the security architecture, which is currently accepted to be either interest-based, institution-based, or community-based.[63]

Security architectures can provide for greater interaction and management of shared interests, however, their effectiveness varies. There is evidence of internal divisions, a lack of common values, and inflexibility, whilst many reportedly lack adequate institutions, procedures, and capacity whilst serving to legitimize the policies of member states or to lock out/in selected states during negotiations. Meanwhile, the multitude of security organizations and the competing interests have yet to be truly tested by a significant and enduring environmental existential threat; the time for such a test may be approaching. In an environment of increased water scarcity for a particular state, which appears solvable only by compromising the water security of another state, will the multitude of security architectures actually present a host of environmental (rather than cultural) fault-lines? With water potentially presenting such a critical element within the future security environment, the traditional security architectures may actually be inadequate.[64]

Perhaps the time is approaching where a fourth international relations' dimension will be required: a design strategy delivering bespoke environment-based security architectures with a particular focus on water security. Water management agreements clearly exist already, but the

fractures presenting within such agreements indicate the potential for environmental fault-lines that could require a military aspect within any solution. The requirement for western governments and militaries to commit to environment-based security architectures, in support of water management agreements, may indeed become a necessary requirement.[65]

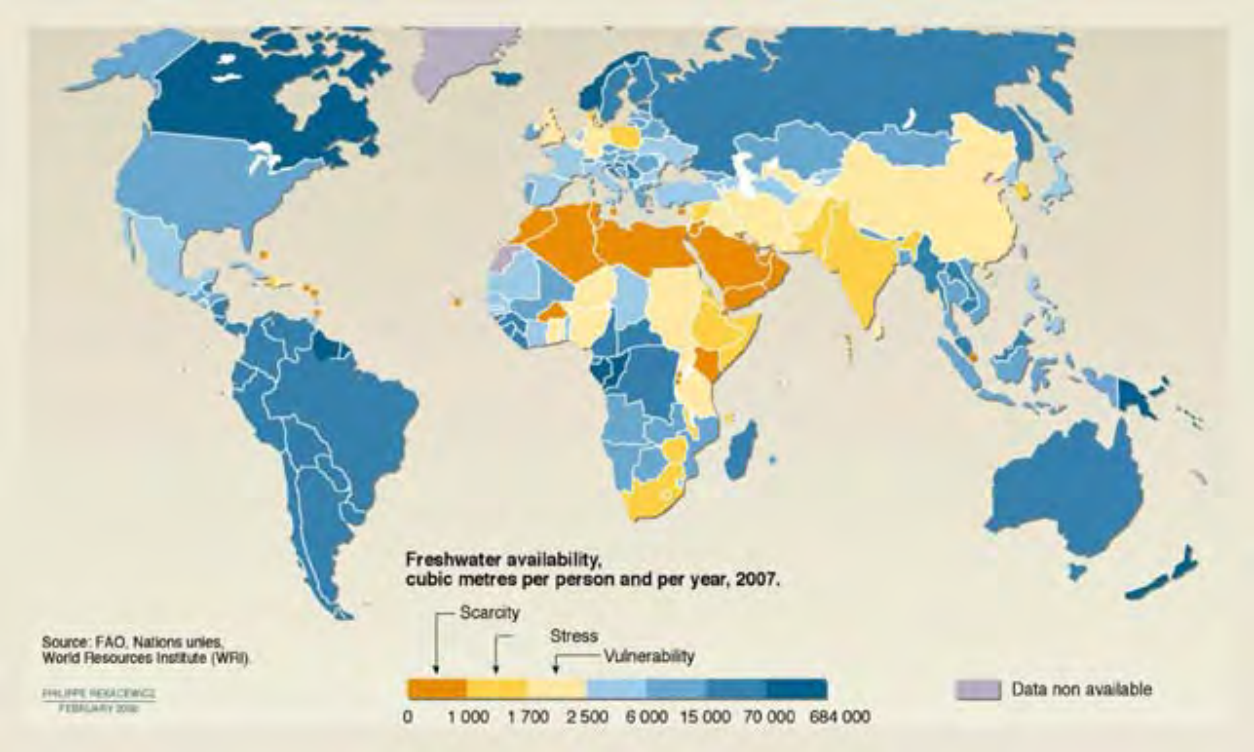
Importantly, an approach of this nature would not be a new form of imperialism, rather a reflection of the Western ability to intervene beyond domestic borders in an act for the global good. This concept can be envisioned when considering the Nile Basin where future intervention could retain water within that area, support equitable distribution, but prevent a dislocation of such proportions that global ramifications would likely result from the destabilizing effects; similar consideration can be applied to other at-threat river basins around the world. Such debate with a military-led drive for wider acceptance of a requirement to use military kinetic capabilities would be significant. Representative states have historically shown their concern, even fear of the military threat posed to that representation; the military's subordinate position within the modern western Trinity is the result. The increasing debate within the military, and particularly one that encompasses a future requirement for military intervention to ensure water security for others, when few western populations would likely accept such a requirement, would perhaps demonstrate an evolution of military thinking in advance of that of the civilian body.

In considering such a concept, is it possible to conclude that the military in western society has evolved to a point where it does not simply respond to governmental direction, but can actually draw the body politic, both government and the people, to where it actually ought to be? If so, perhaps it is possible for the military to actually lead the body politic to set aside ideology, political self-interest, and perhaps national interest to address a more fundamental issue pivotal to securing and maintaining the basis for human survival. The opportunity for the military to do so

rests on the basis that historic fears of civil liberties being violated by an over-powerful military are actually unfounded in the modern western, democratic state. If so, western society will have achieved the true balance between the elements of the Trinity, unlike ever before.[66]

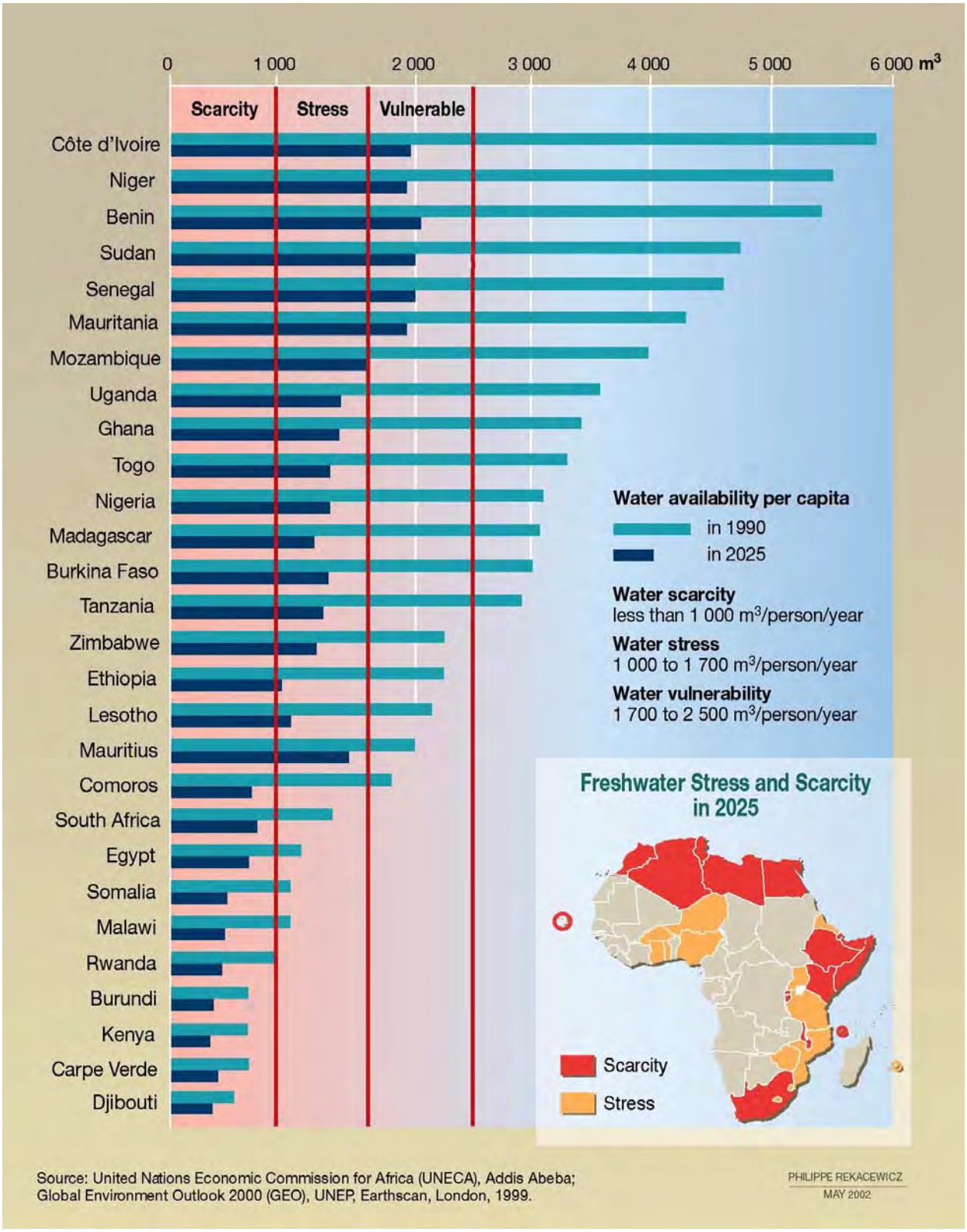
Such a concept may be unthinkable to many. A newly evolved balance within the Trinity, with the military taking primacy on an issue; the military shifting beyond being a respondent to policy, but actually advancing democratic values and relationships. Western societies have necessarily been engaged in ideological conflict since World War Two, whilst the contemporary ideological conflicts of the last decade have been of great importance. Yet, development of the military debate could result in the civilian body recognizing a priority that consequently reduces the focus on ideology, self-interest, and even civilian excess whilst still maintaining as the military's primary responsibility, the assured defense of that civilian body. This would be a profound development of the relationship within the Trinity and in the conceptual approach to the western way of war, perhaps enabling the use of force in a way that is appropriate to countering a primary threat of the future within an environment-based security architecture, and to ensuring delivery of water security for the greater global good. In short, water scarcity needs to be considered as a future threat for civilizations, with a Global Trinity developing the required conceptual approach to ensure all available levers of power are prepared and able to act.

Figure 1 - Global Freshwater Availability (m^3 Per person Per Year)



Source: World Resources SimCenter, '*Global Freshwater Availability Per Capita 2007*', http://www.wrsc.org/attach_image/global-freshwater-availability-capita-2007

Figure 2 - African Continent Water Availability



Source: International Water Law Project Blog, 'The Future of Africa's Water Security', May 27, 2012, http://www.internationalwaterlaw.org/blog/2012/05/27/the-future-of-africas-water-security/.

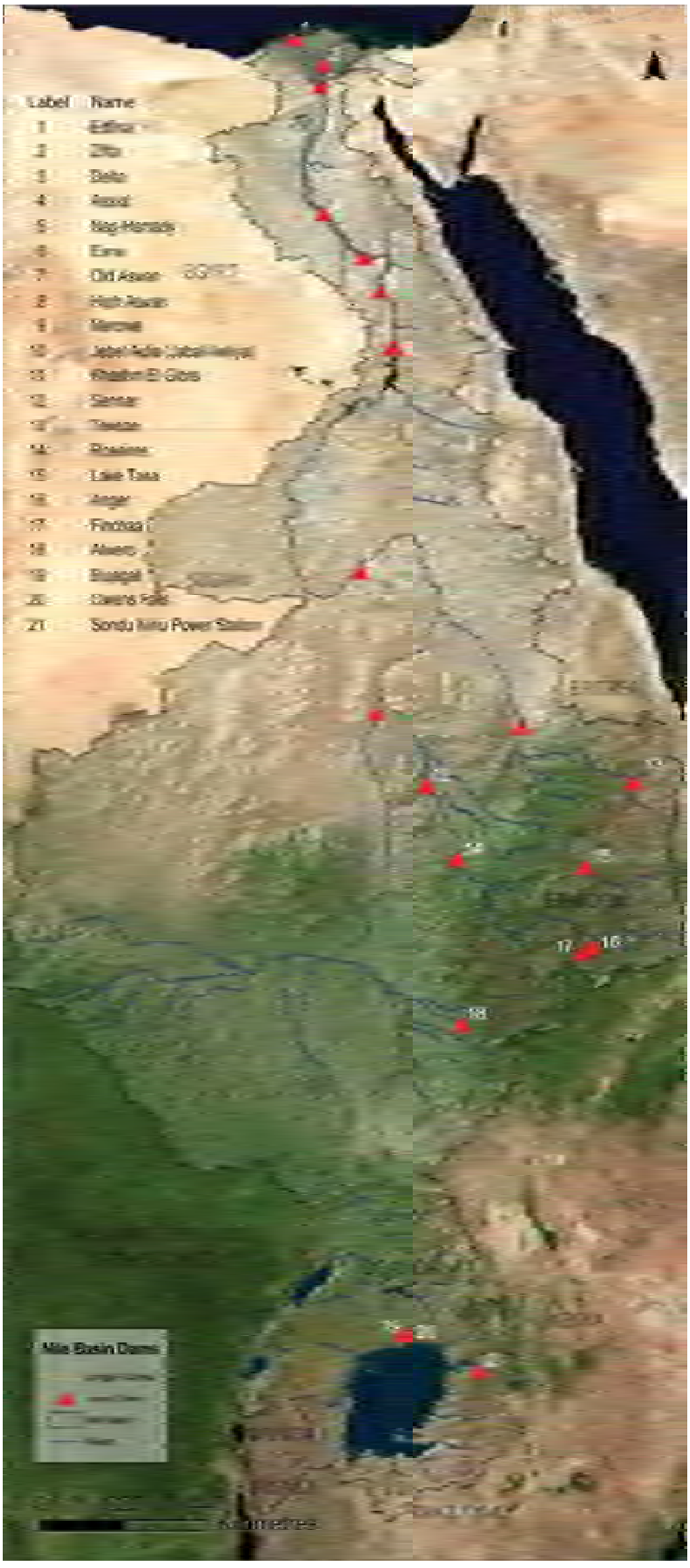
Figure 3 - The Nile River Basin

Source: World Bank Resources http://siteresources.worldbank.org/INTAFRNILEBASINI/About%20Us/ 21082459/Nile_River_Basin.htm

Figure 4 - The Nile River Basin Agricultural Development

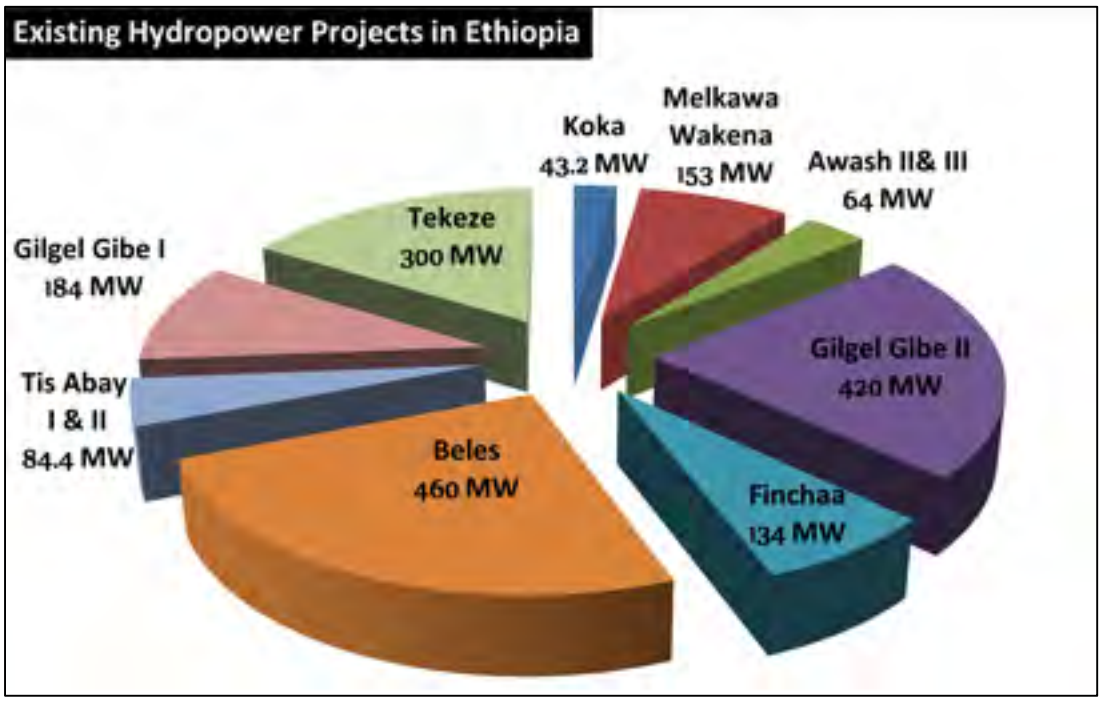
Source: GRAIN, 'Squeezing Africa Dry: Behind Every Land Grab is a Water Grab', Online, 11 June 2012 at http://www.grain.org/article/entries/4516-squeezing-africa-dry-behind-every-land-grab-is-a-water-grab

Figure 5 -Nile Basin Dams



Source: UN Environment Program, *Africa Water Atlas* (Nairobi, Kenya: United Nations, 2010).

Figure 6 -Existing Hydropower Projects in Ethiopia



Source: Tesfalem Waldyes, "Project X; Turning the Energy Tide", *Addis Fortune, 11, 562* (Addis Ababa, Ethiopia, February 6, 2011).

Appendix 1 - Nile Basin Countries Comparative Rates of Population Growth (Annual %)

Serial	Country	2003	2004	2005	2006	2007	2008	2009	2010	2011	Average
1.	Egypt	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.7	1.7	**1.8**
2.	Ethiopia	2.5	2.4	2.4	2.3	2.2	2.2	2.2	2.1	2.1	**2.3**
3.	Sudan	2.3	2.3	2.4	2.5	2.5	2.5	2.5	1.9	2.1	**2.3**
4.	Rwanda	1.8	1.7	2.1	2.6	2.8	3.0	3.0	3.0	3.0	**2.6**
5.	Kenya	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.6	2.7	**2.6**
6.	Burundi	2.7	2.9	3.0	3.0	3.1	3.0	2.8	2.6	2.3	**2.8**
7.	DR Congo	3.0	3.0	2.9	2.9	2.8	2.8	2.7	2.7	2.7	**2.8**
8.	Tanzania	2.6	2.7	2.7	2.8	2.8	2.9	2.9	3.0	3.0	**2.8**
9.	Uganda	3.2	3.2	3.3	3.2	3.2	3.2	3.2	3.2	3.2	**3.2**
10.	Eritrea	4.2	4.1	3.8	3.5	3.2	3.1	3.0	3.0	3.0	**3.4**
11.	Serials 2-10 Combined Average										**2.7**
12.	World	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	**1.2**
13.	World Urban Growth	2.3	2.2	2.2	2.2	2.2	2.2	2.1	2.1	2.1	**2.2**

Note:

1. Separate data for South Sudan was not available at the time of compilation.

Source: World Databank, *Population Growth (Annual %)* (The World Bank, 2012) online at http://search.worldbank.org/data?qterm=population&language=EN

Appendix 2 – Millennium Development Goals

1. The United Nations has established Millennium Development Goals (MDG) for water scarcity, which are defined as follows:

a. **MDG 1**: Access to water for domestic and productive uses (agriculture, industry, and other economic activities) has a direct impact on poverty and food security.

b. **MDG 2**: Incidence of catastrophic but often recurrent events, such as droughts, interrupts educational attainment.

c. **MDG 3**: Access to water, in particular in conditions of scarce resources, has important gender related implications, which affects the social and economic capital of women in terms of leadership, earnings and networking opportunities.

d. **MDGs 4 and 5**: Equitable, reliable water resources management programs reduce poor people's vulnerability to shocks, which in turn gives them more secure and fruitful livelihoods to draw upon in caring for their children.

e. **MDG 6**: Access to water, and improved water and wastewater management in human settlements, reduce transmission risks of mosquito-borne illnesses, such as malaria and dengue fever.

f. **MDG 7**: Adequate treatment of wastewater contributes to less pressure on freshwater resources, helping to protect human and environmental health.

g. **MDG 8**: Water scarcity increasingly calls for strengthened international cooperation in the fields of technologies for enhanced water productivity, financing opportunities, and an improved environment to share the benefits of scarce water management.

2. The Millennium Development Goals Report for 2012 contains the following assessments:

a. The world has met the MDG drinking water target five years ahead of schedule.

b. In 2010, 89 per cent of the world’s population was using improved drinking water sources, up from 76 per cent in 1990. If current trends continue, 92 per cent of the global population will be covered by 2015.

c. The number of people using improved drinking water sources reached 6.1 billion in 2010, up by over 2 billion since 1990.

d. China and India alone recorded almost half of global progress, with increases of 457 million and 522 million, respectively.

e. 11 per cent of the global population (783 million people) remains without access to an improved source of drinking water and, at the current pace, 605 million people will still lack coverage in 2015.

f. In four of nine developing regions, 90 per cent or more of the population now uses an improved drinking water source. In contrast, coverage remains very low in Oceania and sub-Saharan Africa, neither of which is on track to meet the MDG drinking water target by 2015. Over 40 per cent of all people without improved drinking water live in sub-Saharan Africa.

g. Since it is not yet possible to measure water quality globally, dimensions of safety, reliability and sustainability are not reflected in the proxy indicator used to track progress towards the MDG target. As a result, it is likely that the number of people using improved water sources is an overestimate of the actual number of people using safe water supplies.

h. Coverage with improved drinking water sources for rural populations is still lagging. In 2010, 96 per cent of the urban population used an improved drinking water source, compared with 81 per cent of the rural population. In absolute terms, because of population growth, the number of people without an improved source in urban areas actually increased. In rural areas, on the other hand, the number of people without an improved source of water decreased, from 1.1 billion in 1990 to 653 million in 2010. However, the gap between urban and rural areas still remains wide, with the number of people in rural areas without an improved water source five times greater than in urban areas.

Source: United Nations, *Millennium Development Goals Report 2012* (New York, NY: United Nations Online, 2012) at http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2012/English2012.pdf.

Appendix 3 - Nile River Basin: Synopsis of Issues

1. **Key Challenges**. The Nile Basin region suffers with a number of key challenges including floods, drought, climate change, receding lake levels, and degradation of resources. Meanwhile there is the complication of historical relations, opposition to in-force and planned agreements, and the additional pressure of increasing natural and man-related issues.

2. **Increased Pressures**. The following factors are expected to increase water demands:

    a. **Demographic pressures**. The population is anticipated to grow to 600 million in approximately 30 years.

    b. **Food Security**. The Nile Basin is a net importer of food, which is related to a certain extent to the poor irrigation levels in some countries.

    c. **Power deficit**. Whilst electricity consumption is very low, significant parts of the rural areas experience a power deficit.

3. **Constraints**. The following supply constraints are expected to worsen:

    a. Large-scale evaporations and evapo-transpiration.

    b. Climate change, with erratic precipitation and frequent drought.

    c. Technical, economic, and conveyance losses.

    d. Reducing water quality, resulting from pollution, and unsuitable waste management.

    e. Land erosion.

    f. Deterioration of the equatorial lakes.

4. **Political Challenges**. Riparian countries are facing an increasing need for water to increase irrigation and electricity production, combat drought, meet food security, and to manage increased urbanization. Meanwhile, lower riparian countries e.g. Egypt and Sudan, seek to protect their existing allocations, whilst the upstream riparian states want to utilize water within their territory without the constraints of existing (old) agreements. This has particularly prevented progress on Article 14(b) of the Cooperative Framework Agreement (CFA): how to address the issue of harm to riparian countries. Those countries that have signed the CFA are keen to operate within the Nile Basin Commission, as a successor to the Nile Basin Initiative, whilst those that have not signed "question the jurisdiction of the Commission". These fundamental differences present significant challenges to both institutional arrangements i.e. management systems and to the future utilization of the Nile waters.

Source: Strategic Foresight Group/Swiss Agency for Development and Cooperation, *Blue Peace for the Nile*, (Zurich, Switzerland: Schweizerische Eidgenossenschaft, 2012).

Appendix 4 - Synopsis of International Water Law

1. The 1966 Helsinki Rules on the Uses of the Waters of International Rivers, often referred to as the Helsinki Rules, provided the modern basis for international water law. The Rules provided guidelines on the "reasonable and equitable" use of a common waterway, described by Article IV as each state's entitlement "within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin." Thus the Rules introduced the concept of a "drainage basin", whilst also incorporating the right to "beneficial water".

2. The Helsinki Rules considered the "reasonable and equitable" use of water to be based upon 11 factors to be addressed as a whole, rather than in any form of hierarchical structure. The result has been that states have been provided with the scope to promote their own national interests, with each able to find just cause within these factors to protect its own particular concerns ahead of those of other, perhaps competing states. There were naturally different perspectives to be addressed by those states especially reliant on water external to their own territory, and those with concern for their sovereignty over water within their borders. Such positions hampered further work to codify the law for the use of water (for other than navigational purposes). As a result, it took the International Law Commission 21 years to draft articles for the United Nations, which have since formed the Convention on the Law of the Non-navigational uses of International Watercourses (Watercourse Convention). The UN General Assembly adopted the Watercourse Convention in 1997, but it has since been ratified by only a minority of states; currently below the 35 required for the convention to become effective.

3. The Watercourse Convention remains somewhat vague in the terminology used, whilst calling for communication, cooperation, data sharing, protection of ecosystems, and an obligation to not cause "significant harm", amongst other measures. The issue of "significant harm" continues to cause particular concern to riparian states, especially those upstream and is reflected in the ongoing difficulties in progressing the agreement of the utilization of Nile River waters. Historically, claims for water rights have been based upon either hydrography or chronology dependent on individual perspectives of riparian states. A hydrological position is based upon the origins of a river or aquifer and how much it falls within a certain state, whilst a chronological position is simply based on a principle of who has been using the water the longest. Naturally, a state is inclined to adopt the stance that best supports its own interests, which is likely to place a state in a conflicting position to another competing for the same water resources.

4. Whilst the laws for the management of transboundary waters provides for a position fro which to argue, the practical application of those laws has been more complex. The laws provide for a "balancing test" to promote resolution of legal disputes, but this concept requires a third party arbitrator in the form of a court or other empowered individual/organization to achieve such resolution. Where no such organization exists balancing tests are unlikely to be effective, and whilst use of the International Court of Justice (ICJ) may be generally considered as the mechanism through which to address legal water issues, the ICJ can only do so with the consent of all the concerned parties with no practical enforcement powers available to ensure resolution.

Source: Frederick Lorenz and Edward J. Erickson, *Strategic Water, Iraq, Water and Security in the Euphrates Basin* (Quantico: MCU Press, 2012), Chapter 6.

Appendix 5 - Selected Glossary

Abstraction. The process of taking water from a source, either temporarily or permanently.

Adaptation. Any alteration in the structure, function or behavior of an organism, an institution or a society as its external environment changes so that it becomes better able to survive, multiply and achieve its goals, as applicable, in its changing environment.

Adaptive decision-making. Approaches and techniques for addressing problems over time in response to changing conditions.

Agriculture. Activities related to the growing and production of animals and crops that can take place either given the natural rainfall patterns (rainfed agriculture) or with the application of additional water (irrigation), often from surface or groundwater sources.

Aquifer. A water body occupying pore space in the Earth or rock formations under the surface of the Earth. Fossil aquifers take thousands of years to build – and rebuild (or recharge).

Arid region. Characterized by a severe lack of available water, to the extent of hindering or even preventing the growth and development of plant and animal life. There is no universal agreement on the precise boundaries between classes such as 'hyper-arid' or 'semi-arid'.

Capacity. The ability to perform and accomplish particular tasks. Capacity-building and capacity development usually refers to educational programs designed to give individual the knowledge and skills needed to perform given tasks.

Climate change. Climate change refers to any significant change in measures of climate (such as temperature, precipitation or wind) lasting for an extended period (decades or longer). Climate change can result from natural processes or human activities. Mitigation refers to measures that reduce any adverse impacts from climate change. Adaptation refers to measures that are taken to better manage systems as they change due to a changing climate. Forcing is a process that alters the energy balance of the climate system; that is, changes the relative balance between incoming solar radiation and outgoing infrared radiation from Earth.

Delta. A landform that is formed at the mouth of a river where that river flows into an ocean, sea, estuary, lake, reservoir, flat arid area or another river, from the deposition of the sediment carried by the river as the flow leaves the mouth.

Desalination. Removal of salt and other impurities from sea or brackish surface or groundwater.

Desertification. Land degradation in arid, semi-arid and dry sub-humid areas resulting from various factors, including climatic variations and human activities.

Drought. The naturally occurring phenomenon that exists when precipitation has been significantly below normal re- corded levels, causing serious hydrological imbalances that adversely affects land resource production systems.

Ecosystem. A dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Ecosystem/environmental infrastructure. Infrastructure that provides ecosystem services such as water purification, flood control, recreation and climate stabilization.

Ecosystem services (and goods and functions). Any aspect of ecosystem structure and function that has an economic, social or cultural value, known or unknown, to its inhabitants.

Ecosystem tipping point. A threshold at which a relatively small change causes a rapid change in an ecosystem. When the threshold has been passed, the ecosystem may no longer be able to return to its previous state.

Energy. Primary energy is an energy source found in nature that has not been subjected to any conversion or trans- formation process. It can be renewable or non-renewable. Secondary energy is derived from primary energy sources; for example, electricity, transformed from such primary sources as coal, oil, natural gas and wind.

Evapotranspiration. Water released to the atmosphere through evaporation from the ground, from water surfaces, and from the leaf surface of plants (transpiration).

Extraction. The process of locating, acquiring, removing and selling any resource.

Freshwater. Water containing less than 1,000 milligrams per liter of dissolved solids, most often salt. It naturally occurs on the Earth's surface in ice sheets, ice caps, glaciers, bogs, ponds, lakes, rivers and streams, and underground as groundwater in aquifers and underground streams. This term specifically excludes seawater and brackish water although it does include mineral rich waters such as chalybeate springs.

Glacier. A large persistent body of ice that forms where the accumulation of snow exceeds its ablation (melting and sublimation) over many years, often centuries. Glacial ice is the largest reservoir of freshwater on Earth.

Global warming. The rising average temperature of Earth's atmosphere and oceans and its projected continuation.

Globalization. The increasingly global relationships of culture, people and economic activity.

Green water. The precipitation on land that does not run off or recharge the groundwater but is stored in the soil or temporarily stays on top of the soil or vegetation. Eventually, this part of precipitation evaporates or transpires through plants. Green water can be made productive for crop growth (but not all green water can be taken up by crops, because there will always be evaporation from the soil and because not all periods of the year or areas are suitable for crop growth).

Greenhouse gas (GHG). A gas in an atmosphere that absorbs and emits radiation within the thermal infrared range. The primary GHGs in the Earth's atmosphere are water vapor, carbon dioxide, methane, nitrous oxide, and ozone.

Grey water. Polluted water that results from non-sanitary uses of water (e.g. dishwashing, showers).

Gross Domestic Product (GDP). The market value of all final goods and services produced within a country in a given period. GDP per capita is often considered an indicator of a country's standard of living. It is not to be confused with Gross National Product (GNP), which allocates production based on ownership.

Groundwater. Aquifer storage changes depending on the water withdrawn (abstracted) and added (recharge) over time. Aquifer storage can act as a buffer, permitting withdrawals during periods of low recharge, as long as the deficit is reduced during periods of relatively high recharge.

Human well-being. A state of health, happiness and prosperity; of being with others, where human needs are met, where one can act meaningfully to pursue one's goals, and where one enjoys a satisfactory quality of life.

Hydrological cycle = hydrologic cycle = H O cycle = water 2 cycle. The circulatory flux of water at or near the Earth's surface.

Integrated Water Resources Management (IWRM). A systematic process for the sustainable development, allocation and monitoring of water resource use in the context of social, economic and environmental objectives.

Irrigation. The science of artificial application of water to the land or soil. In surface irrigation systems, water moves over the land by simple gravity flow in order infiltrate into the soil. In drip irrigation, the water is placed drop by drop near the root zone of the plants. Ground and rainfed sources obtain their water from groundwater and rainfall respectively.

Large-scale land acquisition. Gaining of tenure rights to large areas of land through purchase, lease, concession or other means.

Millennium Development Goal (MDG). Goals that aim to improve human well-being by reducing poverty, hunger, child and maternal mortality, ensuring education for all, controlling and managing diseases, tackling gender disparity, ensuring sustainable development, and pursuing global partnerships.

Peak ecological water. The point beyond which the total costs of ecological disruptions and damages exceed the total value provided by human use of that water.

Peak renewable water. A term applied where flow constraints limit total water availability over time.

Pollutant/pollution. Contaminants in a natural environment that cause instability, disorder, harm or discomfort to the ecosystem or reduce the value of environmental media for other uses. Point source pollution is a single identifiable localized source of pollution. Non-point source pollution comes from many diffuse sources – by airborne deposition as well as from rainfall or snowmelt moving over and through the ground. Diffuse source pollution has no specific point of discharge.

Potable/non-potable water. Potable water is suitable for human consumption; non-potable water is not.

Recharge. Groundwater recharge is a hydrological process where water moves to groundwater. Surface water recharge is a hydrological process where water runs off to surface watercourses.

Retention capacity. The capacity to store and hold water, such as in soil.

Rights-based approach. Use of human rights as a frame- work to guide the development process.

Runoff. Surface flow from land areas during and after a storm or precipitation event.

Saltwater intrusion. The infiltration or flow of saltwater into fresh surface or groundwater bodies.

Sanitation. The provision of infrastructure, facilities and services for the safe disposal of human urine and faeces. Inadequate sanitation is a major cause of disease worldwide.

Surface water. Water located on the surface of the Earth, such as in streams, rivers, lakes, seas and oceans.

Sustainability, sustainable development. The capacity to endure. The long-term maintenance of environmental, economic and social aspects such that the quality of life is improved over time.

TARWR (total actual renewable water resources). The theoretical maximum annual volume of water resources avail- able on a sustainable basis in a country.

Tipping point. The point at which a slow, reversible change becomes irreversible, often with dramatic consequences.

Transboundary basin, aquifer. A river basin or groundwater aquifer that spans multiple political entities, separated by boundaries.

Uncertainty. Lack of sureness about something. Uncertainty may range from a falling short of certainty to an almost complete lack of conviction or knowledge, especially about an outcome or result.

Urbanization. The physical growth of urban areas as a result of global change. Urbanization can represent the level of urban relative to overall population, or it can represent the rate at which the urban proportion is increasing.

Vulnerability. Degree to which people, property, resources, systems and cultural, economic, environmental and social activities are susceptible to undesired outcomes, harm, degradation or destruction.

Wastewater. Any water that has been adversely affected in quality by human influence.

Water distribution. The percentages of volumes of fresh and saline water, both on and under the surface of the Earth. Alternatively, the transport of water supplies from water treatment plants to particular water users in an urban area.

Water entitlements The right to obtain water established by apportionment institutions. In some places, water entitlements are granted by the state and constitute an informal contract between the state and license-holders. In other, water entitlements constitute a formal property right with judicial enforcement. Whether formal or informal, the contractual nature of water entitlements adds to the cost of institutional change.

Water footprint. The total volume of freshwater used to produce the goods and services consumed by an individual or community or produced by a business. The direct water footprint of a consumer or producer (or a group of consumers or producers) refers to the freshwater consumption and pollution that is associated to the water use by the consumer or producer. It is distinct from the indirect water footprint, which refers to the water consumption and pollution that can be associated with the production of the goods and services consumed by the consumer or the inputs used by the producer. The grey water footprint of a product is an indicator of freshwater pollution that can be associated with the production of a product over its full supply chain. It is the volume of freshwater that is required to assimilate the load of pollutants based on existing ambient water quality standards, calculated as the volume of water that is required to dilute pollutants to such an extent that the quality of the water remains above agreed water quality standards.

Water infrastructure. Physical and organizational structures needed to provide the water quantities and qualities demanded by various water users.

Water quality. The physical, chemical and biological characteristics of water. It is a measure of the condition of water relative to the requirements of one or more biotic species and or to any human need or purpose.

Water security. The availability of a reliable and secure access to water over time.

Water resources management. The activity of planning, developing, distributing and managing the supply and use of water resources. The development and use of structural and non-structural measures to provide and control natural and human-made water resources systems for beneficial uses.

Water stress. The symptomatic consequence of water scar- city (physical or economic), which may manifest itself as increasing conflict over sectoral usage, a decline in service levels, crop failure, food insecurity and so forth. It is often measured by the extent of the difference between supply and demand.

Watercourse. Any flowing body of water.

Watershed. The area of land where all of the water that is under it or drains off it goes into the same place. Healthy watersheds provide a host of services, including water purification, groundwater and surface flow regulation, erosion control and streambank stabilization.

Wetland. An area of ground that is saturated with water either permanently or seasonally (swamp, marsh, peatland, shallow lake).

Withdrawal. The removal of water from some type of source, such as groundwater, for some use by humans. The water that is not consumed is subsequently returned to the environment after use, but the quality of the returned water may not be the same as when it was removed. Withdrawn water can be used (such as for cooling) without being consumed.

Source: UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012), 370-379.

Endnotes

[1] Samuel P. Huntington published his article titled "The Clash of Civilizations" within the journal *Foreign Affairs* in July 1993, and subsequently published his book "The Clash of Civilizations and the Remaking of World Order". His theory has been the subject of significant debate, and gained particular prominence in the post-9/11 period. See Samuel P. Huntingdon, *The Clash of Civilizations and the Remaking of World Order*, (New York, NY: Simon and Schuster Paperbacks, 2011), 13-15; and Chiara Bottici and Benoît Challand, *The Myth of the Clash of Civilizations*, (Abingdon, Oxfordshire: Routledge, 2010), 2-3, 17.

[2] Chiara Bottici and Benoît Challand, *The Myth of the Clash of Civilizations*, (Abingdon, Oxfordshire: Routledge, 2010), 2-3.

Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict*, (New York, NY: Metropolitan Books, 2001).

[3] In his book *On War*, Carl von Clausewitz introduces his concept of the "paradoxical trinity" within war, which is reflected through the three constituent elements of the people, the commander (and his military force), and the government. Clausewitz discusses his theory of the "dominant tendencies" that lead to this Trinity, comprising "primordial violence…the play of chance and probability…and…subordination, as an instrument of policy", themselves representative of the passion within the people, the creativity of the commander, and the reason applied by the government. Clausewitz considers the Trinity to be a dynamic and variable inter-relationship, with each element influenced by the others to a different extent. See Carl von Clausewitz, *On War*, ed. Michael Howard and Peter Paret, trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 88-89.

[4] Samuel P. Huntington, *The Clash of Civilizations and the Remaking of World Order*, (New York, NY: Simon and Schuster Paperbacks, 2011).

Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict*, (New York, NY: Metropolitan Books, 2001).

[5] Huntington assessed the post-Cold War "World of Civilizations" to be comprised of: Western; Latin American; Islamic; Sinic; Hindu; Orthodox; Buddhist; and Japanese civilizations, whilst discussing the addition of an African civilization. In his 1993 article Huntington referred to the Confucian civilization, but in his book he uses the term "Sinic", which he considers an appropriate description for the common culture "of China and the Chinese communities in Southeast Asia and elsewhere outside of China as well as the related cultures of Vietnam and Korea." With reference to an African civilization, he notes that "most major scholars…do not recognize a distinct African civilization", with Africa's North and East coasts reflecting an Islamic basis, Ethiopia historically constituting its own civilization, and European settlement being pervasive elsewhere. However, he notes "Africans are also increasingly developing a sense of African identity", with the prospect of sub-Saharan Africa cohering into a distinct civilization, with South Africa potentially at its core. See Samuel P. Huntington, *The Clash of Civilizations and the Remaking of World Order*, (New York, NY: Simon and Schuster Paperbacks, 2011), 21-39, 45-48.

[6] In essence, Huntington assessed the socio-political fabric of society, to which many have naturally become accustomed as the prevailing norm, was in the process of being re-assembled. The fundamental human commonalities between groups of peoples would become the key factor around which like civilizations would coalesce. The idea of the nation state would become a secondary consideration, whilst the primary divisions between the different civilizations would come to the fore and risk conflict, although he argued that such conflict was not necessarily inevitable. When considering Huntington's argument in respect to the case of Bosnia, the provision of support by Islamic sympathizers appears to evidently be based on a cultural affinity, rather than any direct political or economic relationship. As such, it is indeed possible to understand the natural tension that could result if such alignments were to transcend established state organizations and boundaries; the issue is whether this tension becomes the leading factor in creating conflict. See Samuel P. Huntington, *The Clash of Civilizations and the Remaking of World Order*, (New York, NY: Simon and Schuster Paperbacks, 2011), Chapter 1, 125-126, 207-209, 320-321; and Samuel P. Huntington, "The Clash of Civilizations?" in *Foreign Affairs* (Summer 1993; 72, 3), 22-27.

[7] Fukuyama's theory was proposed following the collapse of the Soviet Union, which heralded the failure of communism, and was perceived to have brought to a close a period in history where ideology had been the "frame of reference for the management of conflict". Fukuyama's theory was considered to have effectively validated thinking that Western liberalism presented an unchallenged, victorious ideology that would spread across the world. Huntington's theory on the clash of civilizations was a counter to Fukuyama's "end of history" theory, and whilst his theory has become the most prominent, there were others who attempted to articulate the new international environment: Thomas Freidman of the New York Times described "The One Big Thing" and argued that economic globalization would come to dominate; Robert Kaplan discussed a world overtaken by population excess; and as discussed, Francis Fukuyama proposed his theory on the victory of liberalism over communism. See: Samuel P. Huntington, *The Clash of Civilizations and the Remaking of World Order*, (New York, NY: Simon and Schuster Paperbacks, 2011), 31; and Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict*, (New York, NY: Metropolitan Books, 2001), 13; and Mohamed Sid-Ahmed, *The Clash of Civilizations Revisited* [Online] in Al-Ahram On-Line (15-21 April 2004; 686), 1.

[8] Chiara Bottici and Benoît Challand, *The Myth of the Clash of Civilizations*, (Abingdon, Oxfordshire: Routledge, 2010), 2-3, 17, 96.

Samuel P. Huntington, *The Clash of Civilizations and the Remaking of World Order*, (New York, NY: Simon and Schuster Paperbacks, 2011), 21, 28-29.

[9] In their book *The Myth of the Clash of Civilizations* Chiara Bottici and Benoît Challand considered people as requiring a *cognitive* schema to provide a mapping device through which it is possible to simplify the world, a *practical* image of that world upon which to act, and an *aesthetic* figure to mobilize and evoke passions and emotions. In simple terms, they argue that these human requirements have created and perpetuated a "political myth" of the "clash of civilizations" that has become tangible; it has provided a simplified perspective of events that have occurred in an increasingly complex, pluralistic, and globalized world, which has been accepted as reality. Therefore, the simplified "clash of civilizations" theory filled this need and provided a unifying context for segments of both Western and Islamic worlds. As such, the supposed clash between the West and Islam has become popularized, but perhaps only as events appear to conveniently meet the perception of this aspect of the clash, rather than being a clear validation of his wider theory. See Chiara Bottici and Benoît Challand, *The Myth of the Clash of Civilizations*, (Abingdon, Oxfordshire: Routledge, 2010), 2-3, 20-25, 35-36.

Significantly, Huntington also considered that clashes would develop between Western and Orthodox Christianity, China and Buddhism, and so on and not just between Western Christianity and Islam. Within the context of this paper the term "West" or "Western" is used to refer ostensibly to the countries that comprise the North American and European continents. See Samuel P. Huntington, *The Clash of Civilizations and the Remaking of World Order*, (New York, NY: Simon and Schuster Paperbacks, 2011), 207-245; and Chiara Bottici and Benoît Challand, *The Myth of the Clash of Civilizations*, (Abingdon, Oxfordshire: Routledge, 2010), 13-22, 55-65, 112-123.

[10] Huntington initially refers to "Fault Line Conflicts" in his *Foreign Affairs* article of 1993, but provides a fuller expansion of his analysis in his later book. Chapter 9 particularly provides his detailed thinking on the historical divisions between: Islam and the West; Asia, China, and America; and "emerging alignments." See Samuel P. Huntington, "The Clash of Civilizations?" in *Foreign Affairs* (Summer 1993; 72, 3), 31; and Samuel P. Huntington, *The Clash of Civilizations and the Remaking of World Order*, (New York, NY: Simon and Schuster Paperbacks, 2011), 207-245.

Egypt was denied financial support "from the United States and Great Britain to build...the Aswan High Dam." Egypt consequently nationalized the Suez Canal as a final act in establishing the Egyptian national status, creating a shift in the balance of power, provoking a military response from France, Britain and Israel to redress that balance; this was not a simplistic cultural conflict. In the case of Iraq, the invasion of Kuwait followed the break down of talks over oil production and debt repayment. The Iraqi invasion provoked a response from a coalition of nations of all religions and cultures that did not reflect a cultural divide of the nature Huntington described. The response was focused on restoring the balance of power, with an understandable concern for the control of oil assets.

Globalization can be accepted as increasing cultural and religious dispersal, yet this could actually diffuse rather than invigorate the differences that Huntington considers pivotal. This could just as readily lead to greater global assimilation, rather than conflict. Additionally, it is reasonable to expect that nation states will remain the leading global actors and, except in a few isolated cases, unwilling to be readily dissembled along cultural lines. Increasing economic union may be considered a precursor to such dissembling, but this can still be argued as a reflection of individual national desire, and pursuit of political and/or economic benefit, rather than recognition of cultural similarities and any particular desire for cultural unification.

Brent Phillips, *The Suez Canal* (2001) online atwww.library.cornell.edu.colldev.medeast/suez.htm.

Steven Solomon, *Water: The Epic Struggle for Wealth, Power, and Civilization* (New York, NY: Harper Perennial, 2011), 239-243.

Encyclopedia Britannica, *The Persian Gulf War* online at http://www.britannica.com/EBchecked/topic/452778/Persian-Gulf-War.

[11] Many recognize the ancient relationship between the West and Islam is "as much intellectual and cultural, as political and military" with shared traditions of "tolerance and moderation" and debates on issues of peace, truth, and compromise. Huntington himself acknowledged that Bin Laden wanted "[the war on terror] to be a clash of civilizations" despite history demonstrating that "Muslims also fight Muslims, and much more than the people of other civilizations fight each other." Azim Nanji, *Beyond the Clash of Civilizations* (Waterloo: The Institute of Ismaili Studies, 2001), 2.

Mohamed Sid-Ahmed, *The Clash of Civilizations Revisited* [Online] in Al-Ahram On-Line (15-21 April 2004; 686), 1 at http://weekly.ahram.org.eg/2004/686/op5.htm.

Paul Wolfowitz, *Bridging the Dangerous Gap between the West and the Muslim World* (Washington, DC: US Department of Defense Online, 2002) at http://www.defense.gov/speeches/speech.aspx?speechid=310, 1.

[12] Chiara Bottici and Benoît Challand, *The Myth of the Clash of Civilizations*, (Abingdon, Oxfordshire: Routledge, 2010), 2-3, 20-25, 35-36.

[13] Thomas Naff and Ruth C. Matson, *Water and the Middle East: Conflict or Cooperation* (Boulder, Colorado: Westview Press, Incorporated, 1984).

[14] Thomas Homer-Dixon, *Environmental Scarcity and Global Security* (New York, NY: Foreign Policy Association Headline Series, 1993); and Thomas Homer-Dixon, "On the Threshold: Environment Changes as Causes of Acute Conflict", *International Security, 16, 2* (October 1, 1991), 76-116; and Thomas Homer-Dixon, "Environmental Scarcities and Violent Conflict", *International Security, 19, 1* (Summer 1994), 5-40.

[15] Arun P. Elhance, *Hydro-Politics in the 3rd World: Conflict and Cooperation in International River Basins* (Washington, DC: United States Institute of Peace Press, 1999),

[16] Wider, continuing analysis has been inspired including that of Michael T. Klare in 2001, who specifically assessed that a focus on ideology would be replaced by conflict over resources, as "the most distinctive feature of the global security environment." Marq de Villiers argued for the specific position of water as a threat in the same year, whilst Steven Solomon provided a recent contribution with his 2010 analysis that "despite its scarcity, it [water]…remains the most short-sightedly and poorly governed critical resource", and that the world's ability to manage the increasing problem would likely reflect in the "ultimate fate of human civilization."

Anne H. Ehrlich, Peter Gleick, and Ken Conca, *Resources and Environmental Degradation as Sources of Conflict* (Cambridge: Queen's College, 2000).

Dr K. R. Spillman and Dr, J. Krause, *International Security Challenges in a Changing World* (New York, NY: Lang, 1999).

Marq de Villiers, *Water: The Fate of Our Most Precious Resource* (New York, NY: Mariner Books, 2001).

Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict*, (New York, NY: Metropolitan Books, 2001).

Steven Solomon, *Water: The Epic Struggle for Wealth, Power, and Civilization* (New York, NY: Harper Perennial, 2011), 487-496.

[17] Dr Peter Gleick (President, Pacific Institute), in email correspondence to the author, March 05, 2013.

UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012).

[18] The UN work consulted has been comprehensive and has comprised a significant quantity of the material published over the last decade. This bulk of this material has comprised that related to the International Year of Freshwater 2003, the World Water Day 2007, the International Decade for Action: Water for Life 2005-2015, the World Development Goals Report 2012, and the World Water Development Report Number 4 produced in 2012.

[19] Admiral Mullen made his comments on 1 April 2011 during the annual Rostov Lecture at Johns Hopkins University's Paul H. Nitze School of Advanced International Studies in Washington, DC on the subject of the global security environment, as reported by the Department of Defense. The DoD report is available at the following page: http://www.defense.gov/News/NewsArticle.aspx?ID=63393. Also see:

Former Secretary of State Hillary Rodham Clinton, *Remarks on World Water Day to the National Geographic Society* on 22 March 2010 at http://www.state.gov/secretary/rm/2010/03/ 138737.htm.

Center for Emerging Threats and Opportunities, *2011 Edition of Flashpoints* (Quantico, VA: USMC, 2011).

U.S. Director of National Intelligence, *Intelligence Community Assessment: Global Water Security*, ICA 2012-08, 2 February 2012, 3.

HM Government, *A Strong Britain in an Age of Uncertainty: The National Security Strategy*, (London, UK: The Stationery Office, 2010), 17-18.

[20] Samuel P. Huntingdon, *The Clash of Civilizations and the Remaking of World Order*, (New York, NY: Simon and Schuster Paperbacks, 2011), 13-15, 21, 28.

Chiara Bottici and Benoît Challand, *The Myth of the Clash of Civilizations*, (Abingdon, Oxfordshire: Routledge, 2010), 2-3.

[21] The United Nations reports extreme poverty and poverty rates falling in every developing region, including in sub-Saharan Africa, where rates are highest. The proportion of people living on less than $1.25 a day fell from 47 per cent in 1990 to 24 per cent in 2008—a reduction from over 2 billion to less than 1.4 billion. However, 47% of the Sub-Saharan population still falls below this measurement of extreme poverty. Meanwhile, the United Nations does also report that 89% of the global population has access to a source of safe drinking water, which is an improvement from previously reported statistics. This does not however mean that there is more water available, simply that more people now have access to this vital resource. United Nations, *Millennium Development Goals Report 2012* (New York, NY: United Nations Online, 2012) at http://mdgs.un.org/unsd/mdg/Resources/Static/Products/Progress2012/English2012.pdf.

US Census Bureau, *Monthly World Population Figures* (Washington, DC: US Department of Commerce Online, 2012) at http://www.census.gov/population/popclockworld.html.

Geohive, *Global Statistics / Population Statistics* (Geohive Online, 2012) athttp://www.geohive.com.

Michael N. Dobkowski and Isidor Wallimann, *The Coming Age of Scarcity: Preventing Mass Death and Genocide in the Twenty-First Century* (New York, NY: Syracuse University Press, 1999), 10.

Jeremy Black, *War Past, Present, and Future* (Stroud: Sutton Publishing Limited, 2000), 273.

Anup Shah, *Poverty Facts and Statistics* (Global Issues Online, 2012) at http://www.globalissues.org/article/26/poverty-facts-and-stats#src1.

[22] Michael N. Dobkowski and Isidor Wallimann, *The Coming Age of Scarcity: Preventing Mass Death and Genocide in the Twenty-First Century* (New York, NY: Syracuse University Press, 1999), 10.

[23] Agriculture accounts for approximately 70% of global freshwater withdrawals, and up to 90% in some fast-growing economies, whilst the growth in population is anticipated to result in an increase in food demand of 70% by 2050. Meanwhile, economic growth and individual wealth have been producing a shift in diets from predominantly starch-based to meat and dairy, requiring more water. Producing 1kg of rice requires approximately 3500L of water, 1kg of beef requires circa 15000L, and a cup of coffee 140L. The US Energy Information Administration has estimated that global energy consumption will increase by approximately 49% by 2035, with increases expected to be greater in non-OECD countries (84%) than in OECD countries (14%), with the primary driver being the expected growth in GDP and the associated increased economic activity. This increase in energy consumption is anticipated to produce an increased water requirement of approximately 11% by 2050. Included within environmental constraints are issues such those presented by climate change, pollution, saltwater intrusion, amongst others.

United Nations World Water Development Report 4 (WWDR4), *Facts and Figures: Managing Water Under Uncertainty and Risk* (New York: UNESCO, 2012) 1-4.

Anne H. Ehrlich, Peter Gleick, and Ken Conca, *Resources and Environmental Degradation as Sources of Conflict* (Cambridge: Queen's College, 2000) 1, 251.

Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict*, (New York, NY: Metropolitan Books, 2001), 213-226.

[24] Dr K. R. Spillman and Dr, J. Krause, *International Security Challenges in a Changing World* (New York, NY: Lang, 1999), 211.

[25] Abraham Maslow (1908-1970) devised a model commonly referred to as the "Hierarchy of Needs" to explain his theory on human motivation. His model is typically portrayed as a pyramid with the ascending layers of Physiological needs, Safety needs, Belonging needs, Esteem needs, and Self-Actualization needs. The first layers contain the fundamental needs, in which rests actual and perceived human security. Water is one fundamental constituent of the Physiological layer, which if unfulfilled will consume the individual's attention and prevent progress towards higher levels of motivation and fulfillment. In such a context the individual's motivation is effectively focused solely on fulfilling that level of need. See Abraham Maslow, *Motivation and Personality* (New York, NY: Harper, 1954).

[26] Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict*, (New York, NY: Metropolitan Books, 2001), 141.

Thomas Naff and Ruth C. Matson, *Water and the Middle East: Conflict or Cooperation* (Boulder, Colorado: Westview Press, Incorporated, 1984), 181-184.

[27] The quantity of available water, calculated to be approximately 43,000 km^3, implies there is enough water for every person on the planet; some 6,498 m^3 per person if distributed evenly, but it is not. Availability below 1700 m^3 per person per annum is considered as reflective of water stress, whilst a level below 1000 m^3 is considered as water scarcity. However, there is much debate over the figure of 1700m^3 as some evidence indicates that no nation is actually consuming more than this figure. Nonetheless, Dr Peter Gleick articulates the reality within Marq de Villiers work as follows: "If a country draws less than its available resources…it doesn't mean that it is living thriftly. It might simply mean that the infrastructure is a shambles." He further explains that there is a need to "look at total resources, renewable resources, the ability to transfer water from water-rich to water-poor places, the development level of the economy, the annual consumption, and the deprivation level, all matched against population trends and economic resources. When you do that, you'll see that there are crises in may places." See Marq de Villiers, *Water: The Fate of Our Most Precious Resource* (New York, NY: Mariner Books, 2001), 18-19, 33-37; and L. Ohlsson, *Hydropolitics: Conflicts Over Water as a Development Constraint* (London: Zed Books, 1995), 3; and UN Environment Programme, *Africa Water Atlas* (Nairobi, Kenya: United Nations, 2010), 14.

The Hydro-logical Cycle refers to the process by which water circulates through the earth's system via the balance of precipitation and evaporation through which water is transferred from one state or form or location to another i.e. atmospheric moisture, oceans, rivers, lakes, groundwater, aquifers, ice-caps, and saturated soil.

[28] UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012).

[29] The Global Water Forum was established in 2010 as an initiative of the UNESCO Chair in Water Economics and Transboundary Water Governance in order to present knowledge and insight from leading water researchers and practitioners. The contributions provide evidence-based articles on local, regional, and global water challenges. The specific goals of the Global Water Forum are noted on the organization's website as to: support capacity building through knowledge sharing; provide a means for informed, unbiased discussion of potentially contentious issues; provide a means for discussion of important issues that receive less attention than they deserve; create a high quality resource for water practitioners that is accessible and freely available across the world. See http://www.globalwaterforum.org/about/.

Dr Xavier Leflaive, *Water Outlook to 2050: The OECD Calls for Early and Strategic Action* (Global Water Forum Online, May 2012) at http://www.globalwaterforum.org/2012/05/21/water-outlook-to-2050-the-oecd-calls-for-early-and-strategic-action/.

Paul Wyrwoll, *India's Groundwater Crisis*, (Global Water Forum Online, July 2012) at http://www.globalwaterforum.org/2012/07/30/indias-groundwater-crisis/.

Christopher Kuzdas, *Unpacking Water Conflict in Guanacaste, Costa Rica* (Global Water Forum Online, October 2012) at http://www.globalwaterforum.org/2012/10/16/unpacking-water-conflict-in-guanacaste-costa-rica/.

Alexandra E. V. Evans, Munir A. Hanjra, Yunlu Jiang, Manzoor Qadir, and Pay Drechsel, *Water Pollution in Asia: The Urgent Need for Prevention and Monitoring* (Global Water Forum Online, June 2012) at http://www.globalwaterforum.org/2012/06/09/water-pollution-in-asia-the-urgent-need-for-prevention-and-monitoring/.

World Water Day 2007, *Coping with Water Scarcity: Challenge of the Twenty-First Century* (UN Water, 2007) 4-7.

UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012).

[30] World Water Day 2007, *Coping with Water Scarcity: Challenge of the Twenty-First Century* (UN Water, 2007).

[31] UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012).

World Water Day 2007, *Coping with Water Scarcity: Challenge of the Twenty-First Century* (UN Water, 2007).

[32] "The primary goal of the 'Water for Life' Decade is to promote efforts to fulfill international commitments made on water and water-related issues by 2015. Focus is on furthering cooperation at all levels, so that the water-related goals of the Millennium Declaration, the Johannesburg Plan of Implementation of the World Summit for Sustainable Development, and Agenda 21 can be achieved. The challenge of the Decade is to focus attention on action-oriented activities and policies that ensure the long-term sustainable management of water resources, in terms of both quantity and quality, and include measures to improve sanitation. Achieving the goals of the 'Water for Life' Decade requires sustained commitment, cooperation and investment on the part of all stakeholders from 2005 to 2015 and far beyond." See http://www.un.org/waterforlifedecade/background.shtml.

"The WHO/UNICEF Joint Monitoring Program for Water Supply and Sanitation (JMP) reports every two years on progress towards the drinking-water and sanitation target under Millennium Development Goal 7. This target calls for halving the proportion of the population without sustainable access to safe drinking water and basic sanitation between 1990 and 2015. The [2012 update] report brings welcome news: measured by the proxy-indicator consistently used by the JMP since 2000, the MDG drinking-water target was met in 2010, five years ahead of schedule. However, the job is far from done. An estimated 780 million still lacked safe drinking water in 2010, and the world is unlikely to meet the MDG sanitation target. A reduction in urban-rural disparities and inequities associated with poverty; drinking-water coverage in countries in sub-Saharan Africa and Oceania; putting sanitation 'on track'; and universal coverage beyond 2015 all remain high on the development and public health agenda." See http://www.who.int/water_sanitation_health/ publications/2012/jmp_report/en/index.html.

United Nations, *United Nations Observances: International Decades for Action* (New York, NY: United Nations Online, 2012) at http://www.un.org/en/events/observances/decades.shtml.

UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012).

[33] United Nations, *Global Issues: Water* (New York, NY: United Nations Online, 2012) at http://www.un.org/en/globalissues/water/.

World Water Day 2007, *Coping with Water Scarcity: Challenge of the Twenty-First Century* (UN Water, 2007) 4-7.

UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012).

[34] UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012).

Center for Emerging Threats and Opportunities, *2011 Edition of Flashpoints* (Quantico, VA: USMC, 2011).

[35] The United Nations also refers to 150 treaties having been signed over this period in the context of the recorded water conflicts. Nonetheless, the UN World Water Development Report 4 produced as late as 2012 makes extensive reference to conflict and the potential for conflict over or involving water resources throughout the entire publication. See United Nations, "Transboundary Waters", *Water for Life Decade 2005-2015*, online at http://www.un.org/waterforlifedecade/transboundary_waters.shtml; and UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012).

[36] Worldwater is an organization dedicated to providing information and resources to help protect and preserve freshwater around the globe. A project of the Pacific Institute, the Worldwater.org site is a companion to their biennial book, *The World's Water*, and also provides links to a range of water resources. Founded in 1987 and based in Oakland, CA the Pacific Institute's focus is to work to create a healthier planet and sustainable communities, whilst conducting inter-disciplinary research and partnering with stakeholders to produce solutions that advance environmental protection, economic development, and social equity. The Pacific Institute was co-founded by Dr. Peter Gleick who is a renowned expert on water and climate issues. Dr. Gleick's work has "redefined water from the realm of engineers to the world of social justice, sustainability, human rights, and integrated thinking." For further information and access to the Pacific Institute's data and wider resources, including on the subject of water scarcity and conflict, refer to http://www.worldwater.org; and http://www.pacinst.org/topics/water_and_sustainability/water_and_conflict/; and http://www.worldwater.org/ conflict/list/.

[37] Irina Bokova, the current UNESCO Director General made her comments within the Foreword to the World Water Development Report 4. See UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012), vi.

The U.S. Intelligence Report on Global Water Security supports Clinton's view, stating water scarcity will become a cause for failed states by 2023, with a fuller assessment that whilst a water-related state-on-state conflict is unlikely in the next 10 years, water in shared basins will increasingly be used as leverage; the use of water as a weapon or to further terrorist objectives will also become more likely beyond 10 years. See U.S. Director of National Intelligence, *Intelligence Community Assessment: Global Water Security*, ICA 2012-08, 2 February 2012, 3.

Pacific Institute, *Water and Conflict*, Pacific Institute, 2012 online at http://www.pacinst.org/topics/water_and_sustainability/water_and_conflict/.

Former Secretary of State Hillary Rodham Clinton, *Remarks on World Water Day to the National Geographic Society* on 22 March 2010 at http://www.state.gov/secretary/rm/2010/03/ 138737.htm.

Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict*, (New York, NY: Metropolitan Books, 2001), 142.

Chris McGreal, "Deadly Thirst," *The Guardian*, January 12, 2004 online at http://www.guardian.co.uk/environment/2004/jan/13/water.israel.

[38] The Jordan River is supplied via three head-water systems: the Hasbani River originates in Syria, with part of its outflow through Lebanon; The Dan and Banyias Rivers originate in the Golan Heights, and both flow into the Jordan above Lake Kinneret within Israeli territory; the lower Jordan River is supplied from springs and runoff from the West Bank, and Syrian, and Jordanian waters, and by the Yamuk River, which rises in Syria, borders Jordan, Syria, and Israel (through its proximity to the Golan Heights, as occupied territory), and closely parallels the Jordan River for several hundred kilometers, before joining the Jordan River at Adam Bridge to the east of the West Bank. The political complexity associated with these water systems can be readily appreciated. See:

Marq de Villiers, *Water: The Fate of Our Most Precious Resource* (New York, NY: Mariner Books, 2001), 185-195.

UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012), 793-797.

Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict*, (New York, NY: Metropolitan Books, 2001), 139.

[39] Marq de Villiers, *Water: The Fate of Our Most Precious Resource* (New York, NY: Mariner Books, 2001), 190.

[40] This section is heavily based upon available UN assessments and broader commentators. See: UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012).

Adel Darwish, *The Next Major Conflict in the Middle East? Water Wars*, A Lecture to the Conference on Environment and Quality of Life (Geneva, 1994) at http://www.mideastnews.com/WaterWars.htm.

Chris Arsenault, *Risk of Water Wars Rises With Scarcity* (Al Jazeera Online, 2012), 4.

Anne Mawathe, *Kenya's Tana River Clashes: MP Charged with Incitement* (London, UK: BBC News Africa, 2012) online at http://www.bbc.co.uk/news/world-africa-19575973.

[41] This section draws heavily on an essay submitted as part of the 2012-13 USMC Command and Staff Course Elective concerning Climate Change and Water convened by Dr E. Erickson. Major Simon Westlake RM, *The River Nile: an Example of Success or Setback Amongst the Riparian States?* (CSC: Quantico, 2013).

[42] United Nations Environment Program, *Africa Water Atlas* (Nairobi, Kenya: United Nations, 2010), 14-16.

World Water Day 2007, *Coping with Water Scarcity: Challenge of the Twenty-First Century* (UN Water, 2007). http://www.unwater.org/wwd07/downloads/documents/escarcity.pdf.

International Year of Freshwater 2003, *Water: A Matter of Life and Death (Water Year Online, 2003) at* www.wateryear2003.org.

International Year of Freshwater 2003, *Water Without Borders (Water Year Online, 2003) at* www.wateryear2003.org.

International Year of Freshwater 2003, *The Right to Water (Water Year Online, 2003) at* www.wateryear2003.org.

[43] The 2011 Edition of Flashpoints assesses 7 of the 11 Riparian states to be within the top 15 countries with greatest risks across the factors considered, whilst a further 3 states are within the top 40 states assessed; only Egypt is outside of this bracket, ranked 61 of 158 states subject to assessment. The factors considered comprised: Governance, Demographics, Religion, Disease, Gender, Education, Corruption, Economics, Energy, and Water. See: Center for Emerging Threats and Opportunities, *2011 Edition of Flashpoints* (USMC: Quantico, 2011), 60-64.

Analysis of the World Bank's data on population growth indicates the significant difference between the world average rate and that of the Nile Basin countries. The world rate of population growth between the years 2003-2011 averaged 1.2% over the period, whilst the Nile Basin's riparian countries reflect a combined average of 2.7%. However, the difference between Egypt's growth rate and that of the remainder of the Basin is significant: 1.8% in Egypt's case, compared to a combined average of 2.8% across the remainder of the riparian states. Also of note, the urban population growth reflects an annual rate of 2.2%, also ahead of the generalized rural growth of 0.2% demonstrating increased urbanization. See the World Databank, *Population Growth (Annual %)* (The World Bank, 2012) online at http://search.worldbank.org/ data?qterm=population&language=EN.

[44] From its most remote source at the head of the River Luvironzo near Lake Tanganyika, to its mouth on the Mediterranean Sea, at 6,700km the Nile is the longest river in the world. Some 2.9 million km^2 in extent, the basin drains about 10 percent of the overall continent, whilst the geographical and political linkages extend beyond the basin itself. The eleven Nile basin states embed Nile basin processes within the wider social and economic development of Africa across all major parts of the continent; linking processes in southern Africa to northern Africa and the Mediterranean, development in Central Africa to the West African Atlantic coast, and the regional systems of the Middle East to the Indian Ocean. Alan Nicol, *The Nile: Moving Beyond Cooperation*, (UNESCO: Paris, 2003), 5.

The Nile's key hydrological aspects are its two major sources: in the highlands of Ethiopia and Eritrea (forming the Blue Nile), and in the equatorial lakes region (providing the lower and slower flow of the White Nile). The Blue Nile catchment is relatively small in comparison to the White Nile, yet the high rate of June-September rainfall makes it the greatest contributor to the Nile with some 60% of the main flow. Of key significance also is the huge seasonality of the Blue Nile's flows, between July-October, which brings a massive flood broadly equivalent to seventy times its low-season flow, which has influenced the downstream settlement and prosperity of riparian societies for millennia. See Alan Nicol, *The Nile: Moving Beyond Cooperation*, (UNESCO: Paris, 2003), 9-10.

The World Bank, *Data: GDP Per Capita (US$)* (The World Bank Online, 2012) at http://data.worldbank.org/indicator/NY.GDP.PCAP.CD/countries/1W?display=default.

Karen Frenken (Editor), *FAO Water Reports 29: Irrigation in Africa in Figures* (Rome, Italy: United Nations Food and Agriculture Organization, 2005), 20 at ftp://ftp.fao.org/agl/aglw/docs/wr29_eng.pdf.

World Water Day 2007, *Coping with Water Scarcity: Challenge of the Twenty-First Century* (UN Water, 2007) at http://www.unwater.org/wwd07/downloads/documents/escarcity.pdf.

[45] Under the 1959 Agreement Egypt became entitled to 55.5 billion m^3 of the Nile's waters per annum, Sudan was allocated 18.5 billion m^3, whilst 10 billion m^3 was assumed to be lost to evaporation from Lake Nasser/Nubia, thereby accounting for the assessed availability of 84 billion m^3 of Nile waters per annum. Egypt publically regarded the 1959 Agreement as defining its minimum entitlement and whilst recognizing Sudan's agreed allocation, until the 1990s Egypt refused to negotiate over Ethiopia's intent for development of the Nile waters. Had the pace of development, particularly in agriculture, not declined Sudan would have likely been utilizing its full entitlement by the 1990s. Ethiopia has previously been unable to develop its significant hydro-power potential, but has now embarked on a project that will potentially change the balance of power regarding access to the Nile waters. Ethiopia, and other riparian states, effectively viewed the 1959 Agreement as a preliminary stage in wider negotiations on usage of the Nile waters; Egypt for its part did not view the Agreement in the same vein, especially up to 1997 when there was agreement on entering into bi-lateral discussions with Ethiopia. See:

Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict*, (New York, NY: Metropolitan Books, 2001), 151-158.

Alan Nichol, *The Nile: Moving Beyond Cooperation* (Paris: UNESCO, 2003).

United Arab Republic, *United Arab Republic and Sudan Agreement for the Full Utilization of the Nile Waters*, (Cairo, Egypt: November 8, 1959) online at www.waterlaw.org.

[46] Although the NBI was formed in 1999, it remains a transitional institution "designed to function in place of a river basin organization", with a technical focus that is not directly involved in political processes. Yet advancement of the agreement on allocation of Nile waters remains a very political issue on which there has been very little sustainable progress. See Nile Council of Ministers, *Nile Basin Corporate Report 2011* (Entebbe, Uganda: Nile Basin Initiative, 2012), 3-6.

United Arab Republic, *United Arab Republic and Sudan Agreement for the Full Utilization of the Nile Waters*, (Cairo, Egypt: November 8, 1959) online at www.waterlaw.org.

Strategic Foresight Group/Swiss Agency for Development and Cooperation, *Blue Peace for the Nile: Workshop Report*, (Zurich, Switzerland: Schweizerische Eidgenossenschaft, 2012).

UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012), 216-218.

Carolyn Lamere, *Nile Basin at a Turning Point as Political Changes Roil Balance of Power and Competing Demands Proliferate* (Wilson Center: Environmental Change and Security Program) online at http://www.newsecuritybeat.org/2012/09/nile-basin-turning-point-egyptian-revolution-roils-balance-power-competing-demands-proliferate/#.UPml3aWSRFI.

Marq de Villiers, *Water: The Fate of Our Most Precious Resource* (New York, NY: Mariner Books, 2001), 216-230.

[47] Nile Basin River Commission, *Agreement on the Nile River Basin Cooperative Framework (Accord-cadre Sur la Cooperation dans le Bassin du Fleuve Nil)* (International Water Law Project) online at www.waterlaw.org.

Carolyn Lamere. *Nile Basin at a Turning Point as Political Changes Roil Balance of Power and Competing Demands Proliferate* (Wilson Center: Environmental Change and Security Program) online at http://www.newsecuritybeat.org/2012/09/nile-basin-turning-point-egyptian-revolution-roils-balance-power-competing-demands-proliferate/#.UPml3aWSRFI.

[48] Carolyn Lamare. *Nile Basin at a Turning Point as Political Changes Roil Balance of Power and Competing Demands Proliferate* (Wilson Center: Environmental Change and Security Program) online at http://www.newsecuritybeat.org/2012/09/nile-basin-turning-point-egyptian-revolution-roils-balance-power-competing-demands-proliferate/#.UPml3aWSRFI.

[49] Carolyn Lamare, *Nile Basin at a Turning Point as Political Changes Roil Balance of Power and Competing Demands Proliferate* (Wilson Center: Environmental Change and Security Program) online at http://www.newsecuritybeat.org/2012/09/nile-basin-turning-point-egyptian-revolution-roils-balance-power-competing-demands-proliferate/#.UPml3aWSRFI.

Arun P. Elhance, *Hydro-Politics in the 3rd World: Conflict and Cooperation in International River Basins* (Washington, DC: United States Institute of Peace Press, 1999), 67, 229.

[50] The UN Food and Agriculture Organization assesses the irrigable capacity within the Nile Basin to be in the region of 8 million hectares in total, indicating an apparent deficit. Irrespective of this deficit, any significant expansion of agricultural capacity would likely have a detrimental impact on the quality and possibly quantity of water available to the downstream states, and in particular Egypt. See Food and Agriculture Organization, *Irrigation Potential in Africa: A Basin Approach* (United Nations, 1997) online at http://www.fao.org/docrep/w4347e/w4347e00.htm.

Human Rights Watch, *Ethiopia: Forced Relocations Bring Hunger, Hardship* (Human Rights Watch, 2012) online at http://www.hrw.org/news/2012/01/16/ethiopia-forced-relocations-bring-hunger-hardship.

S. B. Awulachew, A. D. Yilma, M. Loulseged, W. Loiskandl, M. Ayana, and T. Alamirew, *Water Resources and Irrigation Development in Ethiopia* (Colombo, Sri Lanka: International Water Management Institute, 2007), Working Paper 123.

Some assessments consider that plans to expand irrigation to 10-11million hectares will not be sustainable if the water is used in the same method and under the same management as now. See *Water: Enough in the Nile to Share, Little to Waste* (Nairobi, Kenya: Integrated Regional Information Networks, 2012) online at http://www.irinnews.org/report/96798/WATER-Enough-in-the-Nile-to-share-little-to-waste.

[51] According to the International Rivers organization, China is reportedly heavily involved in a range of dam projects across Africa, including the 1250 MW Merowe Dam on the fourth cataract of the Nile, which is Sudan's largest hydropower project. The reservoir has a length of some 174 km and reputedly displaced more than 50,000 people from the fertile Nile Valley to arid desert locations. In 2010, the Sudanese government reportedly contracted a Chinese company to construct the 360 MW Kajbar Dam on the Nile's third cataract, which could displace at least 10,000 people, whilst also contracting two other Chinese companies to build the Shereik Dam on the Nile's fifth

cataract, and a hydropower and irrigation project on the Atbara River in Eastern Sudan. In Ethiopia, Chinese contractors have built the 300 MW Tekeze hydroelectric dam and Chinese funds have reportedly been used to finance the Gibe III Dam on the Omo River, whilst Chinese support is also being applied to the 100 MW Amerti-Neshe hydropower dam on the Neshi River. Additional projects that are reportedly receiving Chinese assistance are located in Mozambique, Nigeria, Ghana, Gabon, and the Republic of Congo. International Rivers state their objective is to protect rivers and rights, and to promote global solutions for meeting water, energy and flood management needs. Based on five continents, their staff has expertise in dams, energy and water policy, climate change, and international financial institutions. See International Rivers, *Chinese Dams in Africa* (Berkeley, CA: International Rivers, 2012) online at http://www.internationalrivers.org/campaigns/chinese-dams-in-africa.

Carolyn Lamare, *Nile Basin at a Turning Point as Political Changes Roil Balance of Power and Competing Demands Proliferate* (Wilson Center: Environmental Change and Security Program) online at http://www.newsecuritybeat.org/2012/09/nile-basin-turning-point-egyptian-revolution-roils-balance-power-competing-demands-proliferate/#.UPml3aWSRFI.

Michael Kelley and Robert Johnson, *STRATFOR: Egypt Is Prepared To Bomb All Of Ethiopia's Nile Dams* (New York, NY: Business Insider) online at http://www.businessinsider.com/hacked-stratfor-emails-egypt-could-take-military-action-to-protect-its-stake-in-the-nile-2012-10.

Nonetheless, it remains important to note that although Egypt's Minister of Irrigation and Water Resources Mohamed Bahaa Eddin has stated his country will not sign the Entebbe Cooperative Framework Agreement until its wording meets the country's approval, stating that the agreement would be worthless without Egypt and Sudan, he also stated that "the language of war is unacceptable in handling the crisis between countries of the Nile Basin." See *Minister: Egypt Will Not Sign Entebbe Agreement in Current Form* (Cairo, Egypt: Egypt Independent, 2012) online at http://www.egyptindependent.com/news/minister-egypt-will-not-sign-entebbe-agreement-current-form.

[52] Professor Majeed A. Rahman, *The Geopolitics of Water in the Nile River Basin* (Montreal, Quebec: Center for Research on Globalization, 2012) online at http://www.globalresearch.ca/the-geopolitics-of-water-in-the-nile-river-basin/25746.

United Arab Republic, *United Arab Republic and Sudan Agreement for the Full Utilization of the Nile Waters*, (Cairo, Egypt: November 8, 1959) online at www.waterlaw.org.

[53] Peak Water, *Egypt is Prepared to Bomb All Ethiopia's Nile Dams and Water Facilities* online at http://peakwater.org/2012/10/egypt-is-prepared-to-bomb-all-ethiopias-nile-dams-and-water-facilities/.

[54] The Agreements governing the use of Nile waters were established between Great Britain, Egypt, and the Sudan, with the majority of waters allocated to Egypt. The power to veto any upstream projects which might threaten its access to water was also given to Egypt, who also claim the legal right to halt construction on projects that may impact on their supply of Nile waters; the Grand Renaissance Dam project in Ethiopia that would provide electricity to Ethiopia and surrounding states, but also reduce downstream flow significantly, is one such example. The fact that many of the basin countries were governed by colonial powers during that period complicates matters; they were excluded from initial allocation discussions. As such, other riparian states have claimed these agreements should not be applicable to newly independent countries. Ethiopia has raised particular opposition; although independent at the signing of the 1959 treaty and despite the Blue Nile, which originates in Ethiopia, providing 85 percent of the Nile's water, they were not invited to negotiations. Carolyn Lamere, *Nile Basin at a Turning Point as Political Changes Roil Balance of Power and Competing Demands Proliferate* (Washington, DC: Woodrow Wilson Center for Scholars, 2012) online at http://www.isn.ethz.ch/isn/Digital-Library/Articles/Detail/?lng=en&id=153110.

Thomas Homer-Dixon, *Environmental Scarcity and Global Security* (New York, NY: Foreign Policy Association Headline Series, 1993).

Marq de Villiers, *Water: The Fate of Our Most Precious Resource* (New York, NY: Mariner Books, 2001), 310-311.

[55] Marq de Villiers, *Water: The Fate of Our Most Precious Resource* (New York, NY: Mariner Books, 2001), 309-313.

Michael T. Klare, *Resource Wars: The New Landscape of Global Conflict*, (New York, NY: Metropolitan Books, 2001), 138-189.

[56] Carolyn Lamare, *Nile Basin at a Turning Point as Political Changes Roil Balance of Power and Competing Demands Proliferate* (Wilson Center: Environmental Change and Security Program) online at http://www.newsecuritybeat.org/2012/09/nile-basin-turning-point-egyptian-revolution-roils-balance-power-competing-demands-proliferate/#.UPml3aWSRFI.

[57] Nelson E. Hernandez, "Water Security Conflicts: A Regional Perspective", in *Small Wars Journal*, September 28, 2012.

[58] Admiral Mullen made his comments on 1 April 2011 during the annual Rostov Lecture at Johns Hopkins University's Paul H. Nitze School of Advanced International Studies in Washington, DC on the subject of the global security environment as reported by the Department of Defense. The DoD report is available at the following web page: http://www.defense.gov/News/NewsArticle.aspx?ID=63393.

Nelson E. Hernandez, "Water Security Conflicts: A Regional Perspective", in *Small Wars Journal*, September 28, 2012.

Former Secretary of State Hillary Rodham Clinton, *Remarks on World Water Day to the National Geographic Society* on 22 March 2010 at http://www.state.gov/secretary/rm/2010/03/ 138737.htm.

[59] UNESCO, *United Nations World Water Development Report 4: Managing Water Under Uncertainty and Risk* (Paris: UNESCO, 2012), 192.

[60] In this case, the term Trinity is being applied in a global sense, in an expansion from Clausewitz's original concept of the Nation's Trinity. See Carl von Clausewitz, *On War*, ed. Michael Howard and Peter Paret, trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976).

[61] Carl von Clausewitz, *On War*, ed. Michael Howard and Peter Paret, trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 89.

[62] Various UN programs, national water strategies, such as the Jordanian plan, the US National Security Strategy, US Senate, UK National Security Strategy, and the UK's Strategic Defence and Security Review all refer to the relevance of water as a resource within the future operating environment, with connotations for security. Such considerations will undoubtedly lead to an assessment of the planning capacity and capabilities required to address water scarcity within an operational environment, as proposed by Hernandez. However, the threat will become more severe with time, which requires an evolution of approach. See Nelson E. Hernandez, "Water Security Conflicts: A Regional Perspective", in *Small Wars Journal*, September 28, 2012; and HM Government, *A Strong Britain in an Age of Uncertainty: The National Security Strategy*, (London, UK: The Stationery Office, 2010), 17-18.

[63] The particular reasons on which security architectures can be based include issues such as economics, security, energy, culture, politics, and technology amongst others. Dr Benjamin E. Jensen, "The Evolution of Southeast Asian Security Architectures," Culture and Interagency Operations lecture, (Marine Corps University, Quantico, VA, February 25, 2013).

[64] The Governance and Social Development Resource Centre (GSDRC) records their establishment in 2001 as a "partnership of research institutes, think-tanks and consultancy organizations with expertise in governance, social development, humanitarian and conflict issues" by the UK Department for International Development (DFID). The GSDRC record their clients to include DFID, AusAID, the European Commission, the OECD, the World Bank, and UNDP. See GSDRC, *About Us*, online at http://www.gsdrc.org/go/about-us; and GSDRC, *Conflict Chapter 5* -

Intervening in Conflict-Affected Areas: International Peace and Security Architectures, online at http://www.gsdrc.org/index.cfm?objectid=797C0AA2-14C2-620A-279482BA1D731FB4.

[65] The 1995 Mekong River Agreement and the Mekong River Commission are often been held up as the example for effective management of a shared river basin. However, the pressures of contemporary domestic requirements are causing increasing difficulties amongst the riparian states: China, Laos, Myanmar, Cambodia, Vietnam, and Thailand. Dam projects within China and Laos have caused particular concern and have attracted notable criticism, including from the US State Department. See the Economist, "Lies, Dams, and Statistics," *The Economist*, posted July 26, 2012 at http://www.economist.com/blogs/banyan/2012/07/mekong-river; and BBC, *Laos approves Xayaburi 'mega' dam on Mekong*, posted November 5, 2012 at http://www.bbc.co.uk/news/world-asia-20203072.

[66] Carl von Clausewitz, *On War*, ed. Michael Howard and Peter Paret, trans. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1976), 80-81, 89.

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