

Conflict for Resources: Water in the Lake Chad Basin

**A Monograph
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Abstract

Conflict for Resources: Water in the Lake Chad Basin by MAJ Ethan L. Hall, USA 45 pages.

This monograph discusses the propensity for conflict surrounding the diminishing water in Lake Chad. The shortage of water in the lake and its basin threatens regional economic development and the existence of the population in the area. The paper uses a comparative case study to determine the extent that states conflict over scarce natural resources. The first case study examines the dispute over possession of the Spratly Islands located in the South China Sea. The Spratly Islands and the South China Sea may possess significant oil and natural gas deposits. The island chain is also claimed by multiple states with interstate conflict between China and Vietnam over legitimate possession.

The second case study examines the potential for conflict within the Lake Chad Basin. Lake Chad lies within four African states, Nigeria, Niger, Cameroon and Chad. These riparian states require water from the lake to support the population's drinking, agriculture, livestock and sanitation. Since 1960, Lake Chad's water has receded. Population increases, climate change, desertification, regional conflict and manmade water catchment projects compound the regional shortage of water.

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Section 1: Introduction

Throughout human history, conflict over disputed resources has been a justification for interstate conflict. This monograph examines conflict over water resources. The 2008 Joint Operating Environment, which forecasts out to the year 2030, predicts water scarcity could affect 3 billion people.¹ The report further asserts conflict is likely to arise where water scarcity converges with other environmental and societal tensions. Fortunately for human society, interstate water wars are rare. The last true water war occurred over 4,500 years ago in ancient Mesopotamia. While wars fought over water are rare, water rights are usually an issue during peace settlements.² It is logical to assume as water becomes scarcer, the conflict surrounding water resources also increases.

This paper examines two case studies. The first case study is the dispute over the Spratly Islands. The chapter examines the physical characteristics of the island chain, international law governing territorial waters, the states' claims to the islands and military conflict surrounding the islands. The Spratly Islands case study establishes a precedent for interstate conflict over natural resources, specifically oil and natural gas deposits.

The second case study examines Lake Chad located in western Africa. The lake shares a border with four states, Nigeria, Niger, Cameroon, and Chad. This portion of the monograph establishes the scarcity of freshwater worldwide and the water environment in the four countries and throughout the Lake Chad basin. The chapter also reviews international laws governing transboundary watercourses, Lake Chad and its tributaries, the population demographics affecting the basin, previous conflicts surrounding the lake and future issues affecting the lake. Lastly, the chapter examines the propensity of conflict surrounding the Lake Chad system if left unchecked.

The author's systemic approach requires some explanation. The Spratly Islands and Lake Chad dispute are complex systems with interwoven relationships. The subsections of the chapters are

¹ United States Joint Forces Command, *The Joint Operating Environment 2008: Challenges and Implications for the Future Joint Force* (Suffolk: Virginia: 2008), 20.

² The 1967 Israeli War settled with Israel gaining control of the majority of the water in the Jordan River.

components of that system. Concluding each chapter is the propensity of the system using the relationships of the assemblages.

Method

This monograph uses a comparative case study method to determine the propensity for conflict arising from access to scarce natural resources. The first case study will examine the Spratly Islands and the ongoing conflict in the South China Sea for access to potential oil reservoirs. The Spratly Islands case is a useful example of states engaging in conflict in order to secure natural resources they believe are vital to their national security or economic progress. When the demand for resources increases and when existing resources accessibility to a state do not meet anticipated demand, the expectation is that friction between states vying for the same scarce resource can escalate into violent conflict.

The second case study involves access to fresh water in Lake Chad. Like the Spratly Islands with multiple claims of ownership, Lake Chad is located at the border of four African states, Nigeria, Niger, Chad and Cameroon. Historically, the lake's size increases and decreases with the season's rains and the feeding tributaries. However, due to low seasonal rainfalls and diverting of tributaries, the current size of the lake is smaller than historical norms. The decrease of water in the lake and its tributary systems has caused a shortage of a resource for all people relying on the lake for drinking water, livestock, agriculture and fishing. The author is particularly interested in comparing cases, where multiple nations are competing for scarce natural resources and where ambiguity exists over which state or states legitimately controls or has a valid claim over these resources. The competition for oil in the Spratly Islands has already led to military friction between the states laying claim to the island region. The Lake Chad shares many similarities and one could argue that water is even a greater vital commodity than oil to any state. Given this, the author proposes to test the following hypotheses:

H₁ : Water depletion of Lake Chad will cause a humanitarian crisis and interstate conflict over scarce resources developing into a security concern for USAFRICOM.

H₀: Water depletion of Lake Chad will not cause a humanitarian crisis and interstate conflict over scarce resources developing into a security concern for USAFRICOM.

While the hypothesis states conflict over the water will cause interstate friction and possible conflict, history has not supported this argument. If H₀ proves to be true, what factors cause the level of friction not to rise to the level of inter-state conflict? Furthermore, are the factors exportable to claims over other natural resources?

Literature Review

The reasons for conflict over water are not evident because water wars have not occurred in 4,500 years. History has shown most conflicts involving water are resolved through local cooperation efforts or larger state to state grievances incorporating water issues into peace settlements. However, there are some ideas that explain why states wage wars and how scarce natural resources influence the states.

Carl von Clausewitz's treatise, *On War* serves as a starting point for any discussion about war. He claims states conduct war to achieve a political end.³ His trinity of danger, reason and chance, guides state's foreign policy regarding the appropriate use of force. If all state actions, including war, are political in nature, foreign policy must be the visible manifestation of how states interact with other states to get what they want. Paul Collier and Nicholas Sambanis while working as chief economists for the World Bank developed another useful model. Their model examines the variables influencing African nations' stability, specifically whether a state is prone to civil war. Collier and Sambanis use quantifiable methods such as the opportunity model and grievance models as predictors of stability.⁴ B.C. Smith, Professor of Politics at the University of Dundee, also developed theories predicting conflict. Smith

³ Carl Von Clausewitz, *On War*, (New Jersey: Princeton University Press, 1976), 87.

⁴ Paul Collier and Nicholas Sambanis, *Understanding Civil War Volume 1: Africa* (Washington DC: The World Bank: 2005)3-17.

focused on the qualitative aspects of a country's political system and determines if the political regime is stable.⁵ These themes provide the foundations for understanding conflict over scarce resources.

Clausewitz, Collier and Smith's theories provide an understanding about why countries wage war, and conflict over access to natural resources. If states wage wars for political reasons based on their fear, honor or interests, then accepting that states engage in conflict to secure resources vital to their interests is a logical conclusion. Michael Klare, author of *Resource Wars*, argues nations will interpret any interference of resources, particularly natural resources, as threatening a state's national security.⁶ Greg Austin furthers the argument in *China's Ocean Frontier* by adding the sovereignty of the nation to the problem. He acknowledges the need to ensure a state's security by access to scarce resources; historical claims to the resources drives states to conflict. Without this claim to sovereignty, states work through cooperation agreements to secure access to resources.⁷ In addition to historical claims, international norms are fundamental to the decision of who is sovereign over shared natural resources. At the heart of Austin's argument are the norms of territorial acquisition. He discusses four concepts, occupation, prescription, cessation and conquest, and accretion.⁸ Marwyn Samuels includes historical claims into the validity of resource claims. According to Samuels, Chinese maritime law supports China's claim to the Spratly and Paracel islands.⁹

What is the link between environmental scarcities and inter/intra state conflict? Thomas Homer-Dixon, a professor at the University of Waterloo, theorizes there is a causal link between damaged environments and conflict. He hypothesizes three environmental links with violent conflict. First, decreasing supplies of controllable resources provokes interstate resource wars. Second, large population

⁵ B.C. Smith, "*Understanding Third World Politics* (Bloomington: Indiana University Press, 2003), 219.

⁶ Michael T. Klare, *Resource Wars*, (New York: Metropolitan Books, 2001), 23.

⁷ Greg Austin, *China's Ocean Frontier: International Law, Military Force and National Development*, (St. Leonards: Allen & Unwin, 1998), 13.

⁸ Austin, 339-350.

⁹ Marwyn S. Samuels, *Contest for the South China Sea* (New York, New York: Methuen) 77.

movements caused by environmental factors produces ethnic clashes. Finally, environmental scarcity causes economic deprivation and disrupts social institutions leading to civil strife and insurgencies.¹⁰

Water is the most precious natural resource. While the Earth has lots of water, very little of it is freshwater. Miriam Lowi, author of *Water and Power* describes political dynamics of high and low politics. High politics are the state to state level negotiations and low politics are intrastate negotiations at local levels. She claims low politics negotiate water disputes.¹¹ Her studies of the Jordan River Valley have shown that arrangements at the local levels resolve conflicts over water. A useful indicator of water stress in a region is the Falkenmark Water Stress Index which relates scarcity with the meters of water available per person.¹² This metric is heuristic and does not account for agriculture, livestock or unequal distribution. Aaron Wolf, Professor of Geology at Oregon State University, recognizes the difficulty and potential for conflict for water claimed by multiple states. He built on the Falkenmark model and added two additional considerations. First, determine the supply and demand aspects of the water source. Second, determine if the region's political infrastructure and economic base can absorb the stress from the water situation. If the institution absorbs the stress, water cooperation policies reduce the potential for violence. However, if the institution cannot absorb the additional stress, water conflict is the predicted outcome.¹³ He argues strong international cooperation is the diffusing mechanism for these riparian conflicts.

Section 2: Spratly Islands Case Study

The Spratly Islands region provides an ideal barometer for observing the conditions in which states compete for natural resources. This section defines the physical geography of the region, the claims, applicable laws, and a history of the conflict. The Spratly Islands themselves do not provide any strategic

¹⁰ Thomas Homer-Dixon, "Environmental Scarcities and Violent Conflict: Evidence from Cases", *International Security* 19 (1994), <http://www.library.utoronto.ca/pcs/evidence> (accessed 10 February 2009).

¹¹ Miriam Lowi, *Water and Power* (Cambridge, UK: Cambridge University Press), 9.

¹² Aaron T. Wolf, Shira B Yoffe, and Mark Giordano "International Waters: Identifying basins at risk", *Water Policy* 5 (2003), 41.

¹³ Aaron T. Wolf, "Water Conflict and Cooperation", *State of the World 2005* (2005), 90.

advantage to any nation. However, if any state successfully claims the Spratly Islands, the state also claims the 12 mile territorial waters and the 200 mile Exclusive Economic Zone (EEZ) which includes fishing and any natural gas or oil under the seabed. This section demonstrates states resort to conflict to secure these rights.

Spratly Archipelago

The Spratly Islands are located in the South China Sea between China, Taiwan, the Philippines, Vietnam and Indonesia. There are three categories within the Spratly Islands, Western, Southern Shoals and the Dangerous Area.¹⁴ Figure 1 shows the dispersion of islands in the archipelago and it's proximity to neighboring countries in the South China Sea. In total, there are 235 barren rocks making up the Spratly archipelago, many of which are not above sea level during high tide.¹⁵ The largest of the islands are Spratly Island at 750 meters long and 450 meters wide, the Northeast Cay at 1 kilometer long and 400 meters wide and Itu Abu at 1 kilometer long and 400 meters wide.¹⁶ The archipelago, with a total land mass of 3 square kilometers, sprawls over 200,000 square kilometers.¹⁷ None of the Spratly Islands have any indigenous populations and only a handful have any people. Since these islands cannot support life, all life sustaining supplies need to be brought to the islands. In order to understand the history of the claims for sovereignty by multiple nations, it is important to understand why the nations are seeking sovereignty. The following sections discuss the United Nations Convention Law of the Sea and the potential natural resources of the archipelago.

¹⁴ Bob Catley, *Spratlys: The Dispute in the South China Sea* (Aldershot: Ashgate Publishing Limited), 3.

¹⁵ Ibid.

¹⁶ Greg Austin, *China's Ocean Frontier: International Law, Military Force and National Development* (St Leonards: Allen and Unwin Australia Party Ltd), 132.

¹⁷ John C. Baker, *Cooperative Monitoring in the South China Sea* (Westport: Praeger), 2.



Figure 1: Map of Spratly Islands and Surrounding Area¹⁸

United Nations Convention Law of the Sea

The United Nations Convention Law of the Sea (UNCLOS) passed in 1982, establishes some important terms of reference for the parties claiming sovereignty over the Spratly Islands. The convention defines states' territorial waters as extending up to 12 nautical miles. Inside the territorial waters, a state has sovereignty over the air, surface, sub-surface and sub-soil.¹⁹ The convention also describes a state's Exclusive Economic Zone (EEZ). Article 57 defines the EEZ as, "The exclusive economic zone shall not extend beyond 200 nautical miles from the baselines from which the breadth of the territorial sea is measured."²⁰ The EEZ gives the state sovereign rights to explore and exploit the natural resources on

¹⁸ Spratly, Spratly Islands (Nansha Islands) of China, http://www.spratlys.org/maps/1/spratly-islands_95.jpg (accesses 15 January 2009).

¹⁹ Oceans and the Law of the Sea, "United Nations Convention on the Law of the Sea", http://www.un.org/Depts/los/convention_agreements/texts/unclos/closindx.htm (accessed 3 January, 2009).

²⁰ Ibid.

land, below the water and sub-soil. Lastly, the UNCLOS states in Article 121, rocks that cannot sustain human occupation cannot possess EEZ or a continental shelf.²¹ The UNCLOS establishes the parameters for a state to lay claim to a region of water and exploit the resources within the water.

The South China Sea, in which the Spratly Archipelago resides, may have substantial deposits of oil and natural gas. Oil was discovered in the region as early as the 19th century with the first oil well drilled in 1872.²² The sovereignty disputes of the Spratly region prevent any exploratory drilling, but estimates of the oil reserves are over 7 billion barrels.²³ However, Chinese estimates of the oil reserves are much higher. They estimate the potential oil reserves as high at 213 billion barrels of oil. Outside of China this claim is largely disputed.²⁴ Despite this, the Chinese estimate would place the South China Sea as the second largest oil reserve next to the Persian Gulf.

Oil is not the only natural resource drawing states into confrontation over the Spratly Islands. The South China Sea also has known natural gas deposits. The US Geological Survey has the South China Sea estimates for natural gas at 266 Trillion Cubic Feet (Tcf) and the Spratly Islands at 35 Tcf.²⁵ The Chinese estimates, like their estimates for potential oil reserves, are higher. The Chinese estimate the potential natural gas reserves at 900 Tcf for the Spratly's and 2,000 Tcf for the South China Sea.²⁶ The demand for energy is increasing throughout Asia, in particular China, and throughout the world. The competition for access to energy resources in the Spratly Islands remains a source of tension for the region.

²¹ Ibid.

²² Samuels, 154.

²³ Baker, 40.

²⁴ Ibid 41. The US Geological Survey claims the potential oil reserves may be 23 bil b/d for the South China Sea, including the Paracel and Spratly Islands. This figure still places the South China Sea as the world's third largest oil reserve.

²⁵ Ibid, 43.

²⁶ Ibid, 42-43.

Spratly Claims

The People's Republic of China (PRC) lays claim to the entire Spratly archipelago through the principle of first discovery. China claims Chinese fishermen discovered the Spratly Islands in the 2nd Century and mapped the archipelago by the 3rd Century.²⁷ While China may have discovered the Spratly Islands, they did not administer over the islands. The first modern claim to the Spratly Islands occurs in 1933. The French annexed seven of the islands on 26 July 1933 under the terra nullius, land belonging to no one.²⁸ The Chinese protested France's claim over the islands. China responded with the right of first discovery and asserted Chinese nationals worked and lived on the islands. The next critical date for Chinese claim to the Spratly Islands is 1946. Despite China's protest of French annexation, the islands remained under control of French forces from 1933-1939. In 1939, Japanese forces occupied islands in the Spratly archipelago and claimed the entire island chain as Japanese territory. After Japan's defeat in WWII, possession of these islands reverted back to France. In 1946, both the French and Chinese sent naval forces to the Spratly Islands to take possession of the islands.²⁹ French forces landed on Spratly and Itu Abu islands and left stone markers linking the landings to the 1933 annexation.³⁰ While it is clear a Chinese naval force went to Itu Abu, it is not clear if they took possession of the island by occupation. However, one year later, the Republic of China placed the Spratly Islands under the administrative control of the Kuangtung Province and a Chinese administrator occupied his position on Itu Abu Island.³¹

The 1951 Treaty of San Francisco intended to wrap up the Japanese involvement during WWII in the Pacific. However, since the end of the World War II to the beginning of the conference, the players had changed. The Chinese Civil War created the People's Republic of China (PRC) on the mainland and the Republic of China (ROC) on Formosa Island. Both of the Chinas, with identical claims to all of the

²⁷ Catley, 33.

²⁸ Austin, 135.

²⁹ Ibid, 141.

³⁰ Austin, 142.

³¹ Samuels, 76.

Spratly Archipelago, were absent from the conference.³² At this conference, Japan officially renounced all claims to the Paracel and Spratly Islands. Absent from the declaration is acknowledgement to whom the islands belong. International tribunals have subsequently judged the Japanese occupation of the islands to be illegal and therefore sovereignty remained with France.³³ Using the Soviet Union delegation as a proxy, the PRC formally declared the entire Spratly archipelago as sovereign Chinese territory.³⁴ In August of 1951, the Foreign Minister for the PRC declared the Spratly Islands have always been Chinese territory, and they remain Chinese territory regardless of any treaties.³⁵ Currently, China occupies seven of the larger islands.³⁶

Taiwan's claim to the Spratly Islands mirrors China's, they claim the entire Spratly chain as sovereign territory based on first discovery. Taiwan is in a much different strategic position than China. The desire for the natural resources is not the motivating factor in Taiwan's desire for the Spratlys. A Taiwanese claim to the Spratly Islands allows them to maintain the Sea Lines of Communication open and prevent a naval blockade from China.³⁷ Taiwan possesses one island in the Spratlys, Itu Aba. China occupied this island in 1947, but withdrew its forces after the emergence of the Peoples Republic of China. However, Taiwan reoccupied the island in 1956 and maintains a small garrison, approximately 100 soldiers, to the present day.³⁸

The Socialist Republic of Vietnam (SRV) also claims the entire Spratly Archipelago as sovereign Vietnamese territory. Three events supported the Vietnamese claims to the Spratly Islands, historical claims going back to the 17th century, the French claims of 1933/1946 and the Vietnamese government's actions after 1951. Vietnamese published history with the Spratly Islands goes back to the 1630s with

³² Ibid, 78.

³³ Austin, 144.

³⁴ Samuels, 78.

³⁵ Ibid, 79.

³⁶ Baker, 4.

³⁷ Catley, 85.

³⁸ Rames Amer, *War or Peace in the South China Sea?*(Copenhagen: NIAS, 2002), 30.

atlases mentioning the island chain.³⁹ Vietnamese history shows evidence of the South China Sea exploited for economical benefit as evident by Vietnamese salvage parties recovering cargo from shipwrecks. Furthermore, Vietnamese fishermen harvested fish and turtles from the surrounding seas.⁴⁰ European mariners trading with Asian cultures recognized the Vietnamese claims. Specifically, Dutch and Portuguese maps indicate the Spratly islands under Vietnamese control.⁴¹ The economic importance of the Spratly Islands facilitates Vietnamese administrative control of the archipelago under the Binh Son district.⁴² However, at the time, the Spratly Islands were lumped together with the Paracel Islands. Despite this fact, Vietnamese history documents discovery, economic exploitation and administration of the islands.

As discussed earlier, the French claimed seven of the Spratly Islands. Vietnam claims the French titles to the Spratly Islands transferred to Vietnam, specifically to the Republic of Vietnam when they gained independence in 1954. French claims to the islands date back to the 1933 annexation. France claimed these islands for the state of Vietnam (Cochin China). At the time of annexation, Cochin China was the sovereign territory of France and was serving as a protectorate for the states of Tonkin, Laos, Annam and Cambodia.⁴³ When France granted independence to the Republic of Vietnam in 1954, they also granted Vietnam sovereignty of the Paracel Islands. France never transferred title of the Spratly Islands to the new Vietnamese state.⁴⁴ In 1956, the Charge d' Affaires in Manila informed the Philippine government the Spratly Islands were French territory.⁴⁵

³⁹ Todd C. Kelly, "Vietnamese Claims to the Truong Sa Archipelago (ed. Spratly Islands), A Journal of Southeast Asian Studies Student Association. <http://www.hawaii.edu/cseas/pubs/explore/todd.html> (accessed 6 January 2009).

⁴⁰ Ibid.

⁴¹ Ibid.

⁴² Ibid.

⁴³ Austin, 140.

⁴⁴ Samuels, 77.

⁴⁵ Ibid, 84.

Vietnam formally announced its sovereignty over the Spratly Islands during the San Francisco Conference in 1951. The Vietnamese delegation asserted for the first time that the Spratly Islands were the territory of Vietnam and had always belonged to Vietnam.⁴⁶ The chain of title for Vietnam becomes muddy with the division of Vietnam to separate states, the Democratic Republic of Vietnam (DRV) and the Republic of Vietnam (RVN). The RVN maintained its rights to the Spratly Islands, but the DRV recognized the PRC's claim to the islands.⁴⁷ The RVN occupied several of the islands from 1973-1975.⁴⁸ The RVN consistently protested any other states claim to the Spratly Islands, including China, Malaysia and Vietnam. When Vietnam reunified in 1976, the DRV reiterated its claim to the Spratly Islands. By the 1980s, Vietnam started to occupy islands in the Spratlys. Currently, Vietnam occupies 27 islands and maintains 600 soldiers in the Spratly Islands.⁴⁹ As of May, 2008, Vietnam continues to contend sovereignty over the Spratly archipelago.⁵⁰

Malaysia currently claims the southern part of the Spratly archipelago. Malaysia publicized its claim to the Spratly Islands with a map depicting the 12 mile territorial waters and its continental shelf in December 1979.⁵¹ Malaysia's claim to the islands is based on terra nullius.⁵² Malaysia argues the unoccupied islands in their map fall within Malaysia's continental shelf.⁵³ This claim of terra nullius for all of the claimed islands is not supportable because Vietnam occupied two of the islands, Amboyna Cay and Barque Canada. In 1983, Malaysia occupied its first islands in the archipelago, Swallow Reef. The PRC and Vietnam formally objected to Malaysia's occupation of their islands claiming the island's

⁴⁶ Kelly.

⁴⁷ Austin, 149.

⁴⁸ Ibid, 146.

⁴⁹ Baker, 4.

⁵⁰ BBC Monitoring Asia, "Vietnam reaffirms sovereignty over Spratly, Paracel Islands", 6 May, 2008, [http:// www.proquest.com](http://www.proquest.com) (accessed 8 January, 2009).

⁵¹ Nguyen Hong Thao, Ramers Amer, "Managing Vietnam's Maritime Boundary Disputes, Ocean Development and International Law 38 (2007): 308.

⁵² Terra Nullius is a legal term meaning land belonging to no one.

⁵³ Austin, 156.

sovereignty was already established.⁵⁴ Malaysia expanded its occupations and currently occupies four islands with approximately 70 soldiers.⁵⁵

The Philippine claim to the Spratly islands goes back to 1956. On 11 May 1956, a Filipino named Thomas Cloma claimed 33 islands in the southern Spratlys for the independent state of Kalayaan or Freedomland.⁵⁶ Cloma intended to establish a state, distinct from the Philippines. He claimed the right of discovery and his group's occupation of the islands gave them the legal authority to take possession of the islands. Vietnam and the Republic of China immediately protested the Cloma's claims and sent warships to ensure their sovereign rights.⁵⁷

The official Philippine response to Cloma's claim is a major impetus to the current debate over the islands. The Philippine Vice-President's response to Cloma's claim indicated the Spratly Islands, since abdicated by the Japanese through the San Francisco Treaty with no successor specified, were the possessions of the Allied Powers.⁵⁸ His response did not assert Filipino claims on the islands, but rather *res nullius*.⁵⁹ This response, combined with Cloma's declaration of possession, triggered the ROC to re-occupy Ita Abu and prompted naval patrols by the ROC, Vietnam and the PRC.⁶⁰ Thomas Cloma's claim to the Spratly Islands served as the core of Philippine claims to the islands.

In 1971, the Philippine government began asserting its rights to the Spratly Islands. On 10 July 1971, the Philippine President, Marcos, laid claim to 53 islands within the Spratly archipelago based on the Cloma claims in 1956.⁶¹ Shortly after President Marcos proclamation, the Philippine Navy occupied

⁵⁴ Austin, 156.

⁵⁵ Baker, 4.

⁵⁶ Samuels, 82.

⁵⁷ Austin, 152.

⁵⁸ Samuels, 83.

⁵⁹ *Res nullius* is a legal term meaning the property belongs to everyone. For example, wildlife belongs to everyone and not a specific person. In the case of the Spratly Islands, the archipelago belongs to all of the allied powers of WWII and is a shared asset for everyone's benefit.

⁶⁰ Samuels, 86.

⁶¹ *Ibid*, 89.

four of the southern Spratly reefs and islands.⁶² By April, 1972, the Philippine province of Palawan administered Cloma's Kalayaan state. The Philippine government asserts Thomas Cloma passed his claim of the Spratlys to the Philippines. In 1978, the Philippines issued Presidential Decree 1596 claiming sovereignty over the Spratly Islands.⁶³ The decree claimed Philippine sovereignty supported by four points. The islands belonged to no state, and since the Philippines now occupy the area they are under Filipino jurisdiction. Previous claims to the islands by other states are no longer supported because of abandonment. Kayalaan is on the Philippine continental shelf. Finally, the proximity of the islands is vital to the Philippines security and economy.⁶⁴ The Philippines currently occupies eight islands and has approximately 480 soldiers stationed there.⁶⁵

Conflict over the Islands

Each of the above states lay claim to all or some of the Spratly Islands. There is an increased risk of conflict because of the garrisons on the islands, the diplomatic rhetoric, the potential for natural resources and a history of conflict. This section discusses the conflict arising from the Spratly Islands. The first instance of conflict, and the most violent, occurred in 1988 between China and Vietnam. The PRC started in earnest occupying islands throughout out the Spratlys. In March 1988, China occupied Fiery Cross Reef with its soldiers. The PRC, while already claiming sovereignty over the entire archipelago, reinforced their claim with military occupations. Vietnam, also claiming the entire archipelago, protested China's occupation of its sovereign island by sending a naval fleet to the reef. China sunk three Vietnamese ships and killed 74 Vietnamese sailors during the brief naval clash.⁶⁶ Since the naval clash in 1988, China has detained fishermen from countries with competing claims for

⁶² Austin, 153.

⁶³ Chan Robles Virtual Law Library, "Presidential Law Decree 1596", <http://www.chanrobles.com/presidentialdecrees/presidentialdecreeno1596.html> (accessed 13 January 2009)

⁶⁴ Austin, 154.

⁶⁵ Baker, 4.

⁶⁶ Catley, 8

exploiting resources in China's EEZ. Taiwan claims 134 fishing boats were detained, harassed or fired upon by China's naval forces from 1992-1996.⁶⁷ China, while certainly the military power in the region, is not the only antagonist. In 1998, the Philippine Navy detained and later arrested 20 Chinese fishermen at Mischief Reef.⁶⁸ The PRC, ROC, Vietnam and the Philippines claim Mischief Reef. In October 1999, Vietnamese forces on Tinent Reef fired on a Philippine aircraft while it was conducting an over flight at 200ft.⁶⁹ The United States is not immune to the conflicts in the Spratly Islands. The April 2001, midair collision of a US Navy EP-3 and a Chinese F-8 fighter resulted in the death of the Chinese pilot and the American crew detained on Hainan Island.⁷⁰ To strengthen claims of sovereignty, states occupied more islands. Since all of the islands are claimed by China, Vietnam and Taiwan and select islands by the Philippines and Malaysia, any additional claims of disputed islands are sternly rebuked. The reactions are predominately diplomatic, but with military garrisons in the region, aggression remains an option. International organizations attempt to mitigate the potential for conflict over the Spratly Islands.

International organizations have taken measures to reduce the levels of conflict in the South China Sea. Association of South East Asian Nations (ASEAN) produced two documents, the Treaty of Amity and Cooperation and the Declaration on the Conduct of Parties in the South China Seas, to enable peaceful conflict resolution. ASEAN's Treaty of Amity and Cooperation (TAC) is a document designed to foster mutual cooperation and peaceful resolution of disputes within the ASEAN countries. Chapter 4, Pacific Settlement Disputes, states, "In case disputes on matters directly affecting them should arise, especially disputed likely to disturb regional peace and harmony, they shall refrain from the threat or use of force and shall at all times settle such disputes among themselves through friendly negotiations."⁷¹ Two of the Spratly claimants, Malaysia and the Philippines, signed the 1976 treaty. Vietnam signed the

⁶⁷ Baker, 51.

⁶⁸ "Beijing Presses Manila to Free 20 Fishermen" *New York Times*, 22 December, 1998, A4.

⁶⁹ Baker, 60.

⁷⁰ *Ibid*, 51. The crew of the American EP-3 was later released.

⁷¹ ASEAN, "Treaty of Amity and Cooperation in South East Asian Indonesia, 24 February 1976", <http://www.aseansec.org/1217.htm> (accessed 17 January 2009).

treaty in 1998 and the PRC agreed to accede to the provisions of the treaty in 2003.⁷² Only Taiwan does not expressly adhere to the treaty, however, ASEAN recognizes a one China policy. The other document attempting to ameliorate Spratly claimants is the Declaration on the Conduct of Parties in the South China Sea.

ASEAN's Declaration of the Conduct of Parties in the South China Sea intended to reduce the incidents and potential for violent conflict over the Paracel and Spratly Islands. In the declaration, the signatories commit themselves to the UNCLOS principles of freedom of navigation and overflight in the South China Sea. Further, the treaty prohibits states from the use of force or the threat of force to resolve territorial disputes, to include military occupation of uninhabited islands.⁷³ The PRC and Malaysia signed the declaration in 2002; however, Vietnam, the Philippines, and Taiwan did not sign the declaration.

Analysis of Claims

The status quo in South China Sea appears to be tolerable to all claimants as evident by the lack of military conflict and legal actions submitted through the international courts. The UNCLOS, as written, supports each of the claimants' legal justification to the archipelago. The semi-enclosed South China Sea ensures all parties' claims lie within their EEZ or within their continental shelf. The PRC's claim to the Spratlys is the weakest according to international law because they have no continental shelf and the Spratlys physical proximately from the Chinese mainland. Mainland China is over 1000 miles from the nearest island in the Spratlys. The claim of right of discovery does not imply the islands' occupation and exploitation. The claims' strength is irrelevant because the PRC continues its claim over the entire archipelago and occupies seven islands with no competing state capable of forcefully asserting their claims of sovereignty. Being the regional hegemon allows the PRC to sign regional treaties and declarations concerning the Spratlys yet not be constrained by the documents as evident by expanding

⁷² Embassy of the Peoples Republic of China in the Republic of Indonesia, "China joins treaty of Amity, Cooperation in Southeast Asia", <http://id.china-embassy.org/eng/xwdt/t87231.htm> (accessed 19 January 2009).

⁷³ ASEAN, "Declaration on the Conduct of Parties in the South China Sea", <http://www.aseansec.org/13163.htm> (accessed 8 January 2009).

Spratly occupations. The United States is the only state strong enough to forcefully challenge the PRC's claims. The United States would become involved in the dispute if the strategic sea lanes through the South China Sea became impassable through a state's sovereignty claim or conflict over the islands.⁷⁴ Taiwan's claim to the Spratlys is equally weak and they lack the military force to compel competing states.

Vietnam's claims to the Spratlys are similar to China's claim, claiming the entire archipelago through right of discovery. This claim is untenable for the same reasons as China's claim, no continuous occupation of the islands. The Vietnamese also claim possession of the Spratlys transferred from France to Vietnam. As previously stated, France asserted its rights to the Spratlys after Vietnam obtained its independence. Vietnam is an original signatory on the Treaty of Amity and Cooperation; however, they did not sign the Declaration of Conduct on the South China Sea. Vietnam will continue to occupy uninhabited islands to strengthen their claim over the archipelago.

The claim of the Philippines is legally the strongest of all the claimants. Through Thomas Cloma's adventures, they can claim occupation of the islands by Filipino nationals despite Cloma's original intent for an independent state. The islands the Philippines claim are physically proximate to the archipelago state. The Philippines view China's and Vietnam's claims and subsequent occupations of the islands as a threat to their security. The Philippine Navy will continue to patrol the Spratly Islands under their control and detain and arrest fishermen whom they view as exploiting resources that belong to them.

Malaysia's claim to the Spratly Islands is legally unsupportable. Their claim to the Spratlys began in the 1970s, long after the other claimants began occupations of islands. Their claim disregards other states' claims and in the case of the China's and Vietnam's, their historical evidence. Furthermore, they have no history of exploiting the Spratly Islands for economical benefits.

Ironically, competing states' military occupation of the Spratly Islands forces a peaceful status quo for the time being. Military occupations have emerged into a deterrent state as each claimant in the

⁷⁴ Catley, 115.

Spratly dispute occupies islands with their respective military forces. Currently, these states are unwilling to violently contest each other for the possession of these small islands. The confirmation of significant hydrocarbon deposits in the South China Sea would alter the status quo. Sovereignty disputes of the region prevent geological surveys confirming the quantities of oil and natural gas. When the energy deposits are confirmed, claimant states will exploit the Spratly Islands for energy resources. Historically, states have violently contested possession of the Spratly Islands, and with military occupations throughout the archipelago, the region is ripe for future violence.

Section 3: Lake Chad System

This section addresses the factors affecting Lake Chad. Like the Spratly case study, the Lake Chad system is a complex system with interconnecting relationships. The subsections of this section are not stand alone, rather assemblages of that system and comprised of multiple parts. This section establishes a scarcity of fresh water throughout the world and water conditions in Western Africa, the effect of climate change throughout the region, international law governing the use of transboundary, non-navigational watercourses, the characteristic of Lake Chad and its feeder tributaries, the demographics of the region, previous history of conflict surrounding the lake and possible future issues for the lake. Finally, an assessment of the propensity of the Lake Chad system, specifically as it relates to conflict. While the details of the Lake Chad system are discussed later, it is important to have a fundamental understanding of the lake and its basin. Lake Chad is a transnational lake, sharing borders with Niger, Nigeria, Cameroon and Chad. The tributaries feeding the lake are also transnational and flow through one additional country, the Central African Republic. Lake Chad, once a visible landmark for astronauts from space, has shrunk in size over 90%.⁷⁵

⁷⁵ Lester Brown, "Emerging Water Shortages," *The Humanist* (March-April 2008), 27.

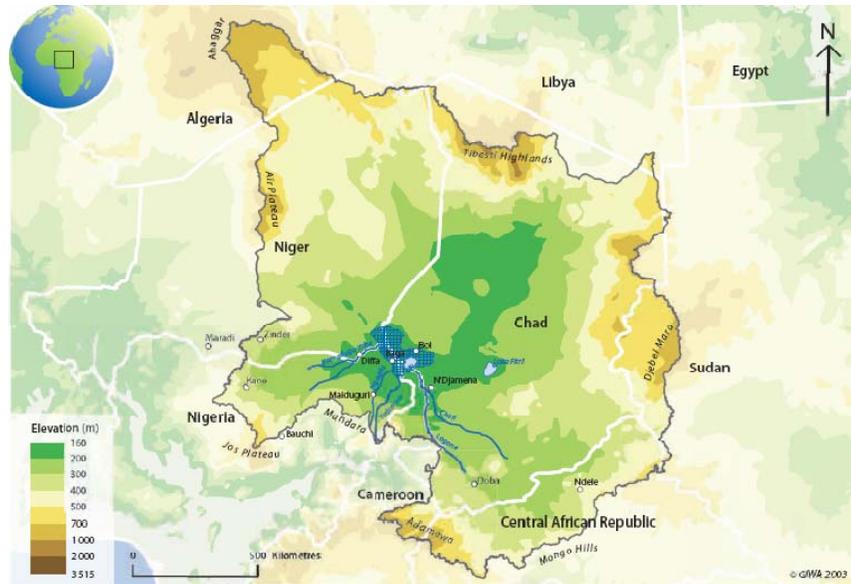


Figure 2: Lake Chad Basin⁷⁶

Water in General

This section provides background information of the availability of water and the scarce water conditions present in West Africa. Water is the most precious resource on Earth because it is vital for human existence. Water covers seventy five percent of the earth's surface, but ninety seven percent of the water is saline and unfit for human use.⁷⁷ Of the remaining three percent of fresh water, eighty seven percent is located in polar ice. The thirteen percent of remaining fresh water is surface, lakes and rivers, subsurface water aquifers and water present in soil. Despite the abundance of the water on Earth, only one hundredth of one percent is accessible to human use.⁷⁸ While the amount of water remains constant, the amount of fresh water available fluctuates. This fraction of available water is approximately 110,000 km³ a year; however, this is not the amount humans can use.⁷⁹ The majority of this water, 70,000 km³, is water vapor in the atmosphere. The remaining 40,000 km³ of fresh water resides in rivers, streams and

⁷⁶ Global International Waters Assessment, *Lake Chad Basin GIWA Regional Assessment 43* (Kalmal: United Nations Environment Programme, 2004), 13.

⁷⁷ Rodaslav S. Dimitrov, "Water, Conflict and Security: A Conceptual Minefield," *Society and Natural Resources*, no 15 (2002): 678.

⁷⁸ Klare, 143.

⁷⁹ *Ibid*, 143.

aquifers.⁸⁰ Over half of this water becomes available during the seasonal flooding and becomes lost through surplus runoff. The amount of water available for human use at any given time is approximately 12,500 km³ of which the majority goes to agricultural activities.⁸¹ There are two categories for fresh water, renewable and non-renewable. Non-renewable water comes from deep aquifers. Once the water is extracted from these aquifers, it requires centuries to replenish. All other waters are renewable. The water available for human use, both renewable and non renewable, incorporates fresh water for human, agriculture, and livestock consumption.

Falkenmark Water Stress Index	
Water (m ³) per Person	Scarcity Level
> 10,000 m ³	Limited Management Problems
10,000-1600 m ³	General Management Problems
1600-1000 m ³	Water Stress
1000-500 m ³	Chronic Scarcity
<500 m ³	Beyond Management "water barrier"

Table 1: Falkenmark Water Stress Index⁸²

The most accepted indicator of human water requirements is the Falkenmark’s Water Stress Index (WSI). The WSI is a tool to gauge whether a region’s population exceeds the available water.⁸³ As stated earlier, Lake Chad is a transboundary lake shared by Nigeria, Niger, Cameroon and Chad. The amount of water per capita for the four states indicates these countries are beyond the “water management barrier” (Table 2). The per capita numbers are an aggregate and do not represent equal distribution. In all of the countries, except Chad, the urban population receives more freshwater than their rural counterparts.

⁸⁰ Ibid, 143.

⁸¹ Ibid, 144. 70% of available freshwater on earth goes to agriculture.

⁸² Aaron T. Wolf, Shira B Yoffe, and Mark Giordano “International Waters: Identifying basins at risk”, *Water Policy*, no 5 (2003) 41.

⁸³ There are several shortcomings of the WSI. The most notable is the index assumes equal distribution of water throughout the area.

Another indicator of the availability of water is the annual renewable water resource. This number represents the amount of water introduced into the system. The renewable water includes rainfall and the water in rivers and does not include water drawn from aquifers. Table 2 indicates Nigeria and Cameroon draw significantly more freshwater than Chad and Niger. All four states are in a water scarcity environment. Chad and Niger have access to significantly less water than Nigeria and Cameroon and are in an extreme water scarcity environment. As a measure of comparison, the United States water per capita is 1600 m³/year per person.⁸⁴ The next section examines the impact of climate change on four states.

Country	Per Capita Water m³/year	Annual renewable (km³/yr)	% of population receiving freshwater Urban/Rural/Total
Nigeria	61 m ³ /yr	286.2 km ³ /yr	67% / 31% / 48%
Niger	156 m ³ /yr	33.7 km ³ /yr	80% / 36% / 46%
Cameroon	61 m ³ /yr	285.5 km ³ /yr	86% / 44% / 66%
Chad	24 m ³ /yr	43 km ³ /yr	41% / 43% / 42%

Table 2: Water Per Capita^{85 / 86 / 87}

Climate Change

According to the United Nations Intergovernmental Panel on Climate Change, “Africa is one of the most vulnerable continents to climate change and climate variability.”⁸⁸ The continent of Africa is vulnerable to climate change because much of the population currently lives in relative deprivation. Droughts, which have become more frequent since the 1960s, devastate local agriculture and increase the

⁸⁴ CIA, “The World Factbook”, <https://www.cia.gov/library/publications/the-world-factbook/index.html> (accessed 5 February 2009).

⁸⁵ CIA, “The World Factbook”, <https://www.cia.gov/library/publications/the-world-factbook/index.html> (accessed 5 February 2009).

⁸⁶ Pacific Institute, “Total Freshwater Supply by Country”, <http://www.worldwater.org> (accessed 9 Feb 2009).

⁸⁷ Peter H Gleick, *The World’s Water 2008-2009* (Washington DC: Island Press), 214-215.

⁸⁸ Michel Boko, *2007 Intergovernmental Panel on Climate Change* (Cambridge: Cambridge University Press), 435.

risk of famine.⁸⁹ Climate change also exacerbates floods, which erodes topsoil leaving the soil devoid of nutrients. Clearly there will be winners and losers in Africa due to climate change. Slight increases in temperature have changed the ecological landscape of Africa. According to Nigel Arnell, Professor of Geography at the University of Southampton, Africa will experience dramatic changes in water stress. However, western Africa, according to his model, experiences a reduction in water stress.⁹⁰ While Arnell's model anticipates a reduction of water stress in West Africa it does not predict the anticipated amount of rainfall. The reduction in water stress may prove disadvantageous to the Lake Chad region. According to Homer-Dixon's hypothesis of Ecological Marginalization, the relative abundance of water in West Africa and the decrease of water in other parts results in population migration.⁹¹ The population, seeking better conditions to live, migrate to regions they believe are better suited to support their needs. The relative abundance of water throughout the Lake Chad basin makes it a likely destination for migrants. Regardless, the region, already severely stressed, will continue to be water stressed for the foreseeable future. The confluence of population growth, migration and water stress creates conditions for famine.

International Law and Cooperative Organizations

Can a state do what it wants to with the water on its sovereign territory? One position argues water, like any other resource within territorial boundary of a state, can be used in any manner the state deems fit. The other position argues water, especially rivers that cross state boundaries, is a shared resource and requires equitable use. Furthermore, upstream states do not have the right to unilaterally divert waters from the downstream states.⁹² Unlike the United Nations Convention on the Law of the Sea which specifies its meaning, the only treaties governing the use of transboundary rivers and lakes are

⁸⁹ Boko, 436. Since 1968 through 1990, West Africa experienced a severe drought resulting in 20 to 40% less annual rainfall.

⁹⁰ Nigel W. Arnell, "Climate Change and Global Water Resources" *Global Environmental Change*, no 14(2004): 42

⁹¹ Thomas F. Homer-Dixon, 9.

⁹² Dimitrov, 679.

vague. Historically, international law has not been the mechanism resolving water disputes. Rather, disputes surrounding water have been resolved using bilateral or multilateral agreements or at low levels.⁹³ This section examines the two treaties from the United Nations governing the use of water from rivers and lakes and the bilateral agreements of the riparian Lake Chad states.⁹⁴

The 1992 Transboundary Watercourse Convention was the first attempt by the United Nations to provide a framework for dispute resolution among riparian states. Article 2 of the convention states the purpose as, “To ensure that Transboundary waters are used in a reasonable and equitable way, taking into particular account their Transboundary character, in the case of activities which cause or are likely to cause Transboundary impact.”⁹⁵ One of the shortcomings of this convention revolves around establishing the water required for all riparian parties. These agreements between the riparian states require bilateral or multilateral agreements. However, the convention provides a forum that allows grieved parties to take their case to the International Court of Justice.⁹⁶ The second UN treaty is the Convention on the Law of the Non-navigational Uses of International Watercourses. Unlike the Transboundary Watercourse Convention, this treaty specifically addresses the unique characteristics of transboundary rivers. Article 6 of the convention addresses the equitable use of these rivers. It states, “Utilization of an international watercourse in an equitable and reasonable manner within the meaning of Article 5 (Equitable and reasonable utilization and participation) requires taking into account all relevant factors and circumstances including the social and economic needs of the watercourse states concerned; and the population dependent on the watercourse in each watercourse state.”⁹⁷ Together, the United Nations Conventions protect the water rights of the downstream user from abuses of upstream states. The

⁹³ Lowi, 9.

⁹⁴ Riparian states are situated on the banks of a river or other body of water.

⁹⁵ United Nations Treaty Collection, Convention on the Protection and Use of Transboundary Watercourses and International Lakes 1992. <http://www.untreaty.un.org/> (accessed 10 February 2009)

⁹⁶ Ibid.

⁹⁷ Ibid

conventions provide the foundation for the development of bilateral and multilateral water agreements from the riparian states.

The United Nations Convention specifies that transboundary resources ought to be equitable. The riparian states develop water use agreements ensuring their states' interests have been achieved. The author expected to find water agreements between all the riparian states in the Lake Chad Basin. However, there is only one bilateral agreement on equitable water between Nigeria and Niger. The water agreement describes the shared water catchments between the two states; rivers, pools, seasonal streams and pools, and aquifers.⁹⁸ The largest catchment is the Komadugu-Yobe River. This river provides a potential flow of 1,296 million m³ of water, however, catchments along the river's path decreases the actual flow of the river.⁹⁹ According to the World Bank, only 1% of the rivers' original waters makes it to Lake Chad.¹⁰⁰ The river terminates into Lake Chad, providing roughly 2% of its waters.¹⁰¹ The second and third largest water catchments are shallow aquifers replenished by seasonal flooding of the Komadugu Yobe River. The Maggia-Lamido and Gada-Gulbin Maradi catchments provide maximum capability of 292 million m³ of water.¹⁰² The last catchment is a seasonal stream, the Tagwai-El Fadama, fed by flooding.

These catchments provide water for a significant portion of the two states' populations. According to the bilateral agreement, the catchment provides water for over twelve million people, ten million Nigerians and two million Nigers.¹⁰³ While the two countries have an agreement on water use, water distribution is not equal. In this water agreement, only 150,000 Nigers have access to perennial

⁹⁸ Integrated Ecosystem Management in Shared Catchments Between Nigeria and Niger, <http://www.gefweb.org> (accessed 10 February 2009)

⁹⁹ Ibid.

¹⁰⁰ The World Bank, *Reversal of Land and Water Degradation Trends in the Lake Chad Basin*, prepared by the Africa Safeguards Policy Enhancement Team, 2002, 7.

¹⁰¹ Eric O. Odada and Lekan Oyebande and Johnson A. Oguntola, "Lake Chad: Experience and Lessons Learned Brief" <http://www.iwlearn.net> (accessed 25 Aug 2008), 80.

¹⁰² Integrated Ecosystem Management in Shared Catchments Between Nigeria and Niger. The Gada-Gulbin Maradi catchment is solely dependent on seasonal flooding and provides 200 million m³ of water. Because of its seasonal nature, the water is available from July to October.

¹⁰³ Ibid.

waters. Nearly two million Nigers are reliant on seasonal water, and are extremely vulnerable to droughts. During the mid 1960s, four years after Cameroon and Nigeria's independence, the four riparian states formed the Lake Chad Basin Commission to manage the equitable use of the basin's waters.

The Lake Chad Basin Commission (LCBC) is a multi-lateral organization to equitably manage resources, promote economic development, and maintain peace and security of the basin.¹⁰⁴ Cameroon, Nigeria, Niger and Chad established the Lake Chad Basin Commission in 1964 as charter members. The original Lake Chad basin included 427,000 km² with the majority of the land in Chad (42%).¹⁰⁵ The commission was later expanded to include the Central African Republic as a full member and Sudan as an observer.¹⁰⁶ The additional states' participation in the commission brings the land management area to 2,434,000 km². The LCBC specifically prohibits member states from undertaking any unilateral action that negatively affects the lake or the lake's basin. However, the commission recognizes the water rights of the states within the basin.¹⁰⁷ The LCBC also arbitrates riparian disputes. The commission attempted to arbitrate the territorial dispute between Nigeria and Cameroon in 1994. The dispute highlighted the ambiguities of the states' boundaries running through the lake.

Lake Chad

As discussed previously, Lake Chad is a transboundary water source. The northern part of the lake and basin lie in Sahelian region, which is the transition of the Sahara Desert and the savannah plains.¹⁰⁸ The tributaries of the lake also flow through these countries and the Central African Republic. Measurements of the lake in the 1960s, at the water's most recent high point, recorded it as the fourth

¹⁰⁴ Lake Chad Basin Commission. 17 December 2008. *Roundtable: To Save Lake Chad Background Paper*. Sirte, Libya, 4.

¹⁰⁵ Luke Oneykakeyah, "Lake Chad, A Study of a Drying Freshwater Body" <http://riversymposium.com/index.php?element=ONYEKAKEYAH> (accessed 15 February 2009).

¹⁰⁶ Ibid.

¹⁰⁷ Ibid.

¹⁰⁸ Global International Waters Assessment, *Lake Chad Basin GIWA Regional Assessment 43* (Kalmar: United Nations Environment Programme, 2004), 25.

largest lake in Africa and the second largest endorheic lake in the world.¹⁰⁹ The growing population and change in climate dramatically changed the properties of the lake over the last 40 years. In 1963 Lake Chad covered over 25,000 km² or roughly the size of New Jersey. Today the lake has shrunk to 1,350 km² losing almost 96% of its waters.¹¹⁰ The water on Nigeria's side of the lake has completely receded beyond its border. Currently only small pools of water remain in Nigeria. The properties of the lake make it vulnerable to minor fluctuations. The lake's average depth is three meters and throughout the lake are marsh banks, reeds and small islands.¹¹¹ There are two pools, northern and southern, averaging a water depth of four to seven meters. Currently, the pools are the only large pools of standing water in the lake, which are the direct recipients of tributary waters. The shallow depths of the lake ensure the shorelines continuously ebb and flow during the dry and wet periods. Fluctuations of the lake's size have been common throughout history. The lake has completely dried up four times from 1400 to the present.¹¹² Lake Chad's receding waters go largely unreported in current maps and atlases. Maps of the region depict Lake Chad's borders at the 1960 high water mark which can lead the casual observer and researcher with the false impression that there is no current water shortage there. Accurate maps made today would depict a very different Lake Chad with only the northern and southern pools.

The four riparian states exist in a water scarce environment. Climate changes reducing the rainfalls proved devastating to ecosystem supporting Lake Chad. The 1973-74 and 1983-84 Sahelian droughts fundamentally changed the ecosystem supporting the lake. Increased desertification of the region pushed the Sahara Desert 100 km south.¹¹³ The desert's move south correspondently moved the Sahel south. The change of the ecosystem affected the long term rainfalls which the Lake Chad system depends upon. As a result of the two droughts and increased desertification, the average rainfall decreased

¹⁰⁹ Lake Chad Basin Commission, 2. Endorheic means the lake only has input tributaries. The waters of Lake Chad do not empty into another river, rather terminate at the lake.

¹¹⁰ Odaba, 75.

¹¹¹ Ibid, 80.

¹¹² Fred Pearce, *When the Rivers Run Dry: Water-The Defining Crisis of the Twenty-First Century* (Boston: Beacon Press, 2006), 85.

¹¹³ Global International Waters Assessment, 44.

30%.¹¹⁴ The reduction of rainfall and the corresponding drop in the lake affects the replenishment of shallow aquifers.

The lake and its floodplains serve a vital role recharging the basin's aquifers. The basin has three aquifers, upper, middle and lower, all of them shared by the four riparian states.¹¹⁵ These aquifers provide water to the water starved populous, and become vital to human survival during times of drought. The upper aquifer, approximately 30 meters from the surface, recharges through water seepage into the soil from streams, rivers, wetlands and the lake.¹¹⁶ During the past droughts, the upper aquifers were exploited beyond their ability to recharge and have lowered the mean water table.¹¹⁷ The middle aquifer lays 450 to 620 meters below the surface and extends beneath the four riparian states. These aquifers possess substantial waters, but currently are too expensive to extract.¹¹⁸ The lower aquifer exists, but very little information is available. While climate changes factor into the current recession of water, more people than previously recorded are getting their water from the lake and its feeder rivers.

Tributaries

Lake Chad gets its water from three sources, two tributary river systems and seasonal rainfall. Both of these rivers, Chari-Logone and the Komadugu Yobe River are transboundary and human developments on the rivers create additional stress on the system. This section addresses the geography of the rivers, the irrigation projects and the environmental considerations.

Chari-Logone River Sub-system

The Chari-Logone river system is a combination of rivers and streams converging into the Chari. This river system provides 95% of Lake Chad's waters. Feeder tributaries from Chad, Cameroon and the

¹¹⁴ Ibid, 45.

¹¹⁵ Ibid, 15.

¹¹⁶ Ibid.

¹¹⁷ Ibid, 51.

¹¹⁸ Ibid, 15.

Central African Republic support the Chari-Logone river system.¹¹⁹ The river stretches 1,400 km and its basin covers 650,000 km².¹²⁰ Over the last 40 years, the water discharge into the lakes as dropped 55%.¹²¹ Recently, the waters from the Chari-Logone system decreased output from 33.3 billion m³/yr average to 20.7 billion m³/yr.¹²² As previously discussed the mean rainfall throughout the basin decreased and the irrigation projects further reduce the flow of water to the lake and wetlands.

Within Cameroon, the Logone River was dammed on the upper part of the Waza-Logone flood plains. The Maga Dam was built in 1979 and spans 30 km with a catchment area of approximately 6,000 km². The purpose of the dam was to alleviate food security problems through the cultivation of rice, fish farming and also short term economic benefits from the construction efforts.¹²³ Discharge water from the river system decreased, further reducing the size of the lake.¹²⁴ Rather than provide economic stimulus, the dam damaged the flood plain and decreased economic value of the flood plains.

The Waza-Logone flood plains are a vital asset to Cameroon. The flood plains extend 8,000 km² throughout the northern areas of Cameroon and border Nigeria and Chad. The flood plains prior to the construction of the Maga Dam introduced \$10 million into the regional economy through agriculture and fishing.¹²⁵ The dam, while controlling the flood waters to protect rice cultivation, devastated the downstream flood plains. The flood plains, once 8,000 km² shrank to 964 km².¹²⁶ The economic cost to the downstream population in Cameroon and Chad exceeds \$2.4 million a year. The loss of the seasonal flooding reduced agricultural yields by depriving farmers of the seasonal flood waters for their field. The reduction of the flood waters also had an effect on the fisheries. With smaller seasonal floods, spawning

¹¹⁹ Ibid, 18.

¹²⁰ Ibid, 21.

¹²¹ Ibid, 46.

¹²² Ibid, 21. This average dates from 1932-1991. The reason for the decrease are climate related and diversion of the waters.

¹²³ Ibid, 46.

¹²⁴ The GIWA asserts the Maga Dam curtailed the downstream discharge by 30%.

¹²⁵ The World Conservation Union, "Waza Logone Floodplain, Cameroon: Economic Benefits of Wetland Restoration" May 2003.

¹²⁶ Ibid.

habitats decreased. As a result, the floodplains experienced a 90% decline in fish yields.¹²⁷ The flood plains also provide pasture areas during the dry season. Prior to the Maga Dam, approximately 250,000 cattle and sheep exclusively grazed on the grasslands. The reduction of water had a corresponding impact on the grasslands. The grasslands are smaller, the soil no longer supports the perennial grass, and the competition for the available grass has increased.¹²⁸ Most importantly, the loss of the seasonal flooding affected the aquifers in the Waza-Logone region. The aquifers provide water for all essential purposes during the dry season. Without the seasonal floods recharging the upper aquifers, the region's water table lowers and existing water holes dry out. This places the population, already in a water scarce environment, in a precarious position during droughts.

The Chari-Logone river system is a vital component to the Lake Chad system. The waters from Chad, Cameroon and the Central African Republic provide the lake with 95% of its waters. Over 220,000 people rely on the rivers' waters for drinking water, agriculture, and fishing.¹²⁹ The Maga Dam is just one example of the effects of human interaction with the system. The Chari-Logone River's reduction of waters to Lake Chad adversely affects the downstream population and the environment.

Komadugu-Yobe River Sub-system

The other major tributary of Lake Chad is the Komadugu-Yobe River system. The river system comprises of rivers converging into the Yobe River and its basin covers 148,000 km².¹³⁰ The river system provides less than 2% of the lakes waters and supports the Hadejia-Nguru wetlands, a vital economic center for the region's population.¹³¹ The Joint Wetlands Livelihood Project estimates the basin supports 15 million people through agriculture, fisheries, and water.¹³² Similar to the Chari-Longone River, the

¹²⁷ Ibid.

¹²⁸ Ibid.

¹²⁹ Ibid.

¹³⁰ Global International Waters Assessment, 88.

¹³¹ Ibid.

¹³² Muhammad J. Chiroma, "Water Management Issues in the Hadejia-Jama'are-Komadugu-Yobe Basin", Joint Wetlands Livelihood Project, 1.

Komadugu-Yobe River is transboundary flowing from Nigeria through Niger and terminating at Lake Chad. The Komodugu-Yobe River system is also heavily dammed to meet agricultural and water demands of the states. The first dam constructed, the Tiga Dam, was completed in 1974. This is the largest dam on this river system and provides water for the Kano River Irrigation Project.¹³³ The rivers currently support twenty dams that severely curtail the flow of water throughout the system.¹³⁴ In addition to the legitimate irrigation projects, farmers illegally cut channels into the river to divert waters to their fields. As a result of water diversion projects, less than one percent of the water terminates into Lake Chad.¹³⁵

The irrigation projects throughout the system affect the Hadejia-Nguru Wetlands. The wetlands, which are dry for most of the year, provide the population with income from agriculture, fishing, pasturing of livestock and firewood.¹³⁶ The wetlands are relatively flat areas allowing seasonal floodwaters to meander. The upstream irrigation projects capture the seasonal floods and reduced the water to the downstream floodplains curtailing the areas it covers. Prior to the irrigation projects, the Hadejia-Nguru wetlands covered 300,000 hectares (ha). Today, the wetlands cover 80,000 ha, a seventy-four percent reduction.¹³⁷ The reduction of wetland size corresponds to an economic cost of \$11 million (US).¹³⁸ Similar to the Waza-Logone floodplains, the change in the natural progression of floodwaters has affected ecological balance. The river system relied on the floodwaters to clear the rivers of silt build up. The siltation of the river has led to at least five species of fish disappearing from the region.¹³⁹ The reduction of flood waters also affects the shallow aquifers of the region. The aquifers provide routine

¹³³ Chiroma, 3.

¹³⁴ Global International Waters Assessment, 90.

¹³⁵ Chiroma, 2.

¹³⁶ Edward B. Barbier, *Upstream Dams and Downstream Water Allocation: The Case of the Hadejia' Jama'are Floodplain, Northern Nigeria* (Stanford, CA: Center for Environmental Science and Policy, 2002), 8.

¹³⁷ Barbier, 8. The author used consistently used the high estimates for the total size of the wetlands and the corresponding reduction. Also, 100 ha equals 1km².

¹³⁸ Global International Waters Assessment, 91.

¹³⁹ Ibid.

water for the region and insurance waters during times of droughts. A decrease of water downstream affects not only the environment and economics of the region, but threatens the survival of the population reliant on the water.

The Komadugu-Yobe River system does not contain enough water to support the population of the region. According to Global International Waters, 20 million people rely on the rivers for water. This represents 55% of the entire Lake Chad basin's population.¹⁴⁰ Despite the extensive river system, the flood plains are an extremely water scarce region. The population, agricultural and livestock water requirements exceed the system's capability by 260%.¹⁴¹ With population growth at 2.6% and desertification of the Sahel region causing population migration to the region, competition for water will grow. The competition for water increases the potential for conflict.

Lake Chad Basin Demographics

The four riparian states' population is disproportionate to the states territory within the Lake Chad Basin. The Global International Waters Assessment (GIWA) estimates the population of the basin at 37 million.¹⁴² Nigeria has the largest population with the smallest amount of land. Roughly sixteen percent of the Nigerian population, or 23 million, live within 179,300 km² of the basin.¹⁴³ The Nigerian population density is 128 people per km², which is less than the national average. Chad's population within the basin is eight million.¹⁴⁴ Unlike Nigeria, Chad's land within the basin is the largest at 1,123,400 km² with a population density of seven people per km².¹⁴⁵ Cameroon and Niger both estimate their population equally at 2,000,000 people. Cameroon's population density is much higher, 42 people

¹⁴⁰ Ibid.

¹⁴¹ Ibid.

¹⁴² Global International Waters Assessment, 29.

¹⁴³ Ibid, 29, 14.

¹⁴⁴ Ibid, 29.

¹⁴⁵ Ibid, 14.

per km², compared with Niger at 3 people per km².¹⁴⁶ The current growth rates, assuming zero outside influences, predict the population of the basin to be 74 million people in 2034.¹⁴⁷ The number does not factor in the impact of periodic droughts or refugees entering into the basin.

Factors	Nigeria	Cameroon	Niger	Chad
Total Population	146,255,312	18,467,692	13,272,679	10,111,337
Population Density per sq km	158	39	10	8
Population Growth Rate	2.03%	2.22%	2.88%	2.20%
GDP Growth Rate	6.20%	4%	4.50%	1.70%
HDI Poverty	37.00%	31.50%	55.10%	56.20%
Democracy Level	3.52	3.27	3.54	1.65
Type of Governance	Federal Republic	Republic	Republic	Republic

Table 3: Riparian State Demographics^{148 / 149 / 150}

The majority of the population relies on the lake or the water from the flood plains for their livelihood. Sixty percent of the populations in the four countries earn their livelihoods from agriculture.¹⁵¹ As mentioned before, agriculture consumes the majority of water. Niger’s population has outmatched its ability to produce required food products. Niger is currently a food importer, and the population is vulnerable to droughts. Last year, the UN World Food Programme (WFP) provided \$42 million dollars in food aid to Niger.¹⁵² The change in climate also affected Niger’s ability to grow food. The desertification of the Sahel region is drying up residual waters and land. The GIWA estimated Niger irrigates 2,000 km²

¹⁴⁶ Ibid, 14/29.

¹⁴⁷ Using the formula to determine population growth $t=.69/\text{pop growth rate}$. The author used 2.7% population growth rate for the LCB provided by the GIWA.

¹⁴⁸ CIA, “The World Fact Book” <https://www.cia.gov/library/publications/the-world-factbook/geos/cm.html#top> (accessed 21 February 2009).

¹⁴⁹ Laza Kekic, “The Economist Intelligence Unit’s Index of Democracy” http://www.economist.com/media/pdf/DEMOCRACY_INDEX_2007_v3.pdf (accessed 21 February 2009)

¹⁵⁰ United Nations Development Programme, “2008 Statistical Update”, <http://hdr.undp.org/en/countries/alphabetical2008/index.htm> (accessed 21 February 2009)

¹⁵¹ Global International Waters Assessment. 30.

¹⁵² World Food Programme, “Countries, Niger”, <http://www.wfp.org/countries/niger> (accessed 21 February 2009)

of the 674,800 km² within the basin.¹⁵³ The area of irrigated land within Niger will decrease with continuation of desertification. The people of the basin also rely on fishing to survive. Fishing provides livelihood for 10 million people within the basin and provides the region with \$23 million dollars in revenue and is a dietary staple throughout the basin.¹⁵⁴ The last major occupation of the region is livestock. In Chad only 25% of the land is irrigated for agriculture while 50% of the total land is used for livestock pasture lands.¹⁵⁵

The Lake Chad basin is a poor region of Africa. It is estimated 60% of the population lives on under \$2 (US) a day.¹⁵⁶ Niger and Chad are the regions poorest countries. In Niger, 63% of the population subsides on less than \$2 a day. The rural areas of Niger are poorer than the cities. Eighty six percent of the poor in Niger live in the countryside.¹⁵⁷ Chad also suffers from high poverty levels. Unfortunately, there is no data on the extent of poverty; however it is known that 80% of Chadians live in rural areas.

The confluences of demographic factors of the basin provide a bleak future for the region. The basins' population is growing, the economies are stagnant and human and climate factors reduce available water which provides the means for livelihood. The reduction of the floodplains' water from both tributaries lowered the regions' water tables. The reduction of waters to the lake and wetlands threatens to eliminate a major source of income for the people in the basin. The confluence of these factors is likely to increase regional tensions.

¹⁵³ Global International Waters Assessment, 32/14.

¹⁵⁴ Ibid, 33.

¹⁵⁵ Ibid, 32.

¹⁵⁶ Ibid, 34.

¹⁵⁷ Ibid, 34.

Previous Conflict Surrounding Lake Chad

Conflict is no stranger to the riparian states surrounding Lake Chad. In April 1983, Nigeria's and Chad's military engaged in violence over territorial disputes, causing over 100 casualties.¹⁵⁸ Refugees flowing from Chad to Nigeria fueled the border dispute. Following this incident, Nigeria closed the border to Chad and it remained closed until 1986. In 1981, Cameroon and Nigeria clashed over territorial disputes in the oil rich areas off of Rio del Rey.¹⁵⁹ More relevant to water conflict, the waters of Lake Chad were directly responsible for interstate conflict. As the waters receded from Nigeria's shoreline, villagers followed the waters to neighboring Cameroon, eventually establishing thirty three villages under Nigerian civil and military administration.¹⁶⁰ This section lists the factors contributing to migration of Nigerians culminating in legal arbitration through the International Court of Justice. The reasons for the migration are the receding waters, the region's population increase, and the undetermined borders.

As discussed earlier, the waters of Lake Chad fluctuate with the seasonal rains. While the water recedes according to the natural laws of physics, there is no redistribution of state allocated waters. Nigeria's shoreline receded disproportional to the other riparian states. Nigerian fishermen, having to travel further to reach the lake, established resting places on newly formed islands. Katti Kime, was the first rest area established in 1959 and these settlements continued throughout the 1960s.¹⁶¹ These resting places soon became villages as the shoreline continued to recede. According the Nigeria's counter-memorial, "During the drought of 1973-1975, the level of the Lake receded considerably. Nigerian fishermen followed the receding Lake shore, establishing villages such as Darak, Naira and Ramin

¹⁵⁸ Peter Wallensteen & Margareta Sollenberg, "Armed Conflict 1989-98", *Journal of Peace Research* 36, no 5 (1999): 602.

¹⁵⁹ Nigeria: Local and Bilateral Issues, 1991, <http://www.country-data.com/cgi-bin/query/r-9454.html> (accessed 16 February 2009).

¹⁶⁰ International Court of Justice, "Counter-Memorial of the Federal Republic of Nigeria 1994", <http://www.icj-cij.org/docket/files/94/8602.pdf> (accessed 17 February 2009), 338.

¹⁶¹ *Ibid*, 335.

Drinna.”¹⁶² From 1959 to 1994, 60,000 Nigerians followed the receding water, fishing and cultivating their crops within Cameroon’s borders.¹⁶³ As the resting stops developed into villages, the Government of Nigeria began treating them as sovereign territories. The Nigerian state of Borno administered the thirty three villages within Cameroon. The Nigerian state levied taxes, provided essential services such as police, official census, the state appointed village leaders (bulama), established a public school systems, provided medical support, established fishing regulations and licensed fishermen.¹⁶⁴ Nigeria considered the Cameroon Lake Chad villages to be sovereign territory of Nigeria and the people within those villages identified themselves as Nigerians.

Cameroon viewed Nigeria’s acquisition of its territory from a different perspective. The government of Cameroon asserts Nigeria conducted an invasion of their sovereign territory. In their *Additional Application of 6 June 1994*, Cameroon accused Nigeria of, “(V)iolating international obligations, under treaty and customary international law, by occupying, with the support of its security forces, parcels of Cameroonian territory in the area of Lake Chad”.¹⁶⁵ The issue of territorial sovereignty was obscured by the delineation of the state borders through Lake Chad. These border disputes can be traced back to European colonization of Africa.

The empires of France, Germany and Great Britain, while administering colonies in West Africa, attempted to delineate the borders of the four riparian states. When the states gained independence in 1960, the borders of Lake Chad area were unclear. Cameroon recognized the Lake Chad borders delineated in the Thomson/Marchland Declaration of 1929. The declaration specified the tri-border point (Chad, Nigeria and Cameroon) with a straight line drawn to the mouth of the Ebeji River.¹⁶⁶ Nigeria did not accept the Thomson/Marchland Declaration; rather they believed demarcation of the border was not

¹⁶² Ibid, 335. A counter memorial is a legal document submitted to a court of law in response to grievance. This information is provided to the court to establish facts prior to arbitration.

¹⁶³ Ibid, 337.

¹⁶⁴ Ibid, 431.

¹⁶⁵ Ibid, 632.

¹⁶⁶ International Court of Justice, *Yearbook 2002-2003* (Hague: United Nations International Court of Justice, 2006), Google Book Search.

resolved. Nigeria argued the declarations were preliminary in nature and not binding.¹⁶⁷ They asserted demarcation of the border was the responsibility of the Lake Chad Basin Commission, which had not been accepted by all four states. Since the state's borders were unclear, Nigeria asserted sovereignty not on the argument of territory; rather on Cameroon's acquiescence of Nigeria's expansion.

Eight years after Cameroon's request for arbitration, the International Court of Justice (ICJ) rendered a decision. The Court demarcated Lake Chad at the Thomson/Marchland Declaration and decided in favor of Cameroon.¹⁶⁸ The judgment requested Nigeria to remove all military and security forces from the Lake Chad disputed area. In December of 2003, the UN Office for the Coordination of Humanitarian Affairs reported the first Nigerian villages within Cameroon are now under the administration of Cameroonian government.¹⁶⁹ This incident of water conflict was resolved, but potential conflicts continue to threaten the stability of the region.

Future Concerns for the Lake Chad Basin

Human and environmental factors continue to stress the Lake Chad system. This section examines the effect of conflict and desertification in neighboring states as it relates to refugees. Refugees fleeing the regional conflicts in Chad and Sudan are migrating into the Lake Chad basin. The changes in climate, specifically the desertification of the northern Sahel, have increased the flow of displaced people to the Lake Chad area. Also, the potential for oil exploitation in the recently receded lake's waters threaten to destabilize the stressed region.

Refugees into the Lake Chad basin continue to stress an already stressed system. Refugees fleeing the fighting in Sudan have entered into Chad. The WFP estimates 435,000 refugees reside within Chad's

¹⁶⁷ International Court of Justice (1999), 375.

¹⁶⁸ International Court of Justice Press Release, "The Court determines the boundary between Cameroon and Nigeria from Lake Chad to the Sea.", <http://www.icj-cij.org/docket/index.php?pr=294&code=cn&p1=3&p2=3&p3=6&case=94&k=74> (accessed 18 February 2009).

¹⁶⁹ Humanitarian News and Analysis, "Cameroon-Nigeria: Handover of Lake Chad villages begins", <http://www.irinnews.org/PrintReport.aspx?ReportID=47603> (accessed 16 February 2009).

borders.¹⁷⁰ Chadian refugees recently crossed the borders into Nigeria and Cameroon. Last year, Cameroon absorbed 300,000 to 500,000 Chadian refugees.¹⁷¹ According to the same report, Nigeria also began receiving Chadian refugees, although the number of refugees is smaller, 3,500. The fewer numbers of refugees into Nigeria is partly because the lake provides a natural obstacle. Refugees into the Lake Chad Basin increase the amount of water required to sustain the population's drinking, sanitation, agriculture, fishing and livestock waters. Another concern is future oil exploration throughout the Lake Chad Basin.

With the exception of Niger, the riparian countries in the Lake Chad Basin are oil producing countries. Geologists have long suspected oil reserves beneath the lake bed.¹⁷² With unfettered access to the lake, these states are capitalizing on these natural resource finds. According to the BBC, Nigeria has been negotiating contracts with China for the extraction of oil from its side of Lake Chad.¹⁷³ The author has been unable to find the suspected amount of oil reserves beneath the lake, but it is reasonable to assume the exploration of petroleum in the basin will have some impact on the fragile environment. The final concern surrounding the lake is the rise of terrorism.

Throughout the region there is a low level of violence from terror organizations. The most prominent organization, the Nigerian Taliban, operates from the Lake Chad Basin.¹⁷⁴ According to Jane's Intelligence Review, the Nigerian Taliban operates mostly from the Nigerian state of Kano and uses the ambiguity of the border to cross into neighboring Cameroon and Niger.¹⁷⁵ This terrorist organization has

¹⁷⁰ The World Food Programme, "Countries: Chad", <http://www.wfp.org/countries/chad> (accessed 21 February 2009).

¹⁷¹ Country Watch, "Thousands of Refugees Fleeing Chad Cross Border into Cameroon, Nigeria", <http://search.countrywatch.com.lumen.cgscarl.com/cw> (accessed 18 February 2009).

¹⁷² Jane's Intelligence Watch, "Lake Chad Basin looks to ride wave of concern" 13 July 2005, <http://www.search.janes.com.lumen.cgscarl.com> (accessed 18 February, 2009).

¹⁷³ "Nigeria, China sign oil, technology pacts." BBC Monitoring Africa 27 April 2006. <http://www.proquest.com.lumen.cgscarl.com> (accessed March 7, 2009).

¹⁷⁴ Richard Reeve, Jane's Intelligence Watch, "Islamic militants establish Lake Chad networks", 18 October 2004, <http://jir.janes.com.lumen.cgscarl.com> (accessed 18 February 2009).

¹⁷⁵ Jane's World Insurgency and Terrorism, "Nigerian Mujahideen Groups" 4 March 2009, <http://search.janes.com.lumen.cgscarl.com/Search/documentView.do?docId=/content1/janesdata/binder/jwit/jwita0>

not produced any spectacular attacks; however, their presence in the basin raises security concerns and thwarts economic investment throughout the region. The future of the Lake Chad basin, without intervention, is turbulent. Additional people from the flow of refugees, the exploration for oil and the low level terror organizations threaten to destabilize the fragile region.

The Propensity of the Lake Chad System

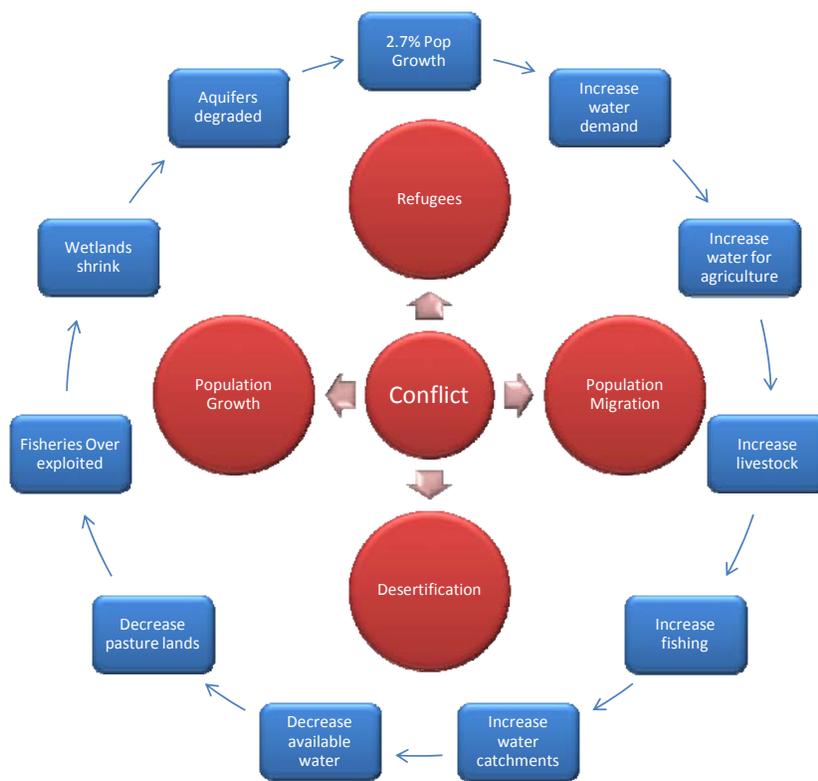


Figure 3: The Lake Chad System

The Lake Chad system is a self-feeding system degrading to a condition where conflict is its propensity. Figure 3 visually depicts the circular nature of this system. The growing population and climate changes stress the system and it is becoming fragile. As discussed earlier, the population growth

79.htm@current&pageSelected=allJanes&keyword=Nigerian%20Taliban&backPath=http://search.janes.com.lumen.cgscarl.com/Search&Prod_Name=JWIT& (accessed 7 March 2009).

rate throughout the basin is 2.7%. Assuming the rate stays constant, the population, currently at thirty seven million, doubles by 2034. The doubling of the population affects Nigeria the most. Nigeria has the smallest amount of territory in the basin and the highest population per km². Within the basin, Nigeria gets its water from the Komadugu-Yobe Rivers. At its current flow, the river is inadequate to meet all water requirements for the population, agriculture, and livestock. As the upstream Nigerian population increases, the downstream users' water scarcity situation continues to deteriorate. The scarcity of water in Niger will trigger human migration to water rich areas specifically Nigeria. Concurrent with population growth and human migration, regional conflicts increase the flow of refugees into the basin. The refugees from Sudan and Chad flowing into water rich Nigeria and Cameroon support this assertion.

Nigeria continues to plan and construct more agriculture and water catchments along the Komadugu-Yobe River. While projects in the region are plagued with funding problems, any additional catchments along the river decrease the water available to downstream users, accelerating the migration of people to water rich areas. Population increases throughout the basin increase the demand on shallow aquifers. People, out of necessity, exploit the aquifers beyond safe recharge levels. This causes water tables to lower and reduces the recharge of the upper aquifers. As the demand for water increases, the middle aquifers are further exploited. The middle aquifers, located 420-620 meters below the surface, recharge at a slower rate and are considered non-renewable water.¹⁷⁶

Population growth affects the water available in the Chari-Logone Rivers. The river system provides 95% of Lake Chad's water. With the Chari-Logone system, Chad, the least populated state, is upstream and Cameroon, more populated, is downstream. Chad currently exists in a water scarce environment. Refugees from the Central African Republic and Sudan add additional stress to the Chad's water scarcity. While humanitarian aid through UNICEF and WFP provide assistance, the exploding population increases Chad's water use. Within Cameroon, upstream reduction of water affects the downstream Waza-Logone flood plains. These flood plains are a vital element to the Cameroon's

¹⁷⁶ The lower aquifers take as long as 1000 years to recharge the water extracted.

economy and for the population's food supply. Unlike Nigeria and Niger, there are no shared water agreements ensuring equitable use. Furthermore, the Lake Chad Basin Commission has been unable to bring all parties to the negotiating table to establish a lasting water agreement.

Lastly, climate change throughout the region affects the system. The droughts of the 1970s and 1980s increased the desertification of the region. The Sahara Desert expanded 100 km southward into the basin. As pasture lands in Niger and Chad transform to desert, human migration south into the Lake Chad Basin accelerates. Again, Nigeria is the likely destination for this migration due to its regionally strong economy.

The propensity of Lake Chad is increased regional conflict. The effects of climate change, population growth, and refugees all consume more water, not less. The tributaries feeding the lake continue to be exploited reducing available water to the lake. As the lake recedes border issues become more frequent. The ICJ's 2002 ruling demarcated the border of the four states through Lake Chad, but only Nigeria and Cameroon recognize this border. Chad's and Nigeria's past border conflicts indicate a resonant level of conflict between the states. Further, all four states have border disputes with each other. Finally, petroleum exploitation of the region increases the relative worth of the land and is a source of tension throughout the region.

Refugees Implications for USAFRICOM

The current propensity for conflict around Lake Chad revolves around the impact of human migration internally within the four states and externally throughout the region. If USAFRICOM chooses to mitigate the region's insecurity, they must use a whole of government approach. This section addresses USAFRICOM's response within the diplomatic, informational, military and economic instruments of power.

The diplomatic efforts focus on prevention of the crisis conditions triggering human population movement. USAFRICOM efforts would focus on actions provided by the United States Agency for International Development (USAID). While currently in the region, USAID's mandate should be

expanded to include the four riparian states and establish programs specifically addressing the situation within the Lake Chad Basin. A strong USAID response to the region also serves as a bridge for the involvement of international organizations such as the WFP, the World Bank, and the United Nations High Commissioner on Refugees (UNHCR). Similar to USAID, these organizations already operate within the basin, but not at levels required to prevent human migration. These organizations need to work with and through the LCBC to ensure humanitarian and development projects address the needs of the people and not the riparian states' coffers. Building the credibility of the LCBC both within the region and internationally is critical for success. If the LCBC fails, the riparian states have no incentive or method ensure water sharing.

USAFRICOM Strategic Communications efforts need to reinforce the legitimacy and effectiveness of the multilateral organizations, specifically the LCBC. The tipping point for conflict within the basin, primarily from human migration, is the disillusion of the LCBC. Currently this organization has international legitimacy. They have secured loans from the World Bank for irrigation schemes along Lake Chad's tributaries and reports progress to the United Nations Development Programme. However, within the basin, the LCBC appears to have weaker influence over its members. The lack of bilateral or multilateral water sharing agreements is evidence of the commission's inability to influence member nation's negotiations.

AFRICOM's military response to any refugee problem depends on the international credibility of the UN and the African Union (AU). Prior to an increase of widespread humanitarian problems, a combined military effort of the UN or AU might be necessary to establish security for IGO and NGO relief organizations. While there is a low level terror threat to the region with the Nigerian Taliban, conditions in the region do not necessitate additional security to provide humanitarian assistance. When conditions deteriorate, a military response serves two purposes. Initially a combined response with Africans in the lead stems the flow of refugees. Massive refugee flow from Chad and Niger into Cameroon and Nigeria creates additional stress on these fragile regimes. For example, Foreign Policy

ranks Nigeria as the 18th most unstable regime.¹⁷⁷ Since roughly half of the population of Africa within Nigeria's borders, it is reasonable to assume an implosion of the government would have catastrophic effects on neighboring states. The second use of the military is to assist in the distribution of humanitarian assistance. These efforts should be focused within the borders of the refugees exporting states. A military intervention of this magnitude would be a long term commitment and would only terminate when the conditions both environmental and governmental stabilize and can operate within the new norm.

The last instrument of power, economics, is necessary to stabilize the region preventing the onset of massive human migration. The tools of this instrument of power are the same organizations secured by the diplomatic efforts. USAFRICOM plays a primary role in with influencing the organizations priorities. The four riparian states must build developmental capacity to reverse the propensity for human migration. Water catchments must be built and the water shared by all LCBC members. Currently the World Bank finances water catchments within Nigeria; however, these construction projects often die on the vine because of a lack of funding. Rather than building catchments for the exclusive use of one state, catchments should become a shared resource managed by an LCBC. Funding for development projects need to focus on creating prosperous conditions in Niger and Chad. A relative increase of prosperous conditions and access to shared waters in these states would likely decrease the flow of people into Cameroon and Nigeria.

USAFRICOM has an opportunity to stabilize the most populated region in Africa. There are no clear cut solutions to complex problems within the Lake Chad Basin. Certainly the solutions do not reside solely within a military organization. However, it is clear the best mitigation for refugees is to prevent the crisis. USAFRICOM is uniquely suited for this challenge because of their interagency structure. Military operations concerning refugees are established after the crisis has emerged. Unlike diplomatic and economic efforts, military operations also put a US face on operations which may not be received well throughout the region.

¹⁷⁷ "The Failed States Index 2008", *Foreign Policy*, http://www.foreignpolicy.com/story/cms.php?story_id=4350&page=1 (accessed 12 April 2009).

Section 4: Conclusion

The analysis of the two case studies supports the author's hypothesis. The reduction of water levels in Lake Chad will increase regional conflict. Conflict throughout the region manifests itself through population migration stressing the system. At some point, the effects of population growth, migration into the system, climate change and refugees will destabilize the system. The destabilization of the Lake Chad system will not result in interstate conflict; however, the institutions ensuring equitable water use throughout the region will fail. There are several emerging properties from the natural resources case studies. The first emergent property prevalent in both case studies is possession of the resource means of legitimacy. In the Spratly Islands, each of the claimants maintains control of their islands through physical possession by their respective militaries. Once possession of the island is established, no state has used violence to enforce their claim. While states refrain from violence over the islands, they will protect their economic resources. The Philippine example of seizing Chinese fishermen under the auspice of violating the Philippine's Economic Exclusion Zone illustrates this point. In western Africa, Nigeria is in a similar position with respect to Niger. Despite a bilateral water agreement, there are twenty catchments along the rivers banks. These catchments divert most of the rivers' water, depriving the downstream user, Niger, of water. Along the Chari-Logone, Cameroon's diversion of the water increases the tensions within its borders by depriving the population of adequate water. Furthermore, Cameroon's water projects directly affect Lake Chad's waters which other states exploit.

The second emergent property is international law governing resources provide stability rather than an equality function. The UNCLOS ensures all states have legitimate claims to the islands. The convention, written to apply to all the seas, does not address the unique geography of the South China Sea. Since the language of the convention cannot be used to arbitrate disputes, it invalidates itself. Within the Lake Chad Basin, the two international conventions governing the use of international watercourse promotes a measure of equitable use for the rivers. Individual states determine what equitable use means and agreements to insure compliance. The riparian states established the Lake Chad Basin Commission as the enforcement mechanism of these conventions. However, there is no shared water agreement for all the

states and there is only one bilateral water agreement between Niger and Nigeria. While the agreement is in place to ensure equitable water use, Niger's population along the Komadugu-Yobe Rivers is extremely water scarce. The Lake Chad Basin Commission does provide a forum for grievance dispute with ultimate resolution through the ICJ. Despite these provisions, waters available to Niger will continue to decrease as the Lake Chad Basin Commission with the support of the World Bank, establishes more catchments along the banks of the rivers.

The last emergent property is the institutions stabilizing the region are powerless to enforce their rulings. Within the South China Sea there is no unifying organization for all the states other than the United Nations. In West Africa, the Lake Chad Basin Commission's primary function is ensuring equitable use of water to all users. However, it has been unable to prevent the exploitation of both river systems feeding the lake. The people living along the shores of the lake from all the states are the end users of the lake's waters. The LCBC can only recommend to the riparian states water equitable use. The LCBC's power lies with financing from the organizations like the World Bank. If Nigeria decides to invest its own monies into an agriculture project along the Komadugu-Yobe River, the LCBC cannot influence the decision. The LCBC only arbitrates a dispute between the states, possibly through the International Court of Justice. These actions are all reactive and do not require years to achieve solutions.

The non-state conflict and emergent properties of Lake Chad pose a security challenge to the US Africa Command. Human migration from sparsely populated areas in Chad and Niger into densely populated areas of Nigeria and Cameroon could destabilize West Africa. Food security, stressed by reduction of fisheries, agriculture and pasturelands, in over-populated areas only increases the propensity for population migration. US Africa Command in conjunction with the Lake Chad Basin Commission, USAID, the UN WFP and the World Bank must address this concern. The waters of the region are not sufficient to support the growing population. The basin also poses a security concern for AFRICOM. The emergence of terror organizations, such as the Nigerian Taliban, threatens the region with low level violence. Areas for further research within this topic include food security programs in Niger and Chad, the effect of the virtual water trade on the system, the examination of the state's institutions governing

equitable water use, and possible introduction of less water intensive agriculture to meet the requirements of the predicted population.¹⁷⁸

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¹⁷⁸ Virtual water is the term referring to the water inherent in all food stuffs. For example 1 kg of rice requires 1000 liters of water.

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