

**THE VOLTA CONVENTION: AN EFFECTIVE TOOL FOR
TRANSBOUNDARY WATER RESOURCE MANAGEMENT IN AN ERA OF
IMPENDING CLIMATE CHANGE AND DEVASTATING NATURAL
DISASTERS?**

MEGAN MATTHEWS*

I. INTRODUCTION

The Volta Basin is a West African watercourse encompassing six riparian states, some of the most impoverished nations in the world. The basin region has recently been plagued with devastating parasitic diseases, floods, droughts, and water shortages. As the global temperature begins to shift, the rainy seasons in the basin have become more sporadic and intense, leading to both flooding and droughts. Recent deluges have spurred conflicts between states, springing from accusations of dam letting without prior notification. The inundations left thousands homeless and destroyed thousands of hectares of farmland. These extreme weather events are projected to increase in occurrence and severity due to climate change, which will also cause sea level rises, elevated regional temperatures, and decreased annual rainfall. The cumulative effect of these imminent environmental stressors will likely cause extreme water stress, food shortages, economic duress, and, ultimately, transboundary conflict between the riparian states relating to shared water resources. In the face of impending climate change disasters and water shortages, the basin states must take swift and immediate action to avoid their continued status as perpetual victims.

Transboundary water resource management has been nonexistent within the basin until recently. In 2007, the Volta Basin states signed and subsequently ratified a convention, the purpose of which is to promote social and economic growth within the region and to effectively manage the Volta River and its tributaries. This instrument was the first and most important step in creating a cooperative effort for the basin's water resource management. Unfortunately, the treaty is severely lacking in many of its substantive and procedural obligations. If these states take swift and immediate action within their transboundary water management program created by the new treaty, the basin states may prevail in

* The author earned her Juris Doctorate from the University of Denver, Sturm College of Law in 2011. Currently, she is an Associate Attorney with the McDivitt Law Firm, specializing in Social Security Disability Insurance. She teaches International Practice and Procedure as an Adjunct Professor at the Sturm College of Law, and coaches the University of Denver's Jessup International Moot Court team. She would like to thank Professor George "Rock" Pring, who taught International Water Law, for his passionate and energetic efforts to ensure his students understood and appreciated the law.

protecting their populations and sovereign interests from the impending dangers of the changing climate.

This paper will begin in Part II with a physical description of the Volta Basin, including the tributaries of the watercourse and their relation to the riparian states of the basin. Part III will examine the historical uses of the basin's water, beginning with the pre-colonial and colonial eras, followed by post-colonial and modern uses. This section will include a detailed discussion of the various social, economic, and other pertinent obstacles caused by water issues that affect the riparian states, particularly those related to climate change. An analysis of the development of the international legal regime relating to the watercourse will follow in Part IV. Part B of this section will specifically treat the recently ratified Volta Convention and analyze its strengths and shortcomings in comparison to the United Nations' Convention on the Law of Non-Navigable Uses of International Watercourses. Then, Part V will argue that the Volta Convention's current obligations are insufficient to combat the impending natural disasters associated with global climate change. Finally, Part V concludes that the Volta Convention has the opportunity to be an effective tool for transboundary water resource management to protect the basin state populations from the dangers of climate change, only if substantial changes are made to the treaty.

II. PHYSICAL DESCRIPTION OF THE WATERCOURSE AND BASIN STATES

The Volta River Basin is the ninth largest basin in Africa, covering over 400,000 km², an extremely sizeable basin when considering that the category for "large" basins begins at 10,000 km².¹ Six riparian countries share the Volta Basin in West Africa: Burkina Faso, Ghana, Togo, Benin, Mali, and Côte d'Ivoire.² Burkina Faso and Ghana occupy a majority of the basin, 43 percent and 42 percent respectively.³ The 15 percent remainder rests within the four remaining riparian states, of which Togo occupies 6 percent, Benin 4 percent, Mali 3 percent, and

1. M. Andreini, Nick van de Giesen, Annette van Edig, M. Fosu & W. Andah, *Volta Basin Water Balance* 3 (Ctr. for Development Research (ZEF), Discussion Paper No. 21 on Development Policy, 2000), available at http://www.zef.de/fileadmin/webfiles/downloads/zef_dp/zef-dp21-00.pdf.

2. Boubacar Barry, Emmanuel Obuobie, Marc Andreini, Winston Andah & Mathilde Pluquet, *The Volta River Basin: Comparative Study of River Basin Development and Management* 11 (International Water Management Institute, Draft, 2005), available at http://www.iwmi.cgiar.org/Assessment/files_new/research_projects/River_Basin_Development_and_Management/VoltaRiverBasin_Boubacar.pdf; Jonathan Lautze, Boubacar Barry, & Eva Youkhana, *Changing Interfaces in Volta Basin Water Management: Customary, National, and Transboundary* 6 (Ctr. for Development Research (ZEF), Working Paper Series, Paper No. 16, 2006), available at http://www.zef.de/fileadmin/webfiles/downloads/zef_wp/wp16.pdf. For a map of Africa's water basins, see *Map: Water Basins of Africa*, WATERWIKI.NET, http://waterwiki.net/index.php/Map:_Water_Basins_of_Africa (last modified Apr. 18, 2009).

3. Barry et al., *supra* note 2, at 11.

Côte d'Ivoire 2 percent.⁴ The Volta Basin stretches from its most northern point, in Mali at 14° 30' N, to its most southern point, in Ghana at latitude 5° 0' N.⁵

The basin is drained by the River Volta and its four main tributaries: the Black Volta, the White Volta with the Red Volta as its tributary, the Lower Volta, and the Oti.⁶ The Black Volta's headwaters originate from the Sourou River in Mali and the Mouhoun in Burkina Faso, which join together in Burkina Faso. The Black Volta then runs contiguously along the Burkina Faso and Ghana border, and flows downstream to Ghana, contributing 18 percent of the total annual flow to the basin. The Sourou dries up for approximately two months a year. The mean annual flow of the Black Volta at Bamboi is about 200 m³/s, of which approximately 57.4 percent originates from Ghana, and its mean annual runoff is 7,673 x 10⁶ m³.⁷

The White Volta's headwaters begin as the Nakanbé River in Burkina Faso and the river travels south into Ghana. Its mean annual flow is approximately 300 m³/s and its mean annual runoff is 9,565 x 10⁶ m³. The main tributaries of the White Volta are the Red Volta and the Sissili, each with their source in Burkina Faso. Both the Red Volta and Sissili dry up for approximately two months a year. These tributaries contribute 20 percent of the total annual flow in the Volta Basin.

The Lower Volta flows predominately within Ghana, occupying an area of 59,414 km², but also enters into Togo briefly, yet only encompassing 3,237 km² within Togo.⁸ The three other basin tributaries converge into the Lower Volta before emptying in to Lake Volta, contributing to the Lower Volta's mean annual runoff of 9,842 x 10⁶ m³.⁹

The Oti River comprises only 18 percent of the total catchment in the Volta basin,¹⁰ but because the Oti's sub-basin has steep topography and comparatively

4. *Id.*; *Global Change and the Hydrologic Cycle in the Volta Basin, The Volta River Basin*, GLOWA VOLTA, http://www.glowa-volta.de/volta_basin.html (last visited Nov. 21, 2012).

5. Barry et al., *supra* note 2, at 11.

6. Ben Y. Ampomah, Bernadette A. Adjei, & Eva Youkhana, *The Transboundary Water Resources Management Regime of the Volta Basin 5* (Ctr. for Development Research (ZEF), Working Paper Series No. 28, 2008), available at http://www.zef.de/fileadmin/webfiles/downloads/zef_wp/wp28.pdf; Nick van de Giesen, Marc Andreini, Annette van Edig & Paul Vlek, *Competition for Water Resources of the Volta Basin*, 28 IAHS PUBL. 199, 201 (2001), available at http://www.glowa.org/de/literaturliste/dateien/competition_in_volta_basin.pdf; Mac Kirby, Devaraj de Condappa, Mohammed Mainuddin, Judy Eastham & Mark Thomas, *Water-Use Accounts in CPWF Basins: Simple Water-Use Accounting of the Volta Basin 7* (CGIAR Challenge Program on Water & Food, Working Papers, BFP Series No. 04, 2004) [hereinafter CPWF], available at http://192.156.137.192/bitstream/handle/10568/10192/CPWF_BFP_WP_04.pdf?sequence=3. For a map of the Volta Basin, see *Global Change and the Hydrologic Cycle in the Volta Basin, The Volta River Basin*, GLOWA VOLTA, http://www.glowa-volta.de/volta_basin.html (last visited Oct. 13, 2012) [hereinafter GLOWA Volta Map].

7. Barry et al., *supra* note 2, at 43, 69, 70.

8. Kwabena Kankam-Yeboah, Philip Gyau-Boakye, Makoto Nishigaki & Mitsuru Komatsu, *Water Resources and Environmental Management in Ghana*, 9 J. FAC. ENVTL. SCI. & TECH. 87, 91 (2004).

9. Barry et al., *supra* note 2, at 42, 68.

10. Hans Peter Arp & Karsten Baumgärtel, Case Study: The Consequences of the Akosombo Dam, The Science and Politics of Large Dam Projects Seminar 3 (Oct. 31, 2005) (unpublished case

higher rainfall than the other countries in the basin, it contributes 30 percent to 40 percent of the Volta River system's annual flow.¹¹ The Oti River originates in the Atakora mountain range of Benin at an altitude of 600 m and its tributaries and basin primarily rest in Togo, Burkina Faso, and Ghana.¹² After leaving Benin, the river travels into Burkina Faso, then moves southwest to form the border between Burkina Faso and Benin, before dropping into Togo, and then Ghana.¹³ Due to the high level of rainfall it receives, the river does not dry up in the winter season and has an annual average flow of 100 to 300 m³/s, with a maximum flow of 500 m³/s.¹⁴

The main tributaries of the Volta Basin discharge into Lake Volta, located in Ghana, and the total annual runoff from the Volta and its tributaries is approximately 56.4 billion m³ of water.¹⁵ The Volta Lake is the largest man-made lake in the world, created as a reservoir by Akosombo Dam.¹⁶ Its surface is near 8,500 km², the average depth is about 18.8 m and the greatest depth is 90 m, with a shoreline of about 5,500 km.¹⁷ The lake's total volume at full supply level is approximately 150 billion m³.¹⁸

The climate within the basin can be divided up into three basic zones: humid tropical, tropical transition, and dry tropical.¹⁹ The humid tropical climate, which is characterized by two distinct rainy seasons, is the most southern zone within the basin, encompassing the southern regions of Côte d'Ivoire, Ghana, Togo, and Benin.²⁰ The northern parts of Côte d'Ivoire, Ghana, Togo, and Benin occupy the tropical transition zone, as well as the southern tips of both Burkina Faso and

study for The Science and Politics of Large Dam Projects Seminar, Swiss Fed. Inst. of Tech. Zurich) (on file with author).

11. T. Petr, *The Volta River System*, in *THE ECOLOGY OF RIVER SYSTEMS* 163, 165 (Bryan Robert Davies & Keith F. Walker eds., 1986); Arp & Baumgärtel, *supra* note 10, at 3. For more detailed information on the hydrology of the Volta Basin and topographic maps, see Gerlinde Jung, *Regional Climate Change and the Impact on Hydrology in the Volta Basin of West Africa* (Jan. 2006) (unpublished Ph.D. dissertation, University of Augsburg), available at http://www.glowa.org/de/literaturliste/dateien/doc_thesis_jung.pdf.

12. Barry et al., *supra* note 2, at 43.

13. See GLOWA Volta Map, *supra* note 6.

14. Barry et al., *supra* note 2, at 43.

15. CPWF, *supra* note 6, at 7; Nelson Obirih-Opareh, *Socioeconomic and Political Impact of Transboundary Water Management of the Volta Basin*, in *THE HYDROPOLITICS OF AFRICA: A CONTEMPORARY CHALLENGE* 175, 177 (Marcel Kitissou et al. eds., 2007).

16. van de Giesen et al., *supra* note 6, at 199.

17. Barry et al., *supra* note 2, at 11.

18. *Id.*

19. See Jacques Lemoalle, *CGIAR Challenge Program on Water and Food, Global Trends in the Volta Basin, Volta Basin Focal Project Report No. 3, 7* (2007), available at [http://cpwfbfp.pbworks.com/f/BFP+Volta_Lemoalle+\(2007\).pdf](http://cpwfbfp.pbworks.com/f/BFP+Volta_Lemoalle+(2007).pdf); Barry et al., *supra* note 2, at 16.

20. Lemoalle, *supra* note 19, at 7.; see also CENTRAL INTELLIGENCE AGENCY, *THE WORLD FACT BOOK: AFRICA*, <https://www.cia.gov/library/publications/the-world-factbook/geos/iv.html> (last visited May 5, 2012) [hereinafter *CIA WORLD FACT BOOK*] (discussing the climate of each riparian state within the Volta Basin). To access the climate information for each riparian state, select the name of the state from the drop down menu on the website and select "geography" under the subject headings.

Mali.²¹ The tropical transitional zone has two less distinct rainy seasons.²² Burkina Faso and Mali occupy the dry tropical zone, and further extend into the Sudan, Sudan-Sahelian, and Sahelian zones.²³ The dry tropical climate consists of two seasons: a longer dry season and a shorter wet season, which peaks in August.²⁴

The predominant sources of water in the basin are rainfall, streams, rivers, lakes, groundwater, and man-made water storage facilities, such as dams and reservoirs.²⁵ The mean annual rainfall in the Volta Basin ranges from 1400 mm in the southern part of the basin to 400 mm in the north.²⁶ The majority of the mean annual rainfall in the basin occurs during the rainy season, which peaks in July and August each year.²⁷ Due to climate change, however, the rainy seasons are shifting, becoming shorter, and more sporadic.²⁸ The basin region is plagued by droughts in the dry season and increasing variability in the rainy season, which is progressively augmenting water stress.²⁹

The mean average annual evaporation of the basin ranges between 1400 mm and 3015 mm,³⁰ a relatively high level of evaporation in comparison to the level of precipitation the basin receives. The high level of evaporation is potentially increasing the rate of desertification in the region; particularly in Burkina Faso where the minimum rate of evaporation is 1900 mm/yr.³¹ Total annual input into the Volta Basin from precipitation is approximately 407,600 mcm.³² The net runoff from the basin is 38,900 mcm/yr, approximately 10 percent of the total input from precipitation.³³ This rate of runoff indicates that a comparatively reduced rate of recharge from surface water is occurring in the region, perhaps due to evaporation, storage of the water by man-made facilities, and other factors.

Groundwater is not a significant resource in the basin, mostly due to the low primary porosity of the region's sediment, known as the Voltaian Formation.³⁴

21. See CIA WORLD FACT BOOK, *supra* note 20.

22. Barry et al., *supra* note 2, at 16.

23. *Id.*; see also Lemoalle, *supra* note 19, at 7.

24. Lemoalle, *supra* note 19, at 7; Barry et al., *supra* note 2, at 16.

25. Barry et al., *supra* note 2, at 67.

26. CPWF, *supra* note 6, at 7. For a chart outlining average annual rainfall and evapotranspiration in the riparian countries of the Volta Basin, see Barry et al., *supra* note 2, at 22.

27. CPWF, *supra* note 6, at 7.

28. Eva Youkhana & Wolfram Laube, *Cultural, Socio-Economic and Political Constraints for Virtual Water Trade: Perspectives from the Volta Basin, West Africa* 5 (Ctr. For Development Research (ZEF), Working Paper Series, Paper No. 13, 2006), available at http://www.zef.de/fileadmin/webfiles/downloads/zef_wp/wp13.pdf.

29. *Id.*

30. Barry et al., *supra* note 2, at 22.

31. *Id.*; United Nations Environment Programme, *Western Africa and Freshwater Resources*, THE ENCYCLOPEDIA OF EARTH (Sept. 2, 2008), http://www.eoearth.org/article/Western_Africa_and_freshwater_resources.

32. CPWF, *supra* note 6, at 19.

33. *Id.*

34. Kankam-Yeboah et al., *supra* note 8, at 91.

Groundwater and aquifers occur marginally from “the development of secondary porosity as a result of jointing, shearing, fracturing and weathering” of the sedimentary formation.³⁵ Unfortunately, use of shallow aquifers in the region, when accessed by boreholes and hand-dug wells, is usually more detrimental than beneficial for the consuming population because the aquifers are often contaminated by domestic and agricultural waste.³⁶

Population growth and concentration are a mounting concern within the basin because of the direct relationship between population and water stress. In 2005, it was estimated that within the next forty years, the current population of 20 million within the Volta Basin would increase by more than 80 percent.³⁷ In relation to the rest of Africa, the basin is densely settled, “possessing roughly three times the mean population density of Sub-Saharan Africa.”³⁸ The density in the basin ranges from 8 to 104 persons/km² and three major cities, Ouagadougou, Bobo Dioulasso, and Tamale, each contain a population over 100,000 people.³⁹ Currently, the water demand of the population, estimated at 1.7 billion m³ per year, is not being met and it is projected by the United Nations Environment Programme that water use could increase by as much as 583 percent within the basin over the next twenty years.⁴⁰

Other issues that significantly affect modern use of the basin include: infestations of aquatic weeds, high rates of water-borne diseases, increased earthquakes, and climate change.⁴¹ The creation of Lake Volta spawned the invasion of several species of aquatic weeds that have persisted and negatively impacted navigation, fishing, power generation, and the proliferation of water-borne diseases.⁴² Stagnant pools of water created by the watercourse alterations for Akosombo Dam have become breeding grounds for the hosts of highly infectious parasitic diseases, such as schistosomiasis (bilharzia), onchocerciasis (river blindness), and malaria.⁴³ Finally, seismic activity in Ghana has increased since the construction of Akosombo Dam and Lake Volta because of the added

35. *Id.*

36. F. Anim, F. K. Nyame & T. K. Armah, *Coliform Status of Water Bodies from Two Districts in Ghana, West Africa: Implications for Rural Water Resources Management*, 12 WATER POL'Y 734, 743-744 (2010).

37. UNITED NATIONS ENVIRONMENT PROGRAMME, HYDROPOLITICAL VULNERABILITY AND RESILIENCE ALONG INTERNATIONAL WATERS: AFRICA 56 (2005), available at http://www.transboundarywaters.orst.edu/research/UNEP_Atlas/Hydropolitical_Vulnerability_%20Resilience_Africa.pdf [hereinafter UNEP, HYDROPOLITICAL VULNERABILITY]. For more detailed reference regarding Volta Basin population statistics, see Barry et al., *supra* note 2, at 32.

38. Youkhana & Laube, *supra* note 28, at 6.

39. Barry et al., *supra* note 2, at 33-34.

40. UNEP, HYDROPOLITICAL VULNERABILITY, *supra* note 37, at 56.

41. Barry et al., *supra* note 2, at 151-54; UNEP, HYDROPOLITICAL VULNERABILITY, *supra* note 37, at 56-57.

42. Barry et al., *supra* note 2, at 151.

43. See Ronald Graham, *Ghana's Volta Resettlement Scheme*, in 2 THE SOCIAL AND ENVIRONMENTAL EFFECTS OF LARGE DAMS: A REPORT TO THE EUROPEAN ECOLOGICAL ACTION GROUP (ECORPA) 131 (Edward Goldsmith & Nicholas Hildyard eds., 1984).

stress of the lake on the underlying rocks.⁴⁴ It has reached a level where Ghana is experiencing regular tremors.⁴⁵ Finally, climate change is significantly impacting the basin region with shifts in the rainy season, the occurrence of droughts and dry spells, escalating regularity in floods, and increased desertification.⁴⁶ These various issues will be discussed in more detail in Section III.

III. HISTORY OF HUMAN USE OF THE VOLTA BASIN

This section will discuss both pre-colonial and colonial uses of the riparian basin and the conflicts created by the various uses, and then address the basin in the modern era. The inherent tension between the colonizers and colonized resulted in a regression towards certain pre-colonial usages and forms of water source governance once colonialism in the region ended. Therefore, it is appropriate to examine the historical uses and conflicts in the basin as necessarily informative to a discussion of current practices.

A. *Uses and Conflicts in the Basin During the Pre-Colonial and Colonial Eras*

Pre-antiquity, at least fifty indigenous ethnic groups shared the Volta Basin and political chiefdoms governed the water management practices.⁴⁷ These ethnic groups, the most prominent being the Akan, Dagomba, Mossi, and Boba, were distinct in their political, economic, social, and cultural identities.⁴⁸ At times, differing uses of the Basin for agricultural and other purposes created conflict among these ethnic groups.

The traditional economies of these indigenous groups largely focused on agricultural activities, both subsistence farming and cattle herding, while some

44. Barry et al., *supra* note 2, at 154.

45. Paulina Ekuia Amponsah, *Seismic Activity in Ghana: Past, Present and Future*, 47 ANNALS OF GEOPHYSICS 539, 542 (2004).

46. Nick van de Giesen, Jens Liebe & Gerlinde Jung, *Adapting to Climate Change in the Volta Basin, West Africa*, 98 CURRENT SCI. 1033, 1034-35 (2010); van de Giesen et al., *supra* note 6, at 199-201; see IUCN REG'L OFFICE FOR WEST AFRICA, REDUCING WEST AFRICA'S VULNERABILITY TO CLIMATE IMPACTS ON WATER RESOURCES, WETLANDS AND DESERTIFICATION: ELEMENTS FOR A REGIONAL STRATEGY FOR PREPAREDNESS AND ADAPTATION 11-20 (Madiodio Niasse, Abel Afouda & Abou Amani eds., 2004).

47. Lautze et al., *supra* note 2, at 7-8; Eva Youkhana, Charles Rodgers & Oliver Korth, *Transboundary Water Management in the Volta Basin* 5 (2006) (unpublished article, Extended Abstract for the III International Symposium on Transboundary Water Management), available at http://www.zef.de/fileadmin/webfiles/downloads/press/transboundary_water_management_volta.pdf (last visited May 5, 2012) [hereinafter TWM Symposium]; see generally JOHN G. JACKSON, INTRODUCTION TO AFRICAN CIVILIZATIONS (1970) (discussing the history and development of African people and their civilization).

48. Yaw Opuku-Ankomah, Youssouf Dembélé, Ben Y. Ampomah & Léopold Somé, *Hydro-Political Assessment of Water Governance from the Top-Down and Review of Literature on Local Level Institutions and Practices in the Volta Basin* 1-2 (Int'l Water Mgmt. Inst., Working Paper No. 111, 2006), available at http://www.iwmi.cgiar.org/publications/Working_Papers/working/WOR111.pdf; TWM Symposium, *supra* note 47, at 5.

tribes were nomadic.⁴⁹ In Ghana and Burkina Faso, the predominant use of water was for cereal cultivation.⁵⁰ In addition to cereals such as millet, pre-colonial Ghanaian tribes farmed yams, peppers, beans, other vegetables, and certain species of rice.⁵¹ The Volta Basin river system was the main source of transportation for trading these crops and other goods.⁵² Several indigenous groups in Burkina Faso were nomadic livestock herders and the movement of these transhumant breeders often created conflicts with the subsistence farmers over water consumption.⁵³ Additionally, tribal groups in the south relied heavily upon fishing as their economic activity.⁵⁴

Traditional land tenure systems within the region varied between ethnic groups, but most centered on a communal approach to land ownership where individuals cultivated the land even though its ownership was governed by the tribe.⁵⁵ Acquisition of land within the basin occurred using the “first-comer” approach where sovereignty over land was obtained by merely occupying the land first.⁵⁶ “Late-comers” were accepted and acquired land ownership rights if the new tribe recognized the “first-comer’s” original sovereignty.⁵⁷

Pre-colonial water rights within the basin paralleled the traditional land tenure system. Water ownership was seen as collective and all families and individuals had a right to utilize the resource freely.⁵⁸ Interestingly, because the water from the basin’s rivers was viewed as holy, most tribes had strict regulations protecting the integrity of the resource.⁵⁹ Tribal chiefs and priests were responsible for protecting the sanctity of a river’s water and, accordingly, they promoted water utilization practices that were environmentally beneficial and sustainable.⁶⁰ It was even forbidden to use the water on certain days of the week for specific activities, such as clothes washing and fishing.⁶¹ Many of these traditional land and water tenure systems continue to operate today, particularly where local and regional governments have failed to implement national water regulation practices.⁶²

Conflicts between lineages and clans over water rights did occur in the Volta Basin,⁶³ although the details of those disputes and subsequent resolutions were not

49. Opuku-Ankomah et al., *supra* note 48, at 3.

50. *Id.*

51. Barry et al., *supra* note 2, at 143.

52. Opuku-Ankoman et al., *supra* note 48, at 3.

53. *Id.*

54. *Id.*

55. See Barry et al., *supra* note 2, at 52, 55, 156; see also Carola Lentz, *First-comers and Late-comers: Indigenous Theories of Land Ownership in the West African Savanna*, in *LAND AND THE POLITICS OF BELONGING IN WEST AFRICA* 35, 35-56 (Richard Kuba & Carola Lentz eds., 2006).

56. Lentz, *supra* note 55, at 35-39.

57. *Id.* at 37.

58. TWM Symposium, *supra* note 47, at 5.

59. *Id.*

60. Lautze et al., *supra* note 2, at 7.

61. *Id.* at 8.

62. *Id.* at 7-8; Barry et al., *supra* note 2, at 52, 55, 156.

63. TWM Symposium, *supra* note 47, at 6.

recorded and most historical information from the basin has been acquired from narratives and anthropological excavations.⁶⁴ As discussed earlier, the basin's indigenous groups were diverse and water ownership practices were varied, creating conflicts between tribes and within factions of the tribes themselves.⁶⁵ Most disputes concerned ultimate sovereignty over the territory and not allocation of land or water use rights, and consequently, even during periods of dispute, farming and herding activities continued largely uninterrupted.⁶⁶

The colonial era began in the late nineteenth century when French, British, and German forces invaded the Volta Basin region.⁶⁷ The basin was divided into the British Gold Coast (later renamed Ghana), several French states (Burkina Faso, Côte d'Ivoire, Mali, the Togolese Republic, and Benin), and German Togoland (later annexed into Ghana).⁶⁸ During the colonial period, local traditional land and water tenure practices were superseded by British and French legislation, the two most important pieces being the Gold Coast's Rivers Ordinance of 1903 and the Forests Ordinance of 1949.⁶⁹ The colonial water management system directly contradicted the indigenous system, as it focused on state ownership and government controlled water rights.⁷⁰ Although the colonial government regulated water resource allocation at the intra-state and interstate level generally, local indigenous authorities maintained significant control of water management at a community level, as long as no conflict with colonial authorities existed.⁷¹ Daily management of water resources was often left to the tribal leaders, and accordingly, many of the traditional indigenous water management practices persisted.⁷² In the French colonies of the Volta Basin, regulation of water use remained predominately with tribal chiefdoms because of inconsistency in the colonial policies.⁷³

Uses within the basin during the colonial period endured as primarily agricultural, but navigational uses and fishing thrived as well.⁷⁴ Some local farmers were forced to transition from traditional farming for subsistence purposes to growing cash crops, such as peanuts.⁷⁵ The new development in water use under the colonial rule was utilization of the basin's water resources for industrialization purposes. The colonial governments initiated water conservation

64. Lentz, *supra* note 55, at 38.

65. Lautze et al., *supra* note 2, at 8.

66. Lentz, *supra* note 55, at 54.

67. Opuku-Ankomah et al., *supra* note 48, at 4.

68. *Id.* at 4-5; *see also* CIA WORLD FACT BOOK, *supra* note 20 (discussing the history of each state within the Volta Basin).

69. Lautze et al., *supra* note 2, at 9.

70. Ampomah et al., *supra* note 6, at 6.

71. *Id.*; Lautze et al., *supra* note 2, at 9.

72. Ampomah et al., *supra* note 6, at 6; Lautze et al., *supra* note 2, at 9.

73. Lautze et al., *supra* note 2, at 9.

74. *See* Jennifer Hauck & Eva Youkhana, *Claim and Reality of Community-based Water Management at the Example of Rural Fisheries in Ghana* 6-7 (Ctr. for Dev. Research (ZEF), Working Paper Grp. No. 28, 2008), available at <http://www.irsa-world.org/XII/papers/28-2.pdf>.

75. *Id.* at 7.

programs and, subsequently, the building of dams, weirs, reservoirs, and dug-outs.⁷⁶ The water obtained from these projects was used for domestic purposes, livestock, and irrigation projects.⁷⁷

B. Post-Colonial Era Uses and Conflicts

Today, the predominant use of the Volta Basin's water is agriculture, as is typical of most African basins.⁷⁸ In Ghana, 62.3 percent of the population relies on the Volta Basin for agricultural needs, and in Burkina Faso, that percentage rises to 92.4 percent.⁷⁹ The majority of the population in the Volta Basin is rural and they earn their livelihood by exploitation of natural resources.⁸⁰

In order to irrigate the land for agricultural and livestock industry purposes, the basin countries built a large number of dams in recent years. Specifically, over 400 dams and small reservoirs were constructed in Burkina Faso during a short span of time, but over 2,100 are in operation within the country, totaling 4.6 km³ in storage volume. Estimated water demand for irrigation in Burkina Faso is 323,000,000 m³/yr and, for domestic water, is approximately 103,500,000 m³/yr. In Mali, the only major dam is the Pont-Barrage of Baye, but in Togo, five major dams store 16,862,400 m³. Côte d'Ivoire only has a few dams as a minority riparian within the basin.⁸¹

Additional uses of the basin's water include: raising livestock, fisheries, forestry, domestic, and industrial.⁸² Due to exponential population growth, domestic and industrial uses within the basin are on the rise and are expected to continue in an aggressive growth pattern.⁸³ Water demands in the Volta Basin⁸⁴ are not currently being met because of inadequate infrastructure of water supply systems, misuse of water, flood irrigation practices which cause evaporation and seepage, overconsumption, and degradation of water supply.⁸⁵

Water stress in the basin is aggravated by inefficient use of the water resources. The reliance of Ghana and Burkina Faso on subsistence and cash crop farming as the main economic activities is 70 percent and 90 percent respectively.⁸⁶ The majority of farmers in the region continue to use flood irrigation, which causes substantial losses of water from both evaporation and

76. *Id.* at 6.

77. *Id.* at 6-7.

78. UNEP, HYDROPOLITICAL VULNERABILITY, *supra* note 37, at 55-56.

79. *Id.* at 56.

80. Barry et al., *supra* note 2, at 32.

81. *Id.* at 13, 65, 73, 133-35.

82. *Id.* at 65-67, 137.

83. UNEP, HYDROPOLITICAL VULNERABILITY, *supra* note 37, at 56.

84. For more detailed information and statistics relating to the discussion in this section relating to irrigation water demand, total consumptive water demand, and domestic versus industrial water demand within the Volta River Basin, see Barry et al., *supra* note 2, at 137-38.

85. Barry et al., *supra* note 2, at 138-39; UNEP, HYDROPOLITICAL VULNERABILITY, *supra* note 37, at 72.

86. Youkhana & Laube, *supra* note 28, at 7.

seepage.⁸⁷ Additionally, the Volta Basin's water supply systems for industrial and domestic purposes lose an estimated 50 percent during transmission from leakage.⁸⁸

Effectiveness in water use and water quality issues may be difficult for the basin states to combat, being among the poorest countries in the world.⁸⁹ The country with the highest per capita Gross National Product ("GNP") is Côte d'Ivoire at \$710; however, the GNP of Mali is disturbingly low at \$190 per capita.⁹⁰ In Burkina Faso, the majority of the population lives below the poverty line, most likely due to a lack of marketable natural resources and arid land that is difficult to cultivate.⁹¹

International water disputes marginally emerged in the basin in 1962 with the start of construction of the Akosombo Dam in Ghana and its reservoir, Lake Volta.⁹² The construction of the dam was spurred by a significant international demand for aluminum in 1945.⁹³ By 1946, American, British, South African, and Canadian companies were embroiled in a bitter competition for securing concessions in Africa for bauxite and electricity.⁹⁴ In 1956, after the United States agreed to loan Ghana money for the Akosombo Dam project, with the condition that American companies be awarded the building contract, a pair of U.S. companies, Kaiser and Reynolds, won the contract with Ghana to harness the Lower Volta River's power for aluminum processing.⁹⁵ The Ghanaians touted the proposed construction of the dam as the symbol of Ghana's progression into the 20th Century and an avenue to certain prosperity.⁹⁶

It appears, however, that Ghana not only failed to realize either progression or prosperity from the construction of Akosombo Dam, but, in fact, the dam was detrimental to Ghana and only the aluminum companies gained financially. The project required that over 80,000 villagers be resettled.⁹⁷ These villagers lost their subsistence, as many were farmers and the new villages required those displaced to farm different crops.⁹⁸ The resettled villagers were required to grow cash crops

87. UNEP, HYDROLOGICAL VULNERABILITY, *supra* note 37, at 72.

88. *Id.* at 56.

89. Barry et al., *supra* note 2, at 37.

90. *Id.*

91. ABIR BEN SLIMANE, CGIAR CHALLENGE PROGRAM ON WATER & FOOD, VULNERABILITE DE L'AGRICULTURE PLUVIALE DANS LE BASSIN DE LA VOLTA: ANALYSE DE L'IMPACT DE LA VARIABILITE DES PLUIES ET LE RISQUE DE SECHERESSE SUR LE RENDEMENT ET LA GESTION DES EXPLOITATIONS AGRICOLES, VOLTA BASIN FOCAL PROJECT REPORT NO. 13, 22 (2008), available at [http://cpwfbfp.pbworks.com/f/BFP+Volta_Ben+Slimane+\(2008\).pdf](http://cpwfbfp.pbworks.com/f/BFP+Volta_Ben+Slimane+(2008).pdf).

92. See Lautze et al., *supra* note 2, at 14.

93. Graham, *supra* note 43, at 132.

94. *Id.*

95. *Id.*; KWAKU OBOSU-MENSAH, GHANA'S VOLTA RESETTLEMENT SCHEME: THE LONG TERM CONSEQUENCES OF POST-COLONIAL STATE PLANNING 13 (1996).

96. DAVID HART, THE VOLTA RIVER PROJECT: A CASE STUDY IN POLITICS AND TECHNOLOGY 76 (1980).

97. Graham, *supra* note 43, at 134.

98. *Id.* at 135-38.

and to practice a cooperative program of farming with mechanical equipment.⁹⁹ The cooperative program failed, the cash crops destroyed the soil conditions, and the mechanical equipment broke down, but the government did not provide repairs or spare parts for the equipment.¹⁰⁰

Most disturbingly, inadequate housing or lack of housing forced many of those displaced to become homeless altogether.¹⁰¹ A majority of villagers received only a fraction or none of the compensation they were promised for their homes and farms, and compensation that was distributed arrived ten years after the resettlement or later.¹⁰² Moreover, nearly all of the resettled population became infected by a variety of parasitic diseases proliferated by the newly created Lake Volta.¹⁰³ In his economical study of the successes and failures of the dam, David Hart prepares a careful calculation of the gains and losses from the Volta Resettlement Scheme that was initiated to facilitate the dam's construction.¹⁰⁴ Hart's research indicates that when subtracting the costs of the resettlement project, the money spent to combat the onslaught of diseases created by the reservoir, and the lost compensation for farmers from the net profit of electricity sales, the dam's construction was in fact an economic loss to the Ghanaian people on a macro level.¹⁰⁵

Water degradation and related health issues are a primary concern in the basin.¹⁰⁶ A majority of the health issues in the Volta Basin arose from the construction of the Akosombo Dam.¹⁰⁷ The reservoir created by the dam, Lake Volta, increased the amount of stagnant water pools in the new habitats below the dam and the lake promulgated new vegetation with flooded woodlands as its bed.¹⁰⁸ The result was a devastating onslaught of three treacherous diseases: malaria, schistosomiasis (bilharzia), and onchocerciasis (river blindness).¹⁰⁹

Malaria is a parasitic disease carried by mosquitoes that infect the red blood cells.¹¹⁰ The first symptoms of malaria include fever, headaches, and vomiting, but if left untreated, the disease will become fatal by disrupting the blood supply to

99. OBOSU-MENSAH, *supra* note 95, at 102-115.

100. *Id.*

101. ROBERT CHAMBERS, SETTLEMENT SCHEMES IN TROPICAL AFRICA: A STUDY OF ORGANIZATIONS AND DEVELOPMENT 205-06 (1969).

102. HART, *supra* note 96, at 82-83.

103. *Id.* at 90-97.

104. *Id.* at 82-83.

105. *See id.* at 102. For additional specific analysis relating to the various effects of the Akosombo Dam as it directly relates to Ghana, see THE SUSTAINABLE INTEGRATED DEVELOPMENT OF THE VOLTA BASIN IN GHANA (Volta Basin Research Project, Chris Gordon & Julius K. Amatekpor eds., 1999).

106. Barry et al., *supra* note 2, at 139; UNEP, HYDROPOLITICAL VULNERABILITY, *supra* note 37, at 73.

107. *See* Graham, *supra* note 43, at 191.

108. *Id.* at 136-37.

109. *Id.* at 136.

110. WHO, MALARIA, <http://www.who.int/topics/malaria/en/> (last visited Nov. 3, 2012).

vital organs.¹¹¹ As of 2005, the infection rate on a per household basis remained at 88 percent, making it the most significant water-borne disease in the basin.¹¹²

Schistosomiasis is a parasitic worm disease, often transmitted by snails, such as those infesting Lake Volta.¹¹³ Prior to the construction of the dam, infection rates in the region were 1 percent to 5 percent.¹¹⁴ After the dam's construction in 1966, the rates of infection rose to alarming figures, ranging from 80 percent to 100 percent in some villages.¹¹⁵

Onchocerciasis, or river blindness, is another parasitic worm disease, which has plagued Ghana and the entire Volta Basin.¹¹⁶ The disease is transmitted by "black flies" that infect human hosts with a parasitic worm, resulting in a host of embryos, or microfilariae, that spread throughout the body, but concentrate in the skin and eyes.¹¹⁷ The microfilariae in the eye cause blindness,¹¹⁸ and infection levels reached 90 percent within some areas after the creation of Lake Volta.¹¹⁹ The prevalence of river blindness in the basin prompted international action, which led to a United Nations program and corresponding treaty, both of which will be discussed later.

Transboundary disputes were negligible within the Volta Basin, despite the potential conflict fodder of the Akosombo Dam, until the 1990s.¹²⁰ During a period of drought in the region in 1998, Ghana suffered from a serious power shortage because of reduced water levels in Lake Volta's reservoir.¹²¹ Despite the apparent link between the drought and the power shortage, Ghana accused its upstream neighbor, Burkina Faso, of unreasonably withdrawing water from the Volta River and obstructing the watercourse with dams.¹²² In an attempt to resolve the dispute, Ghana offered to supply Burkina Faso with energy from the Akosombo Dam, in return for Burkina Faso's discontinuing its construction of its upstream dams.¹²³ Burkina Faso refused to relinquish its sovereignty over the upstream waters and continued its dam building program in order to produce its

111. *Id.*

112. Barry et al., *supra* note 2, at 139.

113. *Id.* at 150.

114. Graham, *supra* note 43, at 137.

115. *Id.*

116. André Rougemont, *The "River Blindness" Control Programmes OCP and APOC in Africa: A Critical Review*, 1 *ASIAN J. WTO & INT'L HEALTH L. & POL'Y* 253, 255 (2006).

117. *Id.*

118. *Id.*

119. Barry et al., *supra* note 2, at 149.

120. Lautze et al., *supra* note 2, at 16.

121. *Id.*

122. *Id.*; Annette van Edig et al., *Transboundary, Institutional, and Legal Aspects of the Water Resources Commission in Ghana 4-5* (2001) (unpublished paper for the Ctr. for Dev. Res. (ZEF)), available at http://www.glowa.org/de/literaturliste/dateien/aspects_of_wrc_in_ghana.pdf (last visited May 5, 2012).

123. van Edig et al., *supra* note 122, at 5.

own hydroelectric power.¹²⁴ Two major water storage facilities were constructed in Burkina Faso recently—Bagré on the White Volta and Kompienga on the Oti.¹²⁵

The most recent transboundary disputes in the Volta Basin are between Ghana and Burkina Faso, although additional potential conflicts between more of the riparian states will likely surface as climate change causes increased droughts and floods. Anxiety is building in Ghana as Burkina Faso attempts to industrialize by building hydropower dams within the basin, especially as Ghana completes its plans for a dam intended at Bui Gorge on the Black Volta.¹²⁶ Burkina Faso's construction of the Bagré Dam and Kompienga Dam already affect the hydroelectric production at Lake Volta, and three more construction projects have been proposed on the upstream waters.¹²⁷

The most significant transboundary effects of Burkina Faso's hydroelectric development relates to flooding caused by Bagré Dam's operations. In 1999, when Burkina Faso opened the dam's spillways, the resulting flooding, combined with torrential rains, caused an outbreak of cholera in Northern Ghana and left 9,000 people homeless.¹²⁸ The letting of dam spillway waters without prior notification by Burkina Faso is a continued accusation from Ghana over the last decade and has occurred as recently as 2009. In 2007, devastating floods crippled East and West Africa.¹²⁹ In Ghana, the White Volta River's banks burst and thousands of hectares of farmland were destroyed and an estimated 400,000 people were displaced.¹³⁰ Even though the floods similarly affected Burkina Faso, Ghana accused their upstream riparian neighbor of exacerbating the situation by intentionally opening Bagré Dam's spillways.¹³¹ Burkina Faso's officials denied Ghana's accusations that opening the dam's floodgates aggravated the floods.¹³²

124. *Id.*; TWM Symposium, *supra* note 47, at 7.

125. TWM Symposium, *supra* note 47, at 7.

126. van de Giesen et al., *supra* note 6, at 202-03; TWM Symposium, *supra* note 47, at 7; see Helena Selby, *Ghana: Bui Dam Resettlement – Livelihoods and Institutional Challenges*, ALLAFRICA.COM (Nov. 18, 2009), <http://allafrica.com/stories/200911190545.html>.

127. Charles Rodgers et al., *The GLOWA Volta Project: A Framework for Water Resources Decision-Making and Scientific Capacity Building in a Transnational West African Basin*, 21 WATER RES. MGMT. 295, 300 (2007), available at http://www.glowa-volta.de/fileadmin/template/Glowa/Downloads/Rodgers2007_The_GLOWA_Volta_Project.pdf.

128. TWM Symposium, *supra* note 47, at 7.

129. WHO, HEALTH ACTION IN CRISES, HIGHLIGHTS NO. 178, at 1-2 (2007), available at http://www.who.int/hac/donorinfo/highlights/highlights_178_8_14oct07.pdf; *African Floods Prompt Aid Appeal*, BBC NEWS, <http://news.bbc.co.uk/2/hi/africa/7005969.stm> (last updated Sept. 21, 2007) [hereinafter BBC, *Aid Appeal*].

130. BBC, *Aid Appeal*, *supra* note 129; Bonaboto-UK, *Call for International Assistance for Northern Ghana Flood Victims*, GHANA WEB (Sept. 19, 2007), <http://www.ghanaweb.com/GhanaHomePage/NewsArchive/artikel.php?ID=130964>; Will Ross, *Floods Devastate Northern Ghana*, BBC NEWS, <http://news.bbc.co.uk/2/hi/africa/6996584.stm> (last updated Sept. 15, 2007) [hereinafter BBC, *Floods*]. For a satellite photograph taken of the Volta Basin before the floods in June of 2007 as compared to the basin after the flood in September of 2007, see *Floods in West Africa*, NASA EARTH OBSERVATORY, <http://earthobservatory.nasa.gov/NaturalHazards/view.php?id=19082> (last visited May 5, 2012).

131. BBC, *Aid Appeal*, *supra* note 129; BBC, *Floods*, *supra* note 130.

132. BBC, *Aid Appeal*, *supra* note 129.

More recently, in 2009, Ghana, Burkina Faso, Benin, Togo, and Mali were all victims of torrential flooding in the Volta Basin.¹³³ In Benin, Togo, and Mali, the number affected was 20,000, 7,500, and 20,000 people respectively.¹³⁴ Once again, Ghana claimed Burkina Faso aggravated the situation by intentionally releasing dam waters in an annual spillage.¹³⁵ Yet as before, Burkina Faso officials denied Ghana's accusation and maintained that the annual letting of Bagré Dam was not intended to harm Ghana and that it similarly affected Burkina Faso citizens.¹³⁶

In a recent study, the United Nations Environment Programme ("UNEP") announced that the Volta Basin is in critical status for impending climate change because of their socioeconomic situation as an impoverished region, the increasing temperature within the region in combination with a decrease in annual rainfall, increased rainfall variability and unreliability, reduced groundwater, reduced crop production, and increased disease rates from malaria, measles, and meningitis.¹³⁷ The study further described the basin in poor status in regards to their institutional capacity to deal with water resource management, particularly for addressing issues arising from climate change.¹³⁸

Africa is considered to be "one of the most vulnerable continents to climate change and climate variability, a situation aggravated by the interaction of 'multiple stresses', occurring at various levels, and low adaptive capacity."¹³⁹ In addition to the concerns mentioned in the UNEP study, climate change is also catalyzing other problematic issues in the Volta Basin, including: an acceleration in the rate of desertification in the region; extreme weather events such as droughts and floods; and rising sea levels which causes land erosion, negatively impacts tourism, reduces the types and quantity of fish for fishermen, and threatens local inhabitants living in coastal cities.

133. WHO, WEST AFRICA FLOODS, SITUATION REPORT NO. 1, at 1-2 (2009), available at http://reliefweb.int/sites/reliefweb.int/files/resources/7C96B1DF32EFD4508525763200613760-Full_Report.pdf [hereinafter WHO, NO. 1]; WHO, WEST AFRICA FLOODS, SITUATION REPORT NO. 2, at 1-2 (2009), available at <http://www.who.int/hac/SituationreportWestAfricaVersion2.pdf> [hereinafter WHO, NO. 2].

134. WHO NO. 1, *supra* note 133, at 1; WHO NO. 2, *supra* note 133, at 2.

135. See WHO NO. 2, *supra* note 133, at 2; see also *Ghana: Spillage of Bagre Dam is Not Intentional*, ALLAFRICA.COM (Sept. 21, 2009), <http://allafrica.com/stories/200909220073.html> [hereinafter ALLAFRICA.COM, *Spillage*].

136. ALLAFRICA.COM, *Spillage*, *supra* note 135.

137. U.N. ENV'T PROGRAMME, ASSESSMENT OF TRANSBOUNDARY FRESHWATER VULNERABILITY IN AFRICA TO CLIMATE CHANGE 93 (2009), available at http://www.unep.org/dewa/Portals/67/pdf/Assessment_of_Transboundary_Freshwater_Vulnerability_revised.pdf.

138. *Id.*

139. INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY: CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE 435 (M.L. Parry et al. eds., 2007), available at http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_wg2_report_impacts_adaptation_and_vulnerability.htm [hereinafter IPCC 2007].

The average annual temperature in Western Africa is expected to rise due to climate change, although a combination of factors in the multitude of studies creates a wide range of predictions. An empirical study by Gerlinde Jung estimates an increase in temperature within the Volta Basin ranging “from 1°C in the maritime South to 1.5°C in the continental North” by the year 2039.¹⁴⁰ One prediction suggests that Burkina Faso will experience a 0.8°C increase in average temperature by 2025, and 1.7°C by 2050.¹⁴¹ In Ghana, an increase of “1.0 to 3.0°C by the 2060s, and 1.5 to 5.2°C by the 2090s” is expected.¹⁴² As an effect of climate change, the rate of desertification in Africa has accelerated and is expected to continue to do so, with some studies calculating the area of arid and semi-arid land in Africa to increase by 5-8 percent (60-90 million hectares) by 2080.¹⁴³

Projections estimate reduced annual rainfall in the Volta Basin due to climate change. Specifically, several studies suggest up to a 20 percent decrease in rainfall in Western Africa and the Volta Basin by 2080-2099.¹⁴⁴ The effects of decreased rainfall in the region range from amplification of drought risks and evaporation, to reduction of agricultural production and water availability for consumption.¹⁴⁵ As a majority of the population within the riparian countries depends on subsistence agriculture, the effects of drought can be particularly devastating. For example, in Ghana, “[i]nsufficient rainfall during the major cropping season during the last major severe drought in 1982-1983, affected more than 12 million people.”¹⁴⁶

Extreme weather events in the Volta Basin are expected to rise in frequency and intensity throughout the twentieth century, including droughts and floods.¹⁴⁷ Despite the increase of water produced during floods, the inundations actually augment water stress due to a reduction in the ground absorption of water, which in turn creates more surface runoff.¹⁴⁸ As discussed above, Burkina Faso and Ghana have recently suffered from several droughts and floods. In total, Burkina Faso has experienced eleven major floods between 1991 and 2009, and a 1994 deluge that affected over 650,000 people was immediately followed by a drought in 1995, which destroyed maize production and affected approximately 75,500

140. Jung, *supra* note 11, at 110.

141. WORLD BANK, BURKINA FASO DISASTER RISK MANAGEMENT: COUNTRY NOTE 2 (2011), available at <https://openknowledge.worldbank.org/bitstream/handle/10986/2752/AAA600ESW0WHIT0aso0DRM0Final0Report.pdf?sequence=1> [hereinafter WORLD BANK, BURKINA FASO].

142. WORLD BANK, CLIMATE RISK AND ADAPTION COUNTRY PROFILE: GHANA 4 (2011), available at http://sdwebx.worldbank.org/climateportalb/doc/GFDRRCountryProfiles/wb_gfdirr_climate_change_country_profile_for_GHA.pdf [hereinafter WORLD BANK, GHANA].

143. IPCC 2007, *supra* note 139, at 448.

144. *Id.* at 443; WORLD BANK, GHANA, *supra* note 142, at 4.

145. WORLD BANK, BURKINA FASO, *supra* note 141, at 1-2.

146. WORLD BANK, GHANA, *supra* note 142, at 6.

147. See IPCC 2007, *supra* note 139, at 444; Alfred Awotwi, Assessing the Impact of Land Cover and Climate Changes on Water Balance Components of White Volta Basin in West Africa 23 (Dec. 2010) (unpublished Master's Degree project, Department of Land and Water Resources Engineering Royal Institute of Technology (KTH)), available at http://www2.lwr.kth.se/Publikationer/PDF_Files/LWR_EX_10_26.pdf.

148. See Awotwi, *supra* note 147, at 26-27.

people.¹⁴⁹ Ghana ranks as one of the highest “amongst African countries most exposed to risks from multiple weather-related hazards”¹⁵⁰ as evidenced by a drastic increase since 1986 in extreme rainfall patterns with maximum rainfall occurring in a 24-hour period.¹⁵¹

As might be expected, these droughts and floods in the basin region, as well as the rising sea levels and progression of desertification, have negatively affected agricultural production, and will continue to do so. By 2100, it is estimate that in Western Africa climate change will cause agricultural losses between 2 percent and 4 percent of GDP.¹⁵² By 2080, estimates project that “wheat production is likely to disappear from Africa” and “a significant decrease in suitable rain-fed land extent and production potential for cereals” will occur.¹⁵³ Since the 1970’s, Burkina Faso has suffered from five major food shortages resulting from successive droughts.¹⁵⁴

Rising sea levels are projected to severely affect the basin’s populations. Along the Ghana coastline, “[s]ea level rise is projected at 5.8 cm, 16.5 cm and 34.5 cm by 2020, 2050, and 2080, respectively.”¹⁵⁵ Forty percent of West Africa’s population lives in coastal cities and the inundation of the coastal land could destroy inhabited territory with large concentrations of the poor and vulnerable.¹⁵⁶ Along the coast, “highly productive ecosystems (mangroves, estuaries, deltas, coral reefs), which form the basis for important economic activities such as tourism and fisheries” will likely be impacted.¹⁵⁷ Coastal agricultural is at risk of flooding and soil salinization due to the rising ocean, including shallots in Ghana, and palm oil and coconuts in Benin and Côte d’Ivoire.¹⁵⁸

The cost of mitigating these climate change effects likely constitutes the most colossal hurdle for these impoverished nations. The Intergovernmental Panel on Climate Change (“IPCC”) estimates that the developing countries in Africa suffer US \$35 billion in direct losses from natural disasters on an annual basis.¹⁵⁹ The September 2009 floods in Burkina Faso exceeded US \$130 million in immediate damages alone.¹⁶⁰ Agricultural losses cost approximately US \$3.5 million from the 1992 floods in Burkina Faso and US \$126 million for those in 1994.¹⁶¹

149. WORLD BANK, BURKINA FASO, *supra* note 141, at 3.

150. WORLD BANK, GLOBAL FACILITY FOR DISASTER REDUCTION AND RECOVERY: DISASTER RISK MANAGEMENT PROGRAMS FOR PRIORITY COUNTRIES 17 (2009), *available at* http://www.unisdr.org/files/14757_6thCGDRMProgramsforPriorityCountry.pdf [hereinafter WORLD BANK, DISASTER].

151. WORLD BANK, GHANA, *supra* note 142, at 5.

152. IPCC 2007, *supra* note 139, at 447.

153. *Id.* at 448.

154. WORLD BANK, BURKINA FASO, *supra* note 141, at 3.

155. WORLD BANK, GHANA, *supra* note 142, at 5.

156. IPCC 2007, *supra* note 139, at 450.

157. *Id.*; *see also* WORLD BANK, DISASTER, *supra* note 150, at 18.

158. IPCC 2007, *supra* note 139, at 450.

159. *Id.* at 457.

160. WORLD BANK, BURKINA FASO, *supra* note 141, at 3.

161. *Id.*

In sum, the quantity of hurdles the basin states must overcome concerning the watercourse in the near future and the gravity of these obstacles emphasizes the imperative need for an effective transboundary water resource management program for the Volta Basin.

IV. LEGAL REGIME

Even a limited review of research in this area highlights the dearth of international law development relating to governance of water resources in the Volta Basin until only a few years ago.¹⁶² The Volta River and its tributaries officially became a transboundary water system upon the imposition of the newly formed colonial boundaries and the codification of the use of the basin's waters in 1906 with the "Exchange of Notes between France and Great Britain relative to the Boundary between the Gold Coast and Soudan."¹⁶³ The notes described the watercourse in detail and delineated the borders between the colonies.¹⁶⁴ Interestingly, the colonial powers left the indigenous inhabitants' rights to use the basin's water and arable land undisturbed and, in addition, the villagers were extended the option of moving their village to the other side of the border if they were discontent with their newly assigned colonial power.¹⁶⁵ Shortly thereafter, in an agreement, the United Kingdom and France reaffirmed the villagers' right to freely use the Volta Basin's water.¹⁶⁶

A. Historical Development of International Water Law in the Volta Basin

After the basin states gained independence from their colonial powers in the 1960s, no transboundary water management system existed in the basin until 2008,

162. For a discussion outlining the reasoning behind the delay in transboundary water resource governance instruments and mechanisms, particularly as compared to other African basins, see AFRICAN WATER FACILITY, AWF SUPPORT FOR CREATION OF THE VOLTA BASIN AUTHORITY: A CASE STUDY 5-6 (2010), available at <http://www.africanwaterfacility.org/fileadmin/uploads/awf/publications-reports/Volta%20Basin%20Authority%20%20Case%20Study%20Report.pdf> [hereinafter AWF CASE STUDY]. Addressing the various domestic, non-governmental, and inter-governmental organizations, as well as the multitude of regional projects which oversee transboundary water governance within the Volta Basin, is outside of the purview of this paper. For a detailed summary of these entities, see Eric Antwi Ofori, Sustainable Irrigation Development in the White Volta Sub-Basin 15-40 (Dec. 13, 2011) (unpublished Ph.D dissertation, Delft University of Technology), available at http://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CDgQFjAC&url=http%3A%2F%2Frepositor.y.tudelft.nl%2Fassets%2Fuuid%3A7a14d929-c29f-4137-a613-600bbf78c520%2FUNESCOIHE_PhD_OFOSU_THESIS.pdf&ei=XPN5UNy2GZGBYAG5IGgBw&usq=AFQjCNHicIb5k4g9ZgrK4klnJNmWQ937rA.

163. See generally Exchange of Notes Between France and Great Britain Relative to the Boundary Between the Gold Coast and French Sudan, Fr.-Gr. Brit., July 19, 1906, 97 B.F.S.P. 31, available at <http://ocid.nacse.org/tfdd/tfdddocs/37ENG.pdf>.

164. *Id.*

165. *Id.* art. III-IV.

166. Agreement Between France and Great Britain Relative to the Frontier Between French and British Possessions from the Gulf of Guinea to the Niger (Southern Nigeria and Dahomey), Fr.-Gr. Brit., art. III, Oct. 19, 1906, 99 B.F.S.P. 217, available at <http://ocid.nacse.org/tfdd/tfdddocs/42ENG.pdf>.

although a few regional cooperation efforts were initiated, usually funded by non-governmental organizations.¹⁶⁷ Only two international agreements in the Volta Basin existed before the 21st Century directly involving multiple riparian states and specifically discussing management of the basin.¹⁶⁸ Neither of these instruments, however, concerned uses of the basin's water. Instead, an agreement signed by Togo, Benin, and Ghana in 1962 was for the purpose of purchasing electricity generated by Akosombo dam from Ghana.¹⁶⁹ Likewise, in 1973, although an international agreement was signed by all six riparian states, the instrument concerned implementation plans to control the spread of onchocerciasis in the Volta Basin.¹⁷⁰ This treaty was signed in conjunction with a comprehensive World Health Organization sponsored program to combat the assault of onchocerciasis in West Africa.¹⁷¹

The first step to transboundary water development in the basin occurred in 1971 when Ghana and Burkina Faso (known then as the Upper Volta) set up a joint transboundary commission known as the Permanent Joint Commission for Cooperation Between Ghana and Upper Volta.¹⁷² The purpose of the commission was not specifically to manage the Volta Basin, but rather collaboration for political, economic, and social issues affecting both states.¹⁷³

The commission set up five committees to complete five primary tasks: (1) to draft a convention regarding demarcation of the Ghana and Burkina Faso border; (2) to ameliorate trade relations between the two states; (3) to promote cooperation regarding education, science, technology, information, and sports; (4) cooperation in the exchange of information and the creation of programs relating to health issues; and (5) to cooperate on irrigation and water-borne illnesses issues, as well as transportations issues.¹⁷⁴

Then, Ghana's energy shortage in 1998 and flood of 1994 ignited an international movement to establish a more permanent transboundary water authority between Ghana and Burkina Faso, as well as the other riparian states.¹⁷⁵ Non-governmental organizations sponsored a variety of regional initiatives in an attempt to assist the riparian states in forming a transboundary water management

167. *See infra* Part IV.B.1.

168. *See* Lautze et al., *supra* note 2, at 10.

169. *Id.*

170. *Id.*; Agreement Governing the Operations of the Onchocerciasis Control Programme in the Volta River Basin Area, Nov. 1, 1973, 1126 U.N.T.S. 197. The World Health Organization funded and promoted the agreement and subsequent program. The parties to the treaty were: Benin, Ghana, Ivory Coast, Mali, Niger, Togo, and Upper Volta (Burkina Faso).

171. Rougemont, *supra* note 116, at 258-59. For a detailed explanation of the WHO program, see generally HELEN BYNUM, SUCCESS IN AFRICA: THE ONCHOCERCIASIS CONTROL PROGRAMME IN WEST AFRICA, 1974-2002 (2002).

172. Ampomah et al., *supra* note 6, at 7, 20-23 (referencing the Permanent Joint Commission Report from 1971 and attached to that article as Annex 1 [hereinafter PJC Report]).

173. *Id.*

174. PJC Report, *supra* note 172.

175. Ampomah et al., *supra* note 6, at 8.

program, as well as to promote sustainable development.¹⁷⁶ The World Bank, the United Nations Development Program, and the Swedish International Development Agency established the Global Water Partnership (“GWP”) in 1996 to promote integrated water resource management around the world.¹⁷⁷ GWP fostered the formation of the West African Water Partnership in 2002, of which all six Volta Basin riparian states are partners, whose goal is to promote and implement regional water management programs that are targeted to improve living conditions and alleviate poverty.¹⁷⁸

Green Cross International (“GCI”), with its sub-regional base in Burkina Faso, also undertook a program in the Volta Basin “to remove the obstacles to integrated and cooperative water management, and resolve related conflicts”¹⁷⁹ GCI, in conjunction with the United Nations Educational, Scientific, and Cultural Organization (“UNESCO”), held two regional conferences to promote discussion and exchange of information amongst the basin states, with the ultimate goal of encouraging the states to create a regional agreement and integrated management plan.¹⁸⁰

One of the most successful programs, initiated by the German Federal Ministry of Education and Research, was the Global Change and the Hydrologic Cycle (“GLOWA”) research program that undertook the GLOWA Volta Project (“GVP”) in May of 2000 to assess the sustainable development potential of water resources among the riparian states in the basin.¹⁸¹ GVP ended in May 2009, but its vision is continued with a follow-up project: “Sustainable Development of Research Capacity based on the GLOWA Volta Project.” The new project ran from June 2009 to November 2010 and sought “to strengthen the human capacity and the research infrastructure, and to promote the dissemination of research results.”¹⁸²

Additionally, the “Addressing Transboundary Concerns in the Volta Basin and its Downstream Coastal Area” project was sponsored by the United Nations Environment Program, as the implementing agency for the Global Environment

176. See Barry et al., *supra* note 2, at 129-32.

177. About GWP, GLOBAL WATER PARTNERSHIP, <http://www.gwp.org/en/About-GWP/> (last visited May 5, 2012).

178. History, GLOBAL WATER PARTNERSHIP, <http://www.gwp.org/en/About-GWP/History/> (last visited May 5, 2012).

179. *Organization and Activities of International Institutions in Geneva*, [2004] 18 INT'L GENEVA Y.B. 342, U.N. Sales No. GV. E/F.04.0.17; *Green Cross International receives “Save the World Award,”* GREEN CROSS AUSTRALIA, <http://www.gcint.org/news/green-cross-international-receives-%E2%80%9Csave-world-award%E2%80%9D> (last visited May 5, 2012).

180. UNESCO, FROM POTENTIAL CONFLICT TO CO-OPERATION POTENTIAL: WATER FOR PEACE: PREVENTION AND RESOLUTION OF WATER RELATED CONFLICTS 13, available at http://webworld.unesco.org/water/wwap/pccp/pdf/brochure_2.pdf.

181. *Welcome to the GLOWA Volta Project*, GLOWA VOLTA, <http://www.glowa-volta.de/> (last visited May 5, 2012) [hereinafter GLOWA VOLTA]; *GLOWA Volta: Overview*, GLOWA, http://www.glowa.org/eng/volta_eng/volta_eng.php (last visited May 5, 2012).

182. GLOWA VOLTA, *supra* note 181.

Facility in 2002.¹⁸³ The project focused on the development of a regional framework for addressing transboundary resource development and concerns in the basin.¹⁸⁴ These international organizations and others effectively blazed the trail for the formation of a regional transboundary water management institution in the Volta Basin.

B. Modern International Water Law and Practice in the Volta Basin

This section will first address the history of the recent Volta Convention. Then, a brief overview of international transboundary watercourse law will follow. Finally, in context of the legal framework governing shared water resources, the Volta Convention's substantive and procedural obligations will be analyzed with particular attention to the sufficiency of these obligations in light of the potential conflicts between the riparian states and water stress in the basin.

1. The Volta Convention and Its Conception

On April 13, 2004, the governments of Ghana and Burkina Faso acknowledged their common environmental and water issues upon signing the "Ghana-Burkina Joint Declaration."¹⁸⁵ This agreement also recognized the importance of involving the other four riparian states in a collaborative committee.¹⁸⁶ The six riparian states of the Volta Basin began the process of forming a transboundary water management institution, the Volta Basin Authority ("VBA").¹⁸⁷ The formation of this body was inspired by the 2002 Johannesburg World Summit on Sustainable Development where the Niger and Volta basins were designated as the West African basins to receive financial aid from the EU Water Initiative for a transboundary water resource management program.¹⁸⁸

Subsequently, a Volta Basin Technical Committee ("VBTC") was established in July of 2004 to include all six riparian states in the planning process of forming a Volta Basin transboundary water resource management program.¹⁸⁹ The Ministers in charge of water resources in each riparian state signed a "Memorandum of Understanding" in 2005, which agreed to create the VBA.¹⁹⁰ In 2006, the VBTC and Ministers adopted a resolution for the signing and subsequent ratification of a treaty and statutes for the VBA.¹⁹¹ On January 19, 2007, the

183. Ampomah et al., *supra* note 6, at 9.

184. *Id.*

185. J. Henry Owusu, *Conflict and Cooperation Among the Riparian Countries of the Volta River Basin in West Africa*, in *WATER RESOURCES CONFLICTS AND INTERNATIONAL SECURITY: A GLOBAL PERSPECTIVE* 187, 208-09 (Dhirendra Vajpeyi ed., 2012) (referencing the Ghana-Burkina Joint Declaration, Ghana-Burk. Faso, Apr. 13, 2004).

186. *Id.* at 209.

187. Ampomah et al., *supra* note 6, at 14.

188. *Id.* at 13; Lautze et al., *supra* note 2, at 12.

189. Ampomah, et al., *supra* note 6, at 13.

190. See Memorandum of Understanding to Establish a Volta Basin Auth. (Dec. 6, 2005) (on file with author).

191. Ampomah et al., *supra* note 6, at 14.

“Convention on the Status of the Volta River and the Establishment of the Volta Basin Authority” (“Volta Convention”) was signed by the all six riparian states at Ouagadougou in Burkina Faso.¹⁹² The Volta Convention came into force on August 14, 2009, upon Burkina Faso’s deposit of its ratification instrument as the fourth state to do so. Only Côte d’Ivoire has not yet ratified the treaty.¹⁹³

The Volta Convention’s threefold purpose is to recognize the Volta River as an international watercourse, create substantive and procedural obligations for the riparian states, and to establish the Volta Basin Authority (“VBA”) and its mandate. In order to implement the obligations of the convention in a “rational and sustainable” approach,¹⁹⁴ the treaty provides that the mandate of the VBA is to:

- (1) Promote permanent consultation tools among the parties for the development of the basin;
- (2) Promote the implementation of integrated water resources management and the equitable distribution of the benefits resulting from their various utilizations;
- (3) Authorize the development of infrastructure and projects planned by the stakeholders and which could have substantial impact on the water resources of the basin;
- (4) Develop joint projects and works; and,
- (5) Contribute to poverty alleviation, the sustainable development of the Parties in the Volta Basin, and for better socioeconomic integration in the sub-region.¹⁹⁵

The Volta Convention established five permanent administrative organs to implement the VBA’s mandate: (a) The Assembly of the Heads of State of Government; (b) The Council of Ministers in charge of Water Resources; (c) The Forum of the Parties involved in the Volta basin development; (d) The Committee

192. Convention on the Status of the Volta River and the Establishment of the Volta Basin Authority, Jan. 19, 2007 [hereinafter Volta Convention]. Although this treaty has not yet been published in a traditional treaty source, it is available in English and French on the Volta Basin Authority website. *Sixth Meeting of the VBA Experts Committee*, VOLTA BASIN AUTHORITY, <http://www.abv-volta.org/> (last visited Oct. 13, 2012) (follow “About VBA” hyperlink; then follow “Mandate and Objectives” hyperlink).

193. *Amélioration de la gouvernance de l’eau dans le bassin de la Volta, Entrée en vigueur de la convention de l’ABV: le Burkina Faso pose le dernier acte* [Improving Water Governance in the Volta Basin, Entry into Force of the Convention of the ABC: Burkina Faso Poses the Last Act], UICN, http://www.iucn.org/fr/propos/union/secretariat/bureaux/paco/programmes/prezoh/pagevhome_paco/ (last visited May 5, 2012) (discussing the date the Volta Convention went into effect and that Burkina Faso was the fourth state to deposit its instrument of ratification, thereby bringing the convention into force); see also *Review, About VBA*, VOLTA BASIN AUTHORITY, <http://www.abv-volta.org/> (last visited Oct. 13, 2012) (listing all the dates each riparian state ratified the Volta Convention: Mali, Apr. 24, 2008; Ghana, Nov. 5, 2008; Togo, Apr. 30, 2009; Burkina Faso, Aug. 14, 2009; and, Benin, June 9, 2009).

194. Volta Convention, *supra* note 192, art. 3.

195. *Id.* art. 6.

of Experts; [and,] (e) The Executive Directorate of the Authority.”¹⁹⁶ Additionally, the Council of Ministers may establish other administrative organs if necessary.¹⁹⁷

The six riparian states signed the Statutes implementing the VBA on November 16, 2007.¹⁹⁸ The VBA Statutes were only recently made publicly available on its website, but the VBA has begun to trek forward in fulfilling its mandate by hosting and participating in a variety of workshops and conferences that address sustainable development and water use concerns relating to agriculture.¹⁹⁹ The VBA Statutes enunciate their primary objectives as: organizing and reinforcing consultations between the riparian states, harmonizing national policies, undertaking research and study activities related to the socio-economic development of the basin, to promote cooperation, and to create institutional mechanisms for sustainable development of the basin.²⁰⁰ The specific tasks of the VBA and how the Convention will be implemented are not treated in the Statutes. Instead, the provisions are vague and, in some instances, merely reiterate many of the general principles outlined in the Convention itself.

On December 29, 2009, the basin states met in Lomé, Togo to ratify the charter for the VBA that “recommends that the countries sharing the basin come up with laws on water management while reducing environmental problems that can have cross-border implications like soil erosion, flooding, water borne diseases and coastal erosion.”²⁰¹ The interim Deputy Director General for the management of the basin, Yao Attikpo, announced that, “[t]he charter will give more details and will provide for practical legal measures that will ensure concrete management.”²⁰² The VBA Charter has either not been completed or is not publicly available. It appears to be the former based on a strategic plan for 2010-2014 released by the VBA announcing that the organization intends to draft a water charter for the riparian states that would create legislative type laws with more specific standards and rules than those laid out under either the Volta Convention or the VBA Statutes.²⁰³

196. *Id.* art. 8.

197. *Id.*

198. Statutes of the Volta Basin Authority (VBA) 11, Nov. 16, 2007, available at <http://www.abv-volta.org/> [hereinafter VBA Statute] (follow “About VBA” hyperlink; then follow “Mandate and Objectives” hyperlink; then “vba-statutes-en-version”).

199. See, e.g., *News, About VBA*, VOLTA BASIN AUTHORITY, <http://www.abv-volta.org/> (last visited Oct. 13, 2012).

200. VBA Statute, *supra* note 198, at 2-3. The Volta Basin Authority only recently posted its Statute on its website, although its site is regularly under construction and not always available electronically. All riparian states have ratified the VBA Statute, except for Côte d’Ivoire. AWF CASE STUDY, *supra* note 162, at 13.

201. *Six Countries Meet in Togo to Ratify Volta Basin Charter*, TOGO, RÉPUBLIQUE TOGOLAISE (Dec. 29, 2009), <http://www.republicoftogo.com/layout/set/print/content/view/full/5636>.

202. *Id.*

203. VOLTA BASIN AUTHORITY STRATEGIC PLAN 2010-2014, at 10 (Jan. 2011) (on file with author or this source can be located on an internet search engine by using the full title name for direct download, but it is not available for download on a traditional webpage). A diligent and nearly exhaustive search for a “VBA Charter” has failed to produce any results to date. Accordingly, it is

2. Introduction to the Law Relating to International Watercourses

Before dissecting the text of the Volta Convention, it is important to briefly introduce the law relating to international water courses, including the scope of customary law and traditional treaty provisions within the regime, in order to better inform this analysis.

The law of international watercourses is distinct from the law of the sea or principles ensconced in international environmental law conventions addressing certain water related concerns, such as obligations regarding clean water, maintenance and protection of the oceans, anti-whaling, and the preservation of wetlands. This particular legal regime governs bodies of water which lie within, or traverse through, two or more states, and is divided into two primary concerns: navigational related uses and non-navigational uses.²⁰⁴ The Volta Convention and this article address only the latter. Non-navigational uses of a watercourse include, *inter alia*, human consumption, providing water for livestock, irrigation, disposing of waste, and the generation of power.

The earliest known treaty concerning delineation of water boundaries and allocation of shared water resources originates from the Mesopotamian city states of Umma in 3100 BC.²⁰⁵ Since that time, international agreements regarding transboundary watercourses have proliferated, both pre- and post-Peace of Westphalia.²⁰⁶ Stephen McCaffrey, former U.N. Special Rapporteur for the International Law Commission's draft articles on the law of the non-navigational uses of international watercourses, which later became the 1997 U.N. Convention, divides the development of international watercourse law into four doctrinal stages: absolute territorial sovereignty, absolute territorial integrity, limited territorial sovereignty, and community of interests.²⁰⁷

The absolute territorial sovereignty principle, as developed primarily under the United States' "Harmon Doctrine," articulates that a state's sovereignty over watercourses in its territory is absolute to the extent that a state may use a watercourse in its territory in any manner, even to the detriment of another riparian state.²⁰⁸ The absolute territorial integrity doctrine mandates a nearly polar opposite of the sovereignty principle, which requires that a state not use a watercourse in any manner that interrupts the natural flow of the source or negatively affects

logical to conclude that no such finalized charter yet exists, especially when the strategic plan has slated the drafting of such a charter for the future. It appears as if the "ratification" of the charter announced in the cited source above is likely a meeting where the six riparian states agreed on the drafting of a charter, or perhaps an outline of proposals. Attempts to receive additional information from written and emailed inquiries sent to the Ghana and Burkina Faso consulates have, to date, been fruitless.

204. See STEPHEN C. MCCAFFREY, *THE LAW OF INTERNATIONAL WATERCOURSES* 34-37 (2d ed. 2007).

205. *Id.* at 59 (citing ARTHUR NUSSBAUM, *A CONCISE HISTORY OF THE LAW OF NATIONS* 1-2 (rev. ed. 1954)).

206. *See id.* at 59-63.

207. *Id.* at 111-70.

208. *Id.* at 112-14.

another state sharing the water resource.²⁰⁹ The third axiom discussed by McCaffrey of limited territorial sovereignty, which he describes as the prevailing modern doctrine, encompasses equality between all riparian states of a watercourse with each state possessing equal rights to use of the resource, but accompanied with a corresponding duty not to use the water in a way that affects the other states' equal usage rights.²¹⁰ Finally, the "community of interests" principle is derived from ancient Roman law that prescribes water to be treated as common property between nations and the public, not subject to private ownership.²¹¹

The International Law Commission ("ILC"), charged with the codification of customary law as well as progressive development of international law,²¹² was tasked with the study, codification, and progressive development of the law of non-navigational uses of international watercourses.²¹³ In 1994 the ILC adopted, and submitted to the General Assembly of the United Nations ("U.N."), thirty-three draft articles on the subject.²¹⁴ The Working Group of the Whole of the Sixth Committee established a Drafting Committee for purposes of transforming the ILC's draft articles into a treaty.²¹⁵ On May 21, 1997, the UN General Assembly adopted The Convention on the Law of the Non-Navigable Uses of International Watercourses ("U.N. Watercourse Convention").²¹⁶ The U.N. Watercourse Convention requires 35 instruments of ratification be deposited before it will enter into force.²¹⁷ To date, only 28 states have ratified the treaty.²¹⁸

The principles articulated in the U.N. Watercourse Convention primarily reflect customary law and "[e]ven the provisions of the Convention that do not reflect current law are likely to give rise to expectations of behavior on the part of riparian states that may, over time, ripen into international obligations."²¹⁹

209. *Id.* at 126-27.

210. *Id.* at 135-36.

211. *Id.* at 147-51.

212. Statute of the International Law Commission, G.A. Res. 174 (II), art. 1(1), U.N. Doc. A/RES/174(II) (Nov. 21, 1947).

213. G.A. Res. 2669 (XXV), U.N. Doc. A/CN.4/244/Rev.1 (Dec. 8, 1970).

214. *Report of the Commission to the General Assembly on the Work of its Forty-Sixth Session*, [1994] 2 Y.B. Int'l L. Comm'n 1, ¶¶ 218, 222, U.N. Doc. A/CN.4/SER.A/1994/Add.1 (Part 2) (paragraph 222 lays out the text of the ILC's "Draft Articles on the Law of Non-Navigational Uses of International Watercourses and Commentaries Thereto and Resolution on Transboundary Confined Water").

215. Summary of *Law of Non-Navigational Uses of International Watercourses*, INT'L L. COMM'N, http://www.un.org/law/ilc/summaries/8_3.htm (last updated June 30, 2005).

216. Convention on the Law of Non-Navigable Uses of International Watercourses, G.A. Res. 51/229, U.N. Doc. A/RES/51/229 (May 21, 1997), *reprinted in* 36 I.L.M. 700 (not yet in force) [hereinafter U.N. Watercourse Convention].

217. U.N. Watercourse Convention, *supra* note 216, art. 36(1).

218. *Chapter XXVII 12 Environment, Convention on the Law of the Non-Navigational Uses of International Watercourses*, UNITED NATIONS TREATY COLLECTION, http://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtsg_no=XXVII-12&chapter=27&lang=en (last updated June 11, 2012).

219. MCCAFFREY, *supra* note 204, at 376 (internal citation omitted). To determine the customary nature of each specific article within the U.N. Watercourse Convention, it is important to determine whether the ILC has supported the drafted article with sufficient state practice and *opinio juris* to

Accordingly, the provisions of the U.N. Watercourse Convention can be instructive in assessing the sufficiency of other international watercourse agreements.

Within the U.N. Watercourse Convention exist two primary types of obligations: substantive and procedural. Substantive obligations are those concerned with achieving specific outcomes, while those of a procedural nature are intended to act as the means to achieve those outcomes.²²⁰ The substantive obligations embodied in the U.N. Watercourse Convention are: equitable utilization, the duty of “no harm,” and the obligation to protect and preserve international watercourses.²²¹ The Convention’s articles encompass the following procedural obligations: the general duty to cooperate, the obligation of prior notification and related obligations, the duty of consultation, and the obligation to exchange data and information on a regular basis.²²²

The duty of equal use prescribes that states sharing a watercourse must equally allocate the resource and use only its designated apportionment.²²³ The requirement of equitable utilization is a fundamental customary principle in international watercourse law, as reaffirmed in the International Court of Justice (“ICJ”) decision in the *Case Concerning the Gabčíkovo-Nagymaros Project*.²²⁴ The case involved a dispute between Hungary and Slovakia over the failure of Hungary to complete construction of a dam on the Danube River, which it was required to do by treaty.²²⁵ Hungary defended its breach by citing environmental concerns and, accordingly, Czechoslovakia (as the predecessor state to Slovakia) built another dam further upstream as a replacement, which diverted the Danube and affected the water Hungary received as the downstream riparian.²²⁶ The ICJ found that Hungary, despite its own breaches, retained a “basic right to an equitable and reasonable sharing of the resources of an international watercourse.”²²⁷

This principle imposes an affirmative duty on states “to take reasonable steps to conserve and augment the water supply of an interstate stream.”²²⁸ Under the U.N. Watercourse Convention, this obligation is codified under Articles 5 and 6. Article 5 articulates that:

demonstrate a crystallized norm as opposed to one which is merely emerging or aspirational. This evidence is assessed primarily in the draft articles’ commentaries or, alternatively, within the *travaux préparatoires*.

220. VED P. NANDA & GEORGE PRING, INTERNATIONAL ENVIRONMENTAL LAW & POLICY FOR THE 21ST CENTURY 17 (2003).

221. MCCAFFREY, *supra* note 204, at 383.

222. *See id.* at 464-80.

223. *Id.* at 385.

224. *Id.* at 384-85.

225. *Gabčíkovo-Nagymaros Project (Hung. v. Slov.)*, 1997 I.C.J. 7 (Sept. 25).

226. *Id.* ¶¶ 23, 31, 40, 55.

227. *Id.* ¶ 78.

228. *Colorado v. New Mexico*, 459 U.S. 176, 185 (1982).

1. Watercourse States shall in their respective territories utilize an international watercourse in an equitable and reasonable manner. In particular, an international watercourse shall be used and developed by watercourse States with a view to attaining optimal and sustainable utilization thereof and benefits therefrom, taking into account the interests of the watercourse States concerned, consistent with adequate protection of the watercourse.

2. Watercourse States shall participate in the use, development and protection of an international watercourse in an equitable and reasonable manner. Such participation includes both the right to utilize the watercourse and the duty to cooperate in the protection and development thereof, as provided in the present Convention.

Article 6 of the International Watercourse Convention expands on the principles established in Article 5 and further requires taking into account all relevant factors and circumstances when complying with the equitable utilization obligation, including:

- (a) Geographic, hydrographic, hydrological, climatic, ecological and other factors of a natural character;
- (b) The social and economic needs of the watercourse States concerned;
- (c) The population dependent on the watercourse in each watercourse State;
- (d) The effects of the use or uses of the watercourses in one watercourse State on other watercourse States;
- (e) Existing and potential uses of the watercourse;
- (f) Conservation, protection, development and economy of use of the water resources of the watercourse and the costs of measures taken to that effect;
- (g) The availability of alternatives, of comparable value, to a particular planned or existing use.

The duty of “no harm” is a basic customary principle which extends to various international legal regimes, from use of force law to that of transboundary watercourses. This obligation is most famously articulated in the *Corfu Channel* case, the ICJ’s first case, in which the Court held that every state is obligated “not to allow knowingly its territory to be used for acts contrary to the rights of other States.”²²⁹ The U.N. Watercourse Convention enshrines this duty in Article 7 and specifies a threshold of “significant harm,” mandating that:

1. Watercourse States shall, in utilizing an international watercourse in their territories, take all appropriate measures to prevent the causing of significant harm to other watercourse States.
2. Where significant harm nevertheless is caused to another watercourse State, the States whose use causes such harm shall, in the absence of

229. *Corfu Channel* (U.K. v. Alb.), 1949 I.C.J. 4, 22 (Apr. 9).

agreement to such use, take all appropriate measures, having due regard for the provisions of articles 5 and 6, in consultation with the affected State, to eliminate or mitigate such harm and, where appropriate, to discuss the question of compensation.

Finally, the substantive obligation to protect and preserve international watercourses derives from the related obligation under the international environmental legal regime requiring protection and preservation of the environment.²³⁰ Unfortunately, this duty remains relatively aspirational, as opposed to established custom,²³¹ and possibly represents one of the primary reasons underlying the lack of sufficient ratifications to bring the U.N. Watercourse Convention into force. The individual and joint obligation of protection and preservation is treated in Articles 20 through 26 of the U.N. Watercourse Convention, which address the broader principle, but then specifies implementation of the duty in regards to: pollution, introduction of alien or new species, and protection and preservation of the marine environment. Additionally, the treaty defines and outlines rules relating to management, regulation, and installations. Article 21 defines pollution as: “any detrimental alteration in the composition or quality of the waters of an international watercourse which results directly or indirectly from human conduct.”

The procedural obligations recognized under the law relating to international watercourses are equally as binding as those that are substantive in nature²³² and are “regarded as essential to the equitable sharing of water resources.”²³³ The general duty to cooperate, which some scholars discuss as a substantive obligation, is also known as the principle of “good neighborliness” and derives from the corresponding duty enshrined in Article 1 of the U.N. Charter,²³⁴ which requires all states “[t]o achieve international co-operation in solving international problems of an economic, social, cultural, or humanitarian character . . .”²³⁵ The necessity of this obligation, in regards to international watercourses, stems from the nature of water systems as indivisible units.²³⁶ This principle is contained in Article 8 of the U.N. Watercourse Convention, requiring that states cooperate, and do so in good faith:

1. Watercourse States shall cooperate on the basis of sovereign equality, territorial integrity, mutual benefit and good faith in order to attain optimal utilization and adequate protection of an international watercourse.

230. See McCAFFREY, *supra* note 204, at 446-48.

231. *Id.* at 453-58 (examining the “emerging” obligation to protect the ecosystems of international watercourses, indicating that the norm is not yet fully emerged and, therefore, does not reflect custom).

232. *Id.* at 464.

233. OSCAR SCHACHTER, *SHARING THE WORLD'S RESOURCES* 69 (1977).

234. NANDA & PRING, *supra* note 220, at 19.

235. U.N. Charter art. 1(3).

236. HERBERT A. SMITH, *THE ECONOMIC USES OF INTERNATIONAL RIVERS* 150-51 (1931).

2. In determining the manner of such cooperation, watercourse States may consider the establishment of joint mechanisms or commissions, as deemed necessary by them, to facilitate cooperation on relevant measures and procedures in the light of experience gained through cooperation in existing joint mechanisms and commissions in various regions.

The obligation of a state to notify another state prior to acting in a manner which the state knows would cause harm to the other is one of the most “firmly established” principles in international law generally,²³⁷ and was found by the ICJ in the *Corfu Channel* case to be one of the “elementary considerations of humanity.”²³⁸ Prior notification encompasses several other sub-duties, including the requirements of consulting other states prior to acting, as well as engaging in negotiations.²³⁹ These inter-related obligations, as established customary law, must be executed in good faith.²⁴⁰ It is important to note that the threshold trigger for this obligation under the U.N. Watercourse Convention is one of “significant adverse effect” as opposed to one of significant harm.²⁴¹ Specifically, Article 12 of the U.N. Watercourse Convention articulates that:

Before a watercourse State implements or permits the implementation of planned measures which may have a significant adverse effect upon other watercourse States, it shall provide those States with timely notification thereof. Such notification shall be accompanied by available technical data and information, including the results of any environmental impact assessment, in order to enable the notified States to evaluate the possible effects of the planned measures.

In addition, Articles 13 through 19 lay out very specific procedures for fulfilling this obligation. For example, Article 13 articulates notification six months before planned measures likely to affect the watercourse, with the option for the notified state to have an additional six months to evaluate the situation or respond before the measure is executed. During this six month to a year period, the notifying state is obligated under Article 14 to refrain from executing the measure without the consent of the other state and provide, on request, additional data and information.

The duty of consultation is, as discussed above, encompassed within the obligation of prior notification when a state knows its actions will harm another riparian state. However, this requirement also extends to an ongoing duty to consult other riparian states in good faith for a variety of reasons, including: for purposes of concluding water agreements for transboundary sources, in protecting and preserving the shared resources, where necessary to achieve equitable utilization of the water source, and if a state believes (as opposed to knows) its

237. NANDA & PRING, *supra* note 220, at 55.

238. *Corfu Channel* (U.K. v. Alb.), 1949 I.C.J. 4, 22 (Apr. 9).

239. NANDA & PRING, *supra* note 220, at 55-56.

240. MCCAFFREY, *supra* note 204, at 469-71.

241. *Id.* at 473.

actions may harm the other state or affect its equitable utilization of the watercourse.²⁴² Article 11 of the U.N. Watercourse Convention requires consultation and negotiation for *any* planned measures, not necessarily limited to those that might significantly affect another state. Article 17 lays out very specific details related to consultation for those situations where a planned measure is protested by the notified state:

1. If a communication is made under article 15 that implementation of the planned measures would be inconsistent with the provisions of article 5 or 7, the notifying State and the State making the communication shall enter into consultations and, if necessary, negotiations with a view to arriving at an equitable resolution of the situation.
2. The consultations and negotiations shall be conducted on the basis that each State must in good faith pay reasonable regard to the rights and legitimate interests of the other State.
3. During the course of the consultations and negotiations, the notifying State shall, if so requested by the notified State at the time it makes the communication, refrain from implementing or permitting the implementation of the planned measures for a period of six months unless otherwise agreed.

Finally, the procedural obligation to exchange data and information on a regular basis is a crucial element to effectively executing the duties of prior notification and consultation, as well as fulfilling the substantive obligations. As Stephen McCaffrey explains, “this obligation may be said to be a necessary adjunct to, or perhaps even an integral part of, the obligations of equitable utilization and prevention of significant harm”²⁴³ Further, this duty supports and sustains the obligation to cooperate.²⁴⁴ This particular principle is laid out in a very specific manner in the U.N. Watercourse Convention and, most importantly, it prescribes a very rigid standard states must meet of “best efforts” when executing this duty. Article 9 states:

1. Pursuant to article 8, watercourse States shall on a regular basis exchange readily available data and information on the condition of the watercourse, in particular that of a hydrological, meteorological, hydrogeological and ecological nature and related to the water quality as well as related forecasts.
2. If a watercourse State is requested by another watercourse State to provide data or information that is not readily available, it shall employ its best efforts to comply with the request but may condition its compliance upon payment by the requesting State of the reasonable

242. *Id.* at 476-77.

243. *Id.* at 478.

244. *Id.* at 479.

costs of collecting and, where appropriate, processing such data or information.

3. Watercourse States shall employ their best efforts to collect and, where appropriate, to process data and information in a manner which facilitates its utilization by the other watercourse States to which it is communicated.

In conclusion, the U.N. Watercourse Convention encompasses the primary principles and obligations present in customary international law relating to environmental law and management of transboundary water sources. In addition, it contains a few provisions that serve as *lex ferenda*, but exist as more than mere progressive developments of the law and, instead, indicate the path contemporary law is taking. As such, it represents an appropriate model for purposes of analyzing other international watercourse instruments, despite its current status as a non-enforceable treaty. Moreover, it articulates clear and specific standards that facilitate interpretation and application.

3. Analyzing the Volta Convention

The first place to begin in analyzing any international watercourse treaty is the definition of the watercourse under that instrument. In defining the scope of the basin, the Volta Convention gives the VBA jurisdiction over “the Volta River, its tributaries and sub-tributaries, the reservoirs and lakes, groundwater and wetlands as well as the aquatic and land ecosystems linked to the basin, the estuary of the river including the zone of coastal and oceanic influence.”²⁴⁵ This definition of the watercourse is more inclusive than that in the U.N. Watercourse Convention where a watercourse is defined as “a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and flowing into a common terminus.”²⁴⁶

The Volta Convention’s progressive definition includes the wetlands, as well as the aquatic and land ecosystems linked to the basin, which might not necessarily be included in the scope of the U.N. Watercourse Convention’s definition because a wetland or an aquatic or land ecosystem does not necessarily “flow” into a common terminus. The Volta Convention’s inclusion of groundwaters into the definition of the basin is a positive step, especially when considering that including them as an integral part of a watercourse remains controversial, as illustrated by the refusal of two delegations to vote on the UN Watercourse Convention because groundwater was added to the treaty’s definition.²⁴⁷

The Volta Convention contains both substantive and procedural obligations for the member states, but these obligations are few and limited in scope. The requirements for State parties include:

245. Volta Convention, *supra* note 192, art. 7.

246. U.N. Watercourse Convention, *supra* note 216, art. 2(a).

247. MCCAFFREY, *supra* note 204, at 360.

- (a) The use of the water resources of the basin and the participation in their development in an equitable and reasonable manner;
- (b) The general obligation to co-operate for the States sharing the same river basin;
- (c) The regular exchange of data and information among the State Parties;
- (d) The notification of planned activities that can have negative effects, as well as the related consultations and negotiations;
- (e) Precaution and prevention;
- (f) The protection and conservation of the ecosystems;
- (g) The obligation not to cause damage;
- (h) The notification of emergency situation;
- (i) The freedom of navigation on the river.²⁴⁸

The substantive duties include: equitable and reasonable use of the Volta; protection and conservation of ecosystems; freedom of navigation on the river; precaution and prevention; and the obligation not to cause damage.²⁴⁹ While several of the substantive provisions' affirmative duties correspond with those laid out in the U.N. Watercourse Convention, most of the obligations are overly broad.

The Volta Convention does contain an equitable and reasonable use provision, requiring that the "use of the water resources of the basin and the participation in their development in an equitable and reasonable manner." The scope of this provision, however, is not as well defined as that in Articles 5 and 6 of the U.N. Watercourse Convention, where equitable and reasonable use is applied to not only use of the watercourse, but to development and protection as well. Moreover, the Volta Basin's treaty fails to address all relevant factors to which equitable and reasonable use is applicable, unlike the U.N. Watercourse Convention. Thus, this particular substantive clause's broad scope could cause difficulties in interpretation and application.

The Volta Convention's "protection and preservation of ecosystems" obligation is progressive and in accordance with the approach of the U.N. Watercourse Convention's substantive obligation requiring protection of international watercourses. Unfortunately, the actual breadth of the duty is undefined, in stark contrast to the U.N. treaty's Articles 20 through 26, which lay out a definition of pollution, expand the obligation of protection and preservation to include prevention, reduction, and control of pollution, as well as set up implementation and regulation procedures. In sum, the protection and preservation portion of the Volta Basin treaty is insufficient for successful implementation, regulation, interpretation, and application.

248. Volta Convention, *supra* note 192, art. 4.

249. To avoid excessive footnoting, the information in this section is based on the following references: Volta Convention, *supra* note 192, art. 4; U.N. Watercourse Convention, *supra* note 216, arts. 5-26.

The “obligation not to cause damage” is the most troublesome substantive obligation in the Volta Convention. Not only is there no defined threshold of harm as there is in the U.N. Watercourse Convention’s Article 7, where significant harm is the requirement, but also there are no affirmative duties of elimination, mitigation, or compensation for the riparian states. There is no explanation or specificity as to what an “obligation to not cause damage” entails, and further, the required harm is “damage,” which is not defined. This provision therefore appears to lack any concreteness, whereby implementation or enforcement would be practical.

The Volta treaty further requires “freedom of navigation on the river,” which is oddly placed in a treaty dealing primarily with non-navigable aspects of the water source. It is, however, an appropriate principle, because the only other treaties in the basin do not create such an obligation.²⁵⁰

The “prevention and precaution” requirement in the Volta Convention, as an independent principle, is unique from the U.N. Watercourse Convention, in that it is a separate duty, whereas the U.N. treaty incorporates prevention into other obligations. For example, Article 7 of the U.N. Convention requires states to prevent causing significant harm to other member states and Article 27 creates an obligation for states to prevent harmful conditions that would affect other riparian states. There is no use of the word “precaution” in the U.N. Watercourse Convention, so the prevention and precaution principle may supplement some of the other substantive obligations where they are lacking.

Regarding the procedural obligations, although these principles mirror those in the U.N. Watercourse Convention on a surface level, their scope is as undefined as the substantive provisions. The procedural obligations are: the general obligation to cooperate; the regular exchange of data and information; notification of planned activities that can have negative effects as well as the related consultations and negotiations; and, notification of an emergency situation.

The first procedural duty is the general obligation of the riparian states “to cooperate” and it appears to be in sync with the U.N.’s broad approach to cooperation. Article 8 of the U.N. Watercourse Convention only expands on the duty by listing the basis on which states should cooperate, namely, sovereign equality, territorial integrity, mutual benefit, and good faith. The Volta Convention’s cooperation provision might be strengthened to a greater degree if it specified that the obligation requires states act in good faith.

The Volta Convention’s obligation to notify the other riparian states of “planned activities that can have negative effects” is extremely deficient compared to the U.N. treaty’s Articles 12 through 19. No time period is allocated in the Volta Convention for which a state should provide prior notification, such as the six months requirement in the Article 12 of the U.N. Watercourse Convention, and

250. *See supra* Part IV.B.1. As this article deals primarily with non-navigational uses of the watercourse and is not concerned with navigational aspects of the Volta Basin, this substantive obligation will not be discussed thoroughly in this paper.

no obligation exists for the notification to be prior or timely at all. Additionally, States have no duty to provide additional data or information that is acquired after notifications are given, much less specific procedures with which the notified states must comply.

Even though the Volta Basin treaty requires the member states to engage in “consultations and negotiations” with other states concerning any planned watercourse measures, there is no requirement of good faith. Furthermore, the treaty does not create a general obligation to consult or negotiate in the entirety of the treaty, but only as those duties relate to planned measures. Accordingly, the notification duty for planned measures may lack the specificity necessary for practical implementation of the notification provision, as well as the consultation and negotiation principles.

The duty of “notification for emergency situation[s]” is a particularly important provision for the Volta Basin treaty in light of the recent emergency situations in the basin, for instance, the floods and droughts.²⁵¹ The issue with the Volta Convention’s emergency obligation is that there is no definition of “emergency,” much less a comprehensive one, such as that contained in the U.N. Watercourse Convention at Article 28. Furthermore, there is no requirement that the notification be made expeditiously, as it is in Article 28 of the U.N. Convention. This principle is the sole provision in the Volta Basin’s treaty dealing with emergency situations, and so overall, the treaty is lacking in a duty for states to develop contingency plans or to take steps to prevent, mitigate, or eliminate harmful effects of the emergency. Therefore, it appears the Volta Convention is deficient in implementing a legal regime for emergency situations.

Finally, the “regular exchange of data and information” procedural requirement in the Volta Basin treaty is extremely lacking compared to the U.N. Watercourse Convention’s Article 9 because no “best efforts” standard is required, and no explanation is provided as to what the exchanges of data and information should entail.

The World Wildlife Fund recently published a guide to understanding the U.N. Watercourse Convention’s obligations, promoting the treaty and recommending its ratification by United Nations members.²⁵² Interestingly, the guide also addressed the Volta Convention and recognized that the basin’s treaty was a “commendable step taken by the states concerned to improve transboundary cooperation within the basin,” but also cautioned that the convention does not “clarify the rights or duties of the watercourse states” for future transboundary disputes or emergency situations.²⁵³ In sum, the intentions and goals of the Volta Basin riparian states is indeed admirable, but with necessary substantive and

251. *See supra* Part III.B.

252. Volta Convention, *supra* note 192; *see also* FLAVIA LOURES, DR. ALISTAIR RIEU-CLARKE & MARIE-LAURE VERCAMBRE, WWF INTERNATIONAL, EVERYTHING YOU NEED TO KNOW ABOUT THE U.N. WATERCOURSES CONVENTION (2009), available at http://www.unwater.org/downloads/wwf_un_watercourses_brochure_for_web_1.pdf.

253. LOURES ET AL., *supra* note 252, at 6.

procedural obligations lacking from the Convention's primary obligations, the Volta Convention may lack teeth and ultimately fail as a transboundary water governance tool.

V. CONCLUSION AND RECOMMENDATIONS FOR THE VOLTA BASIN

The future success of this watercourse is highly dependent upon the riparian states implementing the current obligations of the Volta Convention, potentially submitting amendments to the treaty that require more substantive and procedural obligations in line with the U.N. Convention, and ensuring that the VBA successfully carries out its mandate. Although the Volta Basin has remained relatively dispute free in the past, the future looks grim as climate change issues and competing hydroelectric energy production interests come to the forefront. Another issue regarding the potential success of the Volta Basin stems from the instability of the VBA, charged with the responsibility of implementing the Volta Convention. The main concerns regarding the stability of the VBA include: lack of sufficient financial contributions from the member countries, secretariat staffing, incomplete set-up of the VBA structures, and high turnover of political leadership.²⁵⁴ The VBA's lack of resources is one reason, of many, underscoring the necessity of Côte d'Ivoire to ratify the treaty and assist the other riparian states in committing financial and personnel resources to implement the Volta Convention.

The recent droughts and floods plaguing the basin in recent years are only a foreshadowing of the impact that global climate change will have upon the basin. If the Volta Convention is not amended to correct the shortcomings of the substantive and procedural obligations, as well as established emergency plans for future floods, droughts, and similar situations caused by climatic changes, the Volta Basin will become increasingly impoverished and more lives will be lost. The basin states already lack the financial resources and institutional capacities to effectively deal with potential natural disasters, and accordingly, a successful transboundary water resource management program is crucial for preventing and mitigating such disasters.

It is therefore in the best interests of the Volta Basin states to make immediate amendments to the Volta Convention in order to make the existing obligations implementable. The Convention's principles need to be more specific, in line with the provisions laid out in the U.N. Watercourse Convention. Most importantly, the notification duties, for both planned measures and emergency situations, need to have more concrete procedures laid out for both the actor state and affected state. Additionally, if there is a conflict amongst the riparian states, the treaty's terms will be difficult to interpret and uphold because of the lack of the terms' specificity. As the Volta Convention stands now, it is the bare bones of a transboundary water resource management legal regime and the treaty's provisions, both substantive and procedural, need to be supplemented.

254. AWF CASE STUDY, *supra* note 162, at 18-19.

In addition, the VBA must complete its task of drafting its Water Charter, which will provide a legislative type framework for implementation of the Volta Convention. This Charter needs to ensure sufficient funding for the VBA to properly execute its mandates and provide sufficient staffing for such execution. The VBA should strive to provide access to the pertinent documents relating to the Volta Convention, the VBA, and the basin, in order to ensure transparency in its operations.

The ramifications of leaving the obligations as they stand in the Volta treaty currently are infinite, from continued dam letting by Burkina Faso without recourse for Ghana, to ongoing conflicts over dam building affecting hydroelectric production. As the climate continues to change, the rainy seasons will likely become more sporadic and shorter, but will produce rains with higher intensity. Two devastating floods occurred within only two years of each other in the basin, and most likely, with increasing climate change, the frequency of catastrophic floods will continue to rise incrementally. As such, it is imperative that the Volta Convention contain concrete obligations for the riparian states concerning emergencies and planned measures, such as dam lettings. If the convention's provisions are not amended, Ghana will have no recourse against Burkina Faso for exacerbating floods by opening spillways.

Climate change is also augmenting the rate of desertification and the frequency of droughts within the basin region, as well as affecting agriculture, fisheries, and at risk populations due to the rising sea level. As discussed earlier, the basin states are already experiencing water stress and shortages and this will continue if the Volta Basin Authority is not given the legal and financial tools to implement its mandate to promote poverty alleviation and sustainable development. Droughts will also affect the rates of river recharge generally and river flow, affecting hydroelectric energy production. Thus, it is necessary for progress to continue in developing the VBA and that it be given the resources to efficiently and comprehensively implement its mandate.

If the basin states work diligently and cooperatively to amend the Volta Convention, there is hope that the VBA's mandate to promote sustainable development and alleviate poverty will be successfully achieved. The VBA needs to establish comprehensive cooperation plans and implementation procedures for dealing with water quality issues, desertification, droughts, soil erosion, water-borne diseases, and floods, as well as tailor a program to specifically address combating negative effects from global climate change.

The states have taken the first big steps in creating a basin wide legal regime and even though the Volta Convention and its implementation program are in their infancy, it is crucial that the states remain proactive and diligent in addressing water issues. If the Volta Basin states continue on their progressive course of transboundary water resource management, amend the Convention, and ensure the success of the VBA, it is possible they can achieve their primary goals of poverty alleviation and sustainable development. Moreover, they will have the legal tools and infrastructure to effectively and cooperatively combat the pressing issues in the basin.