GOVERNING SHARED WATERCOURSES UNDER CLIMATIC UNCERTAINTY: THE CASE OF THE NILE BASIN

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SUMMARY

Climate change is projected to have catastrophic impacts on the hydrological cycle. Responding to its projected adverse impacts requires building flexibility and adaptability into watercourse treaties. Exploring the treaty practices of other shared watercourses, this Article studies the context of the Nile Basin, and concludes that the legal regime governing the Basin lacks the flexibility needed to adapt to climate change. It argues that the Declaration of Principle, which contemplates a flexible agreement for governing the Grand Ethiopian Renaissance Dam, is a step in the right direction. It also proposes mechanisms for governing the Nile under climatic uncertainty, and calls upon Nile Basin States and other water-sharing States to set aside their egoistic national interests and develop climate-proof treaties.

Climate change is projected to have catastrophic impacts on the hydrological cycle.[1] Water availability, quantity, and demand will all be affected by climate change.[2] Existing studies show that climate change is changing "the timing of water (when water is delivered), quantity (how much water is available) and quality of the water resources."[3] Even worse, these changes are coming at a time when the sustainability of water resources is severely strained by other non-climatic factors, such as population growth, economic development, and urbanization. All of these factors will decrease water supply or increase demand.[4]

Responding to such changes requires building flexibility and adaptability into watercourse treaties.[5] However, the flexibility needed within these treaties to address the ramifications of climate change could impact the predictability and certainty required by water-sharing States that rely on the language of a watercourse treaty.[6] Thus, developing principles, procedures, and institutions capable of accommodating the ramifications of climate change is challenging, as it requires governing uncertainty, which is at odds with the notion of legal certainty.[7]

But still, as the law of treaties does not "ordinarily permit unilateral modification or withdrawal when such changes occur,"[8] Parties are "required to work within the frame-

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1. *See generally* Nigel Arnell et al., *Hydrology and Water Resources*, *in* Climate Change 2001: Impacts, Adaptation, and Vulnerability 191 (James J. McCarthy et al. eds., Cambridge Univ. Press 2001), *available at* https://www.ipcc.ch/site/assets/uploads/2018/03/wg2TARchap4.pdf[http://web.archive.org/web/20180613000247/http://www.ipcc.ch/ipccreports/tar/wg2/pdf/wg2TARchap4.pdf].
2. *See* Gabriel Eckstein, *Water Scarcity, Conflict, and Security in a Climate Change World: Challenges and Opportunities for International Law and Policy*, 27 Wis. Int'l L.J. 410, 431 (2009).
3. Tuula Honkonen, *Water Security and Climate Change: The Need for Adaptive Governance*, 20 PER/PELJ 1, 2 (2017).
4. *See* Nigel W. Arnell et al., *Freshwater Resources*, *in* Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change 229, 234 (C.B. Field et al. eds., Cambridge Univ. Press 2014).
5. *See generally* Stephen McCaffrey, *The Need for Flexibility in Freshwater Treaty Regimes*, 27 Nat. Res. F. 156 (2003).
6. Alistair Rieu-Clarke et al., United Nations Transboundary Water Governance and Climate Change Adaptation: International Law, Policy Guidelines, and Best Practice Application 34 (2015).
7. Honkonen, *supra* note 3, at 3; *see also* A. Dan Tarlock, *Four Challenges for International Water Law*, 23 Tul. Env't L.J. 369, 383-84 (2009).
8. McCaffrey, *supra* note 5, at 159.

work of existing treaties to respond to changes" associated with climate change.[9] Nevertheless, most of the existing watercourse treaties, locked in rigid rules and procedures, are unable to provide the flexibility needed to address the anticipated changes due to climate change.[10] Only a few watercourse treaties possess the intrinsic capacity for dealing with the ramifications of climate change.[11]

This Article examines treaty flexibility and climate change adaptation in the context of the Nile Basin, with special emphasis on the Grand Ethiopian Renaissance Dam (GERD). The GERD is a giant hydrologic project on one of the Nile River's main tributaries—the Blue Nile in Ethiopia[12]—designed to generate 5,150 megawatts of electricity from 13 turbines.[13] Ever since commencement of its construction in 2011, the GERD has been a point of serious contention between Ethiopia and its downstream neighbors—Egypt and Sudan. For Ethiopia, the project is meant to offer a solution to its severe power problem, providing electricity access for an estimated 65 million Ethiopians.[14]

Egypt, on the other hand, relies on the Blue Nile for freshwater, and maintains that the dam represents an existential threat,[15] although it endorsed the importance of the dam in 2015, signing an Agreement on the Declaration of Principles (DoP) with Ethiopia and Sudan.[16] For its part, Sudan had to balance its concerns about water supply with the dam's benefits, including a more regular flow of water, better siltation prevention, a reduction in evaporation, and cheaper electricity.[17] In a historic break with its past practice of moving in lockstep with Egypt, Sudan has shown unwavering support for the GERD since 2012.[18] But recently, it has firmed up on its opposition to the dam.[19]

To be sure, the dispute over the GERD is the focus of a voluminous body of academic literature. Political scientists have extensively studied the hydro-hegemonic implications of the GERD in their effort to determine "who gets how much [of the Nile] water, when, where, and why?"[20] Other scholars have addressed whether the GERD will be a source of conflict or a catalyst for cooperation.[21] Engineers and hydrologic experts studied the GERD's positive and adverse effects and proposed various scenarios for the filling and operation of the dam.[22]

9. *Id*.
10. Joseph W. Dellapenna, *Adapting the Law of Water Management to Global Climate Change and Other Hydro-Political Stresses*, 35 J. Am. Water Ass'n 1302 (1999); McCaffrey, *supra* note 5, at 156; Gretta Goldenman, *Adapting to Climate Change: A Study of International Rivers and Their Legal Arrangements*, 17 Ecology L.Q. 741 (1990); A. Dan Tarlock, *How Well Can International Water Allocation Regimes Adapt to Global Climate Change?*, 15 J. Land Use & Env't L. 423, 433-34 (2000); Elizabeth J. Kistin & Peter J. Ashton, *Adapting to Change on Transboundary Rivers: An Analysis of Treaty Flexibility on the Orange-Senqu River Basin*, 24 Int'l J. Water Res. Dev. 1 (2008); *see also* Itay Fischhendler, *Legal and Institutional Adaptation to Climate Uncertainty: A Study of International Rivers*, 6 Water Pol'y 281 (2004).
11. Glen Hearns & Richard Kyle Paisley, *Lawyers Write Treaties, Engineers Build Dikes, Gods of Weather Ignore Both: Making Transboundary Waters Agreements Relevant, Flexible, and Resilient in a Time of Global Climate Change*, 6 Golden Gate U. Env't L.J. 259, 262 (2013).
12. The Nile is made up of several tributaries. Three tributaries—the Blue Nile, Sobat (Baro) River, and the Atbara (Tekeze and Angereb) River—originate in Ethiopia and contribute 85%-90% of the Nile waters. The other main tributary, the White Nile, originates in Lake Victoria and is shared among Tanzania, Rwanda, Burundi, Kenya, Uganda, and the Democratic Republic of Congo, and it contributes the rest of the Nile flow. Generally, 11 countries share the Nile River. *See* Nile Basin Initiative, State of the River Nile Basin 25, 27-28, 36-39 (2012), http://sob.nilebasin.org/pdf/Chapter_2_Water%20resources.pdf; *see also* John V. Sutcliffe & Yvonne P. Parks, The Hydrology of the Nile 127 (1999).
13. *Power Generation Capacity of the GERD Slashed to 5150 MW—Ethiopian Minister*, Ezega News, Oct. 17, 2019, https://www.ezega.com/News/NewsDetails/7331/Power-Generation-Capacity-of-GERD-Slashed-to-5150MW-Ethiopian-Minister.
14. Mahemud Eshtu Tekuya, *Sink or Swim: Alternatives for Unlocking the Grand Ethiopian Renaissance Dam Dispute*, 59 Colum. J. Transnat'l L. 65, 68 (2020).
15. *See* Salman M.A. Salman, *The Grand Ethiopian Renaissance Dam: The Road to the Declaration of Principles and the Khartoum Document*, 42 Water Int'l 512, 515-16 (2016); *see* Rawia Tawfik, *The Grand Ethiopian Renaissance Dam: A Benefit-Sharing Project in the Eastern Nile?*, 41 Water Int'l 574 (2016).
16. Agreement on Declaration of Principles Between the Arab Republic of Egypt, the Federal Democratic Republic of Ethiopia, and the Republic of the Sudan on the Grand Ethiopian Renaissance Dam Project, Mar. 23, 2015, https://www.internationalwaterlaw.org/documents/regionaldocs/Final_Nile_Agreement_23_March_2015.pdf [hereinafter DoP].
17. *See* Rawia Tawfik, Revisiting Hydro-Hegemony From a Benefit-Sharing Perspective: The Case of the Grand Ethiopian Renaissance Dam 24 (German Development Institute, Discussion Paper No. 5/2015, 2015) (describing Sudan's position as "a turning point" in the hydro-political relations between the two downstream countries, Sudan and Egypt); *see also* Salman, *supra* note 15, at 516-19.
18. Tawfik, *supra* note 17; *see also* Salman, *supra* note 15.
19. *Sudan: Further GERD Filling "Direct Threat" to National Security*, Al Jazeera, Feb. 6, 2021, https://www.aljazeera.com/news/2021/2/6/filling-ethiopias-dam-threatens-sudans-security-minister.
20. *See generally* Tawfik, *supra* note 15; Tawfik, *supra* note 17; Rawia Tawfik & Ines Dombrowsky, *GERD and Hydro-Politics in the Eastern Nile: From Water to Benefit-Sharing?*, *in* The Grand Ethiopian Renaissance Dam and the Nile Basin: Implications for Transboundary Water Cooperation 113 (Zeray Yihdego et al. eds., Routledge 2018) [hereinafter GERD Implications]; Tadesse Woldetsadik, *The Grand Ethiopian Renaissance Dam and Ethiopia's Succession in Hydro-Legal Prominence: A Script in Legal History of Diplomatic Confront (1957-2013)*, 9 Mizan L. Rev. 369 (2015); Hala Nasr & Andreas Neef, *Ethiopia's Challenge to Egyptian Hegemony in the Nile River Basin: The Case of the Grand Ethiopian Renaissance Dam*, 21 J. Geopolitics 969 (2016); Mohamed Salman Tayie, *The Grand Ethiopian Renaissance Dam and the Ethiopian Challenge of Hydropolitcal Hegemony on the Nile Basin*, *in* Grand Ethiopian Renaissance Dam Versus Aswan High Dam 485, 501 (Abdelazim M. Negm & Sommer Abdel-Fattah eds., Springer 2019).
21. *See*, *e.g.*, International Crisis Group, Bridging the Gap in the Nile Waters Dispute 24-26 (Africa Report No. 271, 2019), https://d2071andvip0wj.cloudfront.net/271-bridging-the-gap.pdf; Dale Whittington et al., *The Grand Renaissance Dam and Prospects for Cooperation on the Eastern Nile*, 16 Water Pol'y 595, 598, 606 (2014); *Nile Dam Talks: Unlocking a Dangerous Stalemate*, Int'l Crisis Group, Mar. 16, 2020; Ana Elisa Cascão & Alan Nicol, *Changing Cooperation Dynamics in the Nile Basin and the Role of the GERD*, *in* GERD Implications, *supra* note 20, at 90, 106-08; Robin Faißt, *How Mediation Based on African Approaches to Conflict Resolution Can Transform the Conflict Over the Nile*, 2019 Conflict Trends 29 (2019); Ana Elisa Cascão & Alan Nicol, *GERD: New Norms of Cooperation in the Nile Basin?*, 41 Water Int'l 550, 566-69 (2016); Meron Teferi Taye et al., *The Grand Ethiopian Renaissance Dam: Source of Cooperation or Contention?*, 142 J. Water Res. Plan. & Mgmt. 02516001-1 (2016); Seifulaziz Milas, Sharing the Nile: Egypt, Ethiopia, and the Geo-Politics of Water (2013).
22. *See*, *e.g.*, Wossenu Abtew & Shielis Behailu Dessu, The Grand Ethiopian Renaissance Dam on the Blue Nile (2018); Kevin G. Wheeler, *Cooperative Filling Approaches for the Grand Ethiopian Renaissance Dam*, 41 Water Int'l 611 (2016); Ying Zhang et al., *Filling the GERD: Evaluating Hydroclimatic Variability and Impoundment Strategies for Blue Nile Riparian Countries*, 41 Water Int'l 593 (2016); Andrew King & Paul Block, *An Assessment of Reservoir Filling Policies for the Grand Ethiopian Renaissance Dam*, 5 J. Water & Climate Change 233 (2014); Ying Zhang et al., *Ethiopia's Grand Renaissance Dam: Implications for Downstream Riparian Countries*, 141 J. Water Res. Plan. & Mgmt. 05015002-1 (2015); Walaa Y. El-Nashar & Ahmed H. Elyamany, *Managing Risks of the Grand Ethiopian*

Legal scholars have explored *some* of the substantive issues concerning the legal developments in the GERD dispute, including the DoP.[23] What the academic discourse regarding the GERD lacks, however, is a detailed analysis of treaty flexibility, and a proposal for governing the GERD in the face of climate change.

The Article intends to fill these gaps. This is especially important because the ramifications of climate change on the Nile water resources are bringing a new dimension to the GERD dispute. Existing studies and climate change models commonly predict increases in the average annual temperature in the Nile Basin, leading to greater water loss due to evaporation.[24] There is much less certainty in projections concerning future rainfall, river flows, and water availability in the Nile Basin. Studies on these topics find contradictory results; one predicts floods and increased runoff,[25] and the other predicts water scarcity and possible droughts.[26]

It seems evident that proper governance of the GERD in the face of these uncertainties demands a response to two contradictory scenarios—either increase in water availability and flooding, or water scarcity and drought—each of which requires opposite adaptation strategies.[27] Building flexible and resilient legal and institutional arrangements will no doubt be at the heart of such adaptation strategies.[28] If climate change reduces the available water in the Nile Basin, competition for water between Ethiopia, Sudan, and Egypt will only intensify, possibly leading to conflicts. If the available water resources increase due to climate change, this will create a need for new legal responses to flooding. In either case, flexible legal arrangements governing the GERD will be crucial to adapt to climate change.

Part I introduces the mechanisms that can provide flexibility in watercourse treaties; it reviews the practice of various water-sharing countries and encapsulates the principal ways of building a climate-proof treaty. Part II analyzes treaty flexibility in the Nile Basin and probes the intrinsic capacity of the 1959 Nile Treaty between Egypt and Sudan, and the 2010 Cooperative Framework Agreement (CFA). Part III specifically addresses whether the DoP contemplates a flexible legal arrangement for governing the GERD under climatic uncertainty. After answering in the affirmative, this part also proposes a flexible basin-wide treaty capable of accommodating the ramifications of climate change for long-term-operation dams in the Nile Basin. Part IV provides concluding remarks, which call upon Nile Basin States and other water-sharing States to set aside their egoistic national interests and address the ramifications of climate change by developing flexible and climate-proof treaties.

I. Building Flexibility Into Treaty Regimes

A new paradigm of flexibility in water treaties is essential to adapt to climate change. This part encapsulates five mechanisms through which flexibility can be provided in watercourse treaties.[29] The five principal ways to build a climate-proof treaty are to incorporate (1) flexible allocation strategies; (2) extreme events provisions; (3) amendment-and-review procedures; (4) termination clauses; and (5) river basin organizations (RBOs).[30] The Article examines each mechanism below.

A. Flexible Water Allocation

Water-sharing States may use flexible water allocation strategies in watercourse treaties to achieve a sustainable water supply in the face of climate change. Instead of allo-

Renaissance Dam on Egypt, 9 Ain Shams Eng'g J. 2383 (2018); Asegdew Mulat & Semu Moges, *Assessment of the Impact of the Grand Ethiopian Renaissance Dam on the Performance of the High Aswan Dam*, 6 J. Water Res. & Prot. 583 (2014).

23. *See generally* Tekuya, *supra* note 14; Salman, *supra* note 15; Salman M.A. Salman, *The GERD and the Revival of the Egyptian-Sudanese Dispute Over the Nile Waters*, *in* Ethiopian Yearbook of International Law 79, 95 (Zeray Yihdego et al. eds., Springer 2018); Zeray Yihdego, The Fairness "Dilemma" in Sharing the Nile Waters: What Lessons From the Grand Ethiopian Renaissance Dam for International Law? (2017); Dereje Zeleke Mekonnen, *Declaration of Principles on the Grand Ethiopian Renaissance Dam: Some Issues of Concern*, 11 Mizan L. Rev. 255 (2017); Mahemud Eshtu Tekuya, *The Egyptian Hydro-Hegemony in the Nile Basin: The Quest for Changing the Status Quo*, 26 J. Water L. 10 (2018); Salman M.A. Salman, *Agreement on Declaration of Principles on the GERD: Levelling the Nile Basin Playing Field*, *in* GERD Implications, *supra* note 20, at 41; Zeray Yihdego et al., *How Has the Grand Ethiopian Renaissance Dam Changed the Legal, Political, Economic, and Scientific Dynamics in the Nile Basin?*, 41 Water Int'l 503 (2016).

24. Anton Earle et al., Transboundary Water Management and the Climate Change Debate 130 (2015); Declan Conway, *From Headwater Tributaries to International River: Observing and Adapting to Climate Variability and Change in the Nile Basin*, 15 Global Env't Change 99, 106 (2005); United Nations Environment Programme, Climate Change Adaptation Capacities in the Nile River Basin 13 (2015); Heather Cooley et al., Pacific Institute, Understanding and Reducing the Risks of Climate Change for Transboundary Waters (2009).

25. Nigel W. Arnell, *Climate Change and Global Water Resources: SRES Emissions and Socio-Economic Scenarios*, 14 Global Env't Change 31, 31-49 (2004); Reinhard Voss et al., *Enhanced Resolution Modelling Study on Anthropogenic Climate Change: Changes in Extremes of the Hydrological Cycle*, 22 Int'l J. Climatology 755, 771-73 (2002). *See also* Waltina Schuemann & Manuel Schiffler, Water in the Middle East: Potential for Conflicts and Prospects for Cooperation 146 (1998) ("Some experts estimate that the Nile's flow will increase by as much as 30%, while others estimate a decrease of up to 78%.").

26. Alice Shih & Trevor Stutz, *Sink or Swim: Abrogating the Nile Treaties While Upholding the Rule of Law*, 43 ELR 10789 (Sept. 2013); *see* Conway, *supra* note 24, at 106; Vivek K. Arora & George J. Boer, *Effects of Simulated Climate Change on the Hydrology of Major River Basins*, 106 J. Geophysical Rsch. 3335, 3335-48 (2001).

27. Richard Kyle Paisley, *Why the 11 Countries That Rely on the Nile Need to Reach a River Deal Soon*, Conversation, Aug. 27, 2017, https://theconversation.com/why-the-11-countries-that-rely-on-the-nile-need-to-reach-a-river-deal-soon-75868. It is worth mentioning that the global climate change discourse has two approaches, mitigation and adaptation, for tackling the problems of climate change. While mitigation focuses on resolving the root causes of climate change by controlling greenhouse gas emissions and mitigating the rise of global temperature, adaptation "accepts the projected increases and seeks to understand both the effects of global climate change and the impacts of those effects in order to adapt to them." *See* Tarlock, *supra* note 10, at 423-24.

28. *See also* Eckstein, *supra* note 2, at 432-33. *See generally* McCaffrey, *supra* note 5, at 159; Hearns & Paisley, *supra* note 11, at 259-60; Fischhendler, *supra* note 10, at 282; Goldenman, *supra* note 10, at 741; Cooley et al., *supra* note 24, at 14; Rieu-Clarke, *supra* note 6, at 9-11.

29. *See also* Fischhendler, *supra* note 10, at 282-83. *See generally* McCaffrey, *supra* note 5, at 158-61.

30. *See generally* Fischhendler, *supra* note 10, at 282-83. *See generally* McCaffrey, *supra* note 5, at 159-61.

cating shared waters based on the assumption of a fixed, and often too optimistic, perpetual water supply, or fixed allocation strategy, Parties should allocate their shared water resources in accordance with the social, economic, or climatic changing conditions existing in the Basin States.[31] There are a couple of ways this can be achieved.

A rather simple method is to enter into an agreement that requires upstream States to deliver a minimum flow to a downstream riparian State in order "to maintain human health and basic ecological functions."[32] The other mechanism is to proportionally "allocate the water based on a percentage of the flow and time of flow, rather than a fixed or minimum amount."[33] Although this approach "requires flexible infrastructure, effective operating rules, and regular communication and data sharing,"[34] it "allows flow regimes to respond to both wet and dry conditions."[35]

B. Response Strategy for Extreme Events

Perhaps the most common mechanism for enhancing treaty flexibility is to include special provisions in watercourse treaties that govern particular kinds of exceptional circumstances, such as droughts and floods.[36] For instance, the 1944 Agreement between the United States and Mexico on the Rio Grande and Colorado Rivers has provisions governing possible problems resulting from drought.[37] The Agreement allows Mexico to deliver less than the minimum quantity of Rio Grande water to the United States during an "extraordinary drought" for up to five years.[38] If deficiencies occur during this period, Mexico is to repay by increasing flows during the next five-year cycle.[39] In the case of the Colorado River, the Agreement guarantees that Mexico receives a certain annual quantity of the Colorado River's water from the United States.[40] "In the event of extraordinary drought," though, the water allotted to Mexico is to "be reduced in the same proportion as consumptive uses in the United States are reduced."[41]

Floods, although posing serious risks for lower riparian States, are often ignored in the recent discourse of climate change concerning resilience and adaptability of international watercourse treaties.[42] Most international watercourses are not governed by regimes with the institutional capacity to address the problem of flooding.[43] Only a few watercourse treaties include flood management systems. Among such treaties, the Columbia River Basin Treaty stipulates that "Canada (the upstream party) will adjust its operation of hydroelectric dams to mitigate flooding in the United States."[44] Also, the Agreement on the Cooperation for Sustainable Development of the Mekong River Basin provides maximum river flow rates, requiring "upstream dam operations to be adjusted to meet these requirements."[45]

C. Amendment and Periodic Review

Amendment and periodic review processes give the riparian States the chance to address unforeseen circumstances, while "resynchroniz[ing] national and basin-wide strategies with new knowledge and changing circumstance."[46] These processes are crucial for the sustainability of watercourse treaties because, through time, the hydrological and climatic conditions on which such treaties are based will change significantly.[47] This is particularly true in the era of climate change.

Several mechanisms can be used to amend watercourse treaties. In the Colorado River Basin, for instance, modifications of the 1944 Colorado Treaty are made through the "minutes" of meetings of the International Boundary and Water Commission, a joint commission charged with the application of the Treaty and composed of an engineer commissioner from both Parties (United States and Mexico).[48] The Mekong River Basin Agreement between Cambodia, Laos, Thailand, and Vietnam also allows the alteration of the Agreement through amendment proposals agreed to by all the Parties.[49]

Moreover, some international watercourse treaties have provisions dealing with periodic reviews. In the Syr Darya River Basin, for instance, the Framework Agreement requires periodic review of agreements "on water releases, production and transit of electricity, and compensations for energy losses" and calls for the conclusion of new agreements annually.[50] Another example is the treaty between India and Nepal governing the Mahakali River, which

31. *See generally* Fischhendler, *supra* note 10, at 282-83. *See generally* McCaffrey, *supra* note 5, at 158-61.
32. *See* Rieu-Clarke, *supra* note 6, at 34.
33. *Id.*
34. Heather Cooley & Peter H. Gleick, *Climate-Proofing Transboundary Water Agreements*, 56 Hydrological Sci. J. 711, 715 (2011).
35. *Id.*
36. *Id. See also* Fischhendler, *supra* note 10, at 283-84; McCaffrey, *supra* note 5, at 160; Goldenman, *supra* note 10; Eckstein, *supra* note 2, at 457; Cooley et al., *supra* note 24, at 15.
37. Utilization of the Waters of the Colorado and Tijuana Rivers and of the Rio Grande, Mex.-U.S., art. 4, Feb. 3, 1944, 59 Stat. 1219, T.S. No. 994 (entered into force Nov. 8, 1945) [hereinafter 1944 Colorado Treaty].
38. *Id.* art. 4, para. B(c).
39. *Id.* para. B(d).
40. *Id.* art. 10, para. a.
41. *Id.* para. b.
42. *See* Cooley et al., *supra* note 24, at 15.
43. *Id.*
44. *Id.*; Treaty Relating to the Cooperative Development of the Water Resources of the Columbia River Basin, U.S.-Can., *opened for signature* Jan. 17, 1961, 15 U.S.T. 1555, 542 U.N.T.S. 244. It is worth nothing that flood protection is the main purpose of this Treaty.
45. *See* Cooley et al., *supra* note 24, at 15.
46. *See* Kistin & Ashton, *supra* note 10, at 6. Indeed, a review process has been addressed in the *Kishenganga* case between Pakistan and India. The award states that after seven years from the implementation of the project either party may seek reconsideration of the tribunal's minimum flow requirement. *See* In re Indus Waters Kishenganga Arbitration (Pak. v. India), para. 119 (2013), https://pcacases.com/web/sendAttach/48. This was because "a degree of uncertainty is inherent in any attempt to predict environmental responses to changing conditions." *See id.* para. 117.
47. Cooley et al., *supra* note 24, at 16.
48. 1944 Colorado Treaty, *supra* note 37, arts. 2 and 25; *see* McCaffrey, *supra* note 5, at 161.
49. Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, art. 37, Apr. 5, 1995, 34 I.L.M. 864.
50. *See* McCaffrey, *supra* note 5, at 159.

requires a review every 10 years or "earlier as required by either party."[51]

D. Termination Clauses

The fourth mechanism for enhancing treaty flexibility is to simply include a termination clause in the treaty allowing any riparian State "to terminate it upon a given period of notice, e.g. six months."[52] In the Syr Darya Basin, for instance, the Framework Agreement restricts its validity to five years,[53] allowing automatic renewal for another five years provided that no termination notice is submitted six months in advance from any Party.[54] In so doing, the Framework Agreement provides sufficient flexibility for Parties adversely affected by changed circumstances, permitting them to withdraw from what could otherwise be an oppressive treaty.[55]

It is, however, to be noted that a termination clause would not always be appropriate for all types of treaties. As pointed out by Prof. Stephen McCaffrey, it would best fit only treaties that do "not involve permanent structures but provide for allocations of water."[56]

E. RBOs

Sustainable transboundary water management is inextricably linked with RBOs. Developing an institutional structure for joint management of transboundary watercourses is essential for the pragmatic application of both substantive and procedural principles governing transboundary watercourses.[57] Indeed, RBOs play a significant role in building flexibility into watercourse treaties. RBOs' ability to adapt, amend, and extend the institutional arrangement between riparian States is at the center of developing greater resilience and adaptability to the changing environment.

Of the 260 transboundary river basins, about 119 of them have water institutions.[58] While the roles and authorities of such institutions vary significantly, institutions capable of adapting to the challenges of climate change should "have a broad scope, include all riparian nations, and have management and enforcement authority."[59] Factors that are likely to influence the resilience of the RBOs include:

> [t]he membership structure of the organization, focusing on whether all riparians in the respective basin are included in joint climate change adaptation activities; the functional scope of the RBO, focusing on the degree of integration of water resources management and climate change adaptation; a decision-making mechanism that ensures the timely and efficient adoption of decisions; the existence and the well-functioning of data and information sharing mechanisms ensuring long-term cooperation; the existence and well-functioning of dispute-resolution/conflict management mechanisms allowing for solving emerging water-related collective action problems; [and] the secured availability of financial resources for climate change adaptation activities in the basin . . .[60]

Consequentially, although mechanisms discussed in this section are by no means exhaustive, water-sharing States are recommended to use these mechanisms when building climate-proofing treaties to adapt to climate change. The next part of this Article specifically analyzes the legal regime governing the Nile Basin using the aforementioned five mechanisms.

II. Adapting the Nile Basin to Climate Change

A. Overview of the Nile Water Agreements: A Fragmented Legal Regime

Legal and institutional frameworks are essential for efficient transboundary water management. States are often advised by scholars to regulate the use and allocation of their shared water resources through a basin-wide treaty.[61] This advice seems to be ignored in the Nile Basin, however. The Nile Basin has no mutually acceptable legal framework applicable to all riparian States.[62] Currently, three types of legal instruments—bilateral treaties, a multilateral agreement establishing a framework for cooperation, and a tripartite agreement on a DoP—are governing the use and allocation of Nile waters.

Several bilateral treaties have been agreed to between riparian States and their colonial masters concerning the flow of the Nile waters since the end of the 19th century.[63] Of these bilateral treaties, the 1902, 1929, and 1959

51. Treaty Between His Majesty's Government of Nepal and the Government of India Concerning the Integrated Development of the Mahakali River Including the Sarada Barrage, Tanakpur Barrage, and Pancheshwar Project, India-Nepal, art. 12, Feb. 12, 1996.
52. Agreement Between the Governments of the Republic of Kazakhstan, the Kyrgyz Republic, and the Republic of Uzbekistan on the Use of Water and Energy Resources of the Syr Darya Basin, art. 12, Mar. 17, 1998, https://iea.uoregon.edu/treaty-text/4763 [hereinafter Syr Darya Basin Treaty]. *See also* McCaffrey, *supra* note 5, at 160.
53. Syr Darya Basin Treaty, *supra* note 52, art. 12. *See also* McCaffrey, *supra* note 5, at 159-60.
54. Syr Darya Basin Treaty, *supra* note 52, art. 12; McCaffrey, *supra* note 5, at 159-60.
55. *Id.*
56. *Id.* at 160.
57. *See* Hearns & Paisley, *supra* note 11, at 274-75.
58. *See* Cooley & Gleick, *supra* note 34, at 712 (mentioning 260 international river basins) and at 716 (mentioning 106 RBOs). *See also* Susanne Schmeier, *Opening the Black Box of River Basin Organizations*, Global Water F., Oct. 16, 2012, http://www.globalwaterforum.org/2012/10/16/opening-the-black-box-of-river-basin-organizations/ (mentioning 119 RBOs).
59. *See* Cooley et al., *supra* note 24, at 16.
60. *See* Sabine Schulze & Susanne Schmeier, *Governing Environmental Change in International River Basins: The Role of River Basin Organizations*, 10 Int'l J. River Basin Mgmt. 229 (2012).
61. *See* McCaffrey, *supra* note 5, at 157.
62. Tekuya, *supra* note 14, at 74.
63. Fasil Amdetsion, *Scrutinizing the Scorpion Problematique: Arguments in Favor of the Continued Relevance of International Law and a Multidisciplinary Approach to Resolving the Nile Dispute*, 44 Tex. Int'l L.J. 1, 19 (2008); Salman M.A. Salman, *The Nile Basin Cooperative Framework Agreement:*

Agreements are the most controversial and widely disputed treaties.[64] First, the 1902 Agreement was a bilateral treaty concluded between Great Britain, on behalf of Sudan, and Ethiopia to determine the boundary between Ethiopia and Sudan.[65] Although the Agreement is about boundary delineation, it contains a provision relating to the waters of the Nile, in which Ethiopia undertook "not to construct or allow to be constructed, any work across the Blue Nile, Lake Tana, or the Sobat, which would *arrest* the flow of their waters into the Nile except in agreement with His Britannic Majesty's Government and the Government of the Soudan."[66]

Second, the 1929 Nile Agreement was a bilateral treaty between Egypt and Britain, representing Sudan and its East African colonies (Kenya, Tanzania, and Uganda).[67] This Agreement, recognizing the historical and natural rights of Egypt, gave Egypt veto power over any construction projects along the Nile River and its tributaries.[68] It also allocated a volumetric quantity of water to each State: 48 billion cubic meters (BCM) for Egypt and 4 BCM for Sudan. In so doing, it determined the amount of water each State received, which the 1959 Agreement then used as the "established rights" of the two States.[69]

Third, the 1959 Agreement was a bilateral treaty between Egypt and Sudan.[70] This Agreement was meant to allocate the net benefit generated from the High Aswan Dam (HAD). Although more favorable to Sudan than the 1929 Agreement, the 1959 Agreement also allocated the bulk of the Nile's waters, 55.5 BCM, to Egypt (66% of the 84 BCM total water flow), 18.5 BCM (22%) to Sudan, and left the remaining 10 BCM (12%) for evaporation.[71] It does not recognize the rights of the upstream States.

The Nile Basin CFA is the other important legal instrument concerning the uses and allocations of the Nile watercourse. The CFA was the result of the riparian States' attempt to prepare a basin-wide legal and institutional framework that would regulate the interstate utilization and management of the Nile River. The process of the CFA was started in the early 1990s and formalized in the adoption of the Nile Basin Cooperative Framework Project in 1995.[72] All Nile riparian States at the time, except Eritrea, participated in the project, and with financial and technical support from the United Nations Development Programme, the project provided for high-level legal and political negotiations toward the conclusion of a basin-wide agreement. A separate but parallel track, the Nile Basin Initiative (NBI), focused on development, was supported by the World Bank beginning in 1999, and was participated in by the same nine Nile Basin States that participated in the CFA.[73]

During the negotiations, the fate of the 1902, 1929, and 1959 Agreements was the subject of controversy. The upstream States believed that the purpose of the Cooperative Framework Project was to produce an inclusive agreement that would replace and supersede the previous agreements. The lower riparian States—Egypt and Sudan—insisted that the new agreement must explicitly recognize the earlier treaties, referred to as "existing agreements," and would continue to be binding against all riparian States.[74]

In an attempt to address the controversy, the negotiators of the CFA introduced the new and nonlegal concept of water security.[75] The principle of water security would have replaced the provision proposed to govern the relationship between the CFA and the existing agreements because an agreement could not be reached on such provision.[76] The idea was that since Egypt was concerned about its water security, water security could be protected in a new provision and the relationship between the CFA and the "existing agreements" could be left to the general rules of international law.[77] However, the Nile Basin States were not able to agree on the draft provision on water security, contained in Article 14 of the draft CFA.[78]

A Peacefully Unfolding African Spring?, 38 Water Int'l 18 (2012); Dereje Zeleke Mekonnen, *Between the Scylla of Water Security and Charybdis of Benefit Sharing: The Nile Basin Cooperative Framework Agreement—Failed or Just Teetering on the Brink?*, 3 Goettingen J. Int'l L. 345, 351-55 (2011).

64. Salman, *supra* note 63, at 18-19.
65. Treaties Relative to the Frontiers Between the Soudan, Ethiopia, and Eritrea, Eth.-U.K., May 15, 1902, [1902] U.K.T.S. 16 [hereinafter 1902 Treaty].
66. *See id*. art. 3 (emphasis added). Egypt considers itself as successor of this treaty and claims that Ethiopia should get Egypt's consent to build any project on the Nile. Ethiopia, on the other hand, rejected, claiming, inter alia, that the Treaty was not ratified, and that the meaning of the word "arrest" in the Amharic (Ethiopian language) version of the Treaty does not preclude Ethiopia from using the waters. *See* Salman, *supra* note 63, at 18-19; Abadir M. Ibrahim, *The Nile Basin Cooperative Framework Agreement: The Beginning of the End of Egyptian Hydro Political Hegemony*, 18 Mo. Env't L. & Pol'y Rev. 282, 299 (2011); Mohammed Abdo, *The Nile Question: The Accords on the Water of the Nile and Their Implications on Cooperative Schemes in the Basin*, 9 Perceptions J. Int'l Affs. 47, 48 (2004).
67. *See* Exchange of Notes Between Her Majesty's Government in the United Kingdom and the Egyptian Government on the Use of Waters of the Nile for Irrigation, May 7, 1929 [hereinafter the 1929 Agreement].
68. The 1929 Agreement states:

> Except with the prior consent of the Egyptian Government, no irrigation works shall be undertaken nor electric generators installed along the Nile and its branches nor on the lakes from which they flow if these lakes are situated in Sudan or in countries under British administration which could jeopardize the interests of Egypt either by reducing the quantity of water flowing into Egypt or appreciably changing the date of its flow or causing its level to drop.

Id. art. IV, para. 2. In 1962, former British East Africa colonies Kenya, Tanzania, and Uganda, adopting the Nyerere doctrine, declared that they were no longer bound by this Treaty. However, Egypt has continued to deem the Treaty as valid and binding on all Parties under the principle of state succession. *See* Salman, *supra* note 63, at 18; Ibrahim, *supra* note 66, at 297-99; Amdetsion, *supra* note 63, at 23.
69. *See* Agreement Between the Republic of Sudan and the United Arab Republic (Egypt) on the Full Utilization of the Waters of the Nile, art. 1(1), Nov. 8, 1959, 453 U.N.T.S. 51 [hereinafter 1959 Agreement] (characterizing the aforementioned quantities as established rights of the Parties).
70. *See generally id*.
71. *Id*. art. II, paras. 3-4.
72. Interview with Professor Stephen McCaffrey, Legal Consultant, Nile Cooperative Framework Project, in Sacramento, Cal. (Nov. 2017) [hereinafter Interview with Professor McCaffrey].
73. *Id*.
74. *Id*. *See also generally* Dereje Zeleke Mekonnen, *The Nile Basin Cooperative Framework Agreement Negotiations and the Adoption of a "Water Security" Paradigm: Flight Into Obscurity or a Logical Cul-de-Sac?*, 21 Eur. J. Int'l L. 421 (2010).
75. Mekonnen, *supra* note 74, at 436-40; Interview with Professor McCaffrey, *supra* note 72.
76. Interview with Professor McCaffrey, *supra* note 72.
77. *Id*.
78. *Id*.

Specifically, the lower riparian States opposed the part of Article 14 providing that the Parties "agree, in a spirit of cooperation not to significantly affect the water security of any other Nile Basin State."[79] The lower riparian States insisted that the language should obligate all Nile Basin States "*not to adversely affect the water security and current uses and rights* of any other Nile Basin State."[80] The upstream States did not accept that proposal and opened the Agreement for signature on May 14, 2010.[81] The CFA has been signed by six upstream States and ratified by three since that date.[82] By its terms, the CFA requires six ratifications to enter into force.[83] Therefore, as it exists today, the CFA does bind the lower riparian States.

After signing the CFA, Ethiopia started constructing the GERD some 20 kilometers upstream from the border with Sudan on the Blue Nile. Egypt and Sudan initially opposed the dam, alleging that it would significantly affect their interests and violate the rules regulating the Nile watercourse.[84] Considering the enormous advantages it would get from the dam, Sudan immediately changed its position and started to support the construction of the dam.[85] Gradually, after painstaking negotiations,[86] Egypt accepted the importance of the dam and the three States signed an Agreement of DoP on the GERD on March 23, 2015.[87] Although the legal status of the document is debatable,[88] the DoP reiterates the most fundamental principles of international water law.

Generally, it can be said that the legal regime governing the Nile watercourse consists of several legal instruments, none of which involves all Basin States or applies to the Basin as a whole. Despite the fragmented nature of the treaties, the following section of this Article analyzes the flexibility of the most prominent legal instruments, the 1959 Agreement, the CFA, and the DoP, and assesses their capacity to adapt to climate change.

B. *The 1959 Agreement*

As Table 1 demonstrates, the 1959 Agreement does not incorporate most of the mechanisms essential for treaty flexibility. The Agreement does not follow a proportion allocation strategy. It also fails to address flooding and does not have provisions regarding the amendment process and periodic review. Moreover, it envisages perpetual applicability and does not allow for termination by the riparian States.

Table 1. Treaty Flexibility in the Nile Basin

Flexibility Mechanisms	1959 Treaty	CFA	DoP
Allocation	Yes, but fixed	Equitable utilization	Equitable utilization
Extreme Events **I. Drought** **II. Flood**	I. Yes II. No	I. Yes II. Yes	I. No II. No
Amendment and Review **I. Amendment** **II. Review**	I. No II. No	I. Yes, but a bit rigid II. No	I. No, but contemplates II. No, but contemplates
Revoking Clause	No	Yes	No, but contemplates
RBOs	Yes, but nominal	Yes	No, but contemplates

The 1959 Agreement does not allocate any water for the upstream States. It allocates the waters of the Nile only between Egypt and Sudan. As the 1929 Agreement determined the "established rights" of the two States, the 1959 Agreement allocated only the net benefit generated from the construction of the HAD.[89] Of the 32 BCM gross gain expected after the construction of the HAD, the Agreement deducts 10 BCM for evaporation and seepage and divides the remaining 22 BCM in a 2:1 ratio in favor of Sudan, or 14.5 BCM for Sudan and 7.5 BCM for Egypt.[90] Then, by adding the net benefits to the established rights of each State, the Agreement allocates a fixed volumetric quantity of waters between the two States, 55.5 BCM to Egypt and 18.5 BCM to Sudan. This allocation strategy is very rigid and at odds with the proportional allocation strategy discussed in Part I.

As to extreme events, the drought provision of the 1959 Agreement states that, if normal yearly quotas cannot be drawn during the low years,[91] the Permanent Joint Technical Committee (PJTC) will devise fair arrangements and submit proposals to both governments for approval.[92] As to the high flow years,[93] the Agreement requires the two

79. *Id.*; *see also* Mekonnen, *supra* note 74, at 428.
80. Interview with Professor McCaffrey, *supra* note 72; *see also* Mekonnen, *supra* note 74, at 428.
81. By opening the draft CFA for signature, the upstream States have used the document as a counter-hegemonic strategy. Among others, they used the document to politically isolate the lower riparian States and change the narrative that Egypt is the gift of Nile. Tekuya, *supra* note 23, at 14.
82. Agreement on the Nile River Basin Cooperative Framework, *opened for signature* May 14, 2010 [hereinafter CFA]. Ethiopia, Kenya, Uganda, Burundi, Rwanda, and Tanzania have signed the Agreement, and four States, Ethiopia, Tanzania, Uganda, and Rwanda, have ratified it.
83. *Id.* art. 43.
84. *See* Salman M.A. Salman, *Grand Ethiopian Renaissance Dam: Challenges and Opportunities*, 10 CIP Rep. 23 (2011) (stating that Egypt and Sudan considered the GERD a violation of the 1902 Treaty).
85. *See* Tawfik, *supra* note 17, at 24.
86. *See generally* Salman, *supra* note 15 (for the negotiation process).
87. DoP, *supra* note 16.
88. Regarding the status of the DoP, see Tekuya, *supra* note 14, at 79-83.
89. *See* 1959 Agreement, *supra* note 69, art. II, paras. 3-4; Goldenman, *supra* note 10, at 753-54. The net benefit is as follows:

Mean natural river supply at Aswan	84 BCM
Less over-year storage losses	-10
Egypt's established right	-48
Sudan's established right	-4
Total net benefit	22 BCM

90. *See* 1959 Agreement, *supra* note 69, art. II, para. 4.
91. "Low years" are years when the water flows are below the average mean natural river supply at Aswan (84 BCM).
92. *See* 1959 Agreement, *supra* note 69, art. IV, para. 1(e).
93. "High years" are years when the water flows are above the average mean natural river supply at Aswan (84 BCM).

States to divide net benefits equally.[94] The Agreement, like many watercourse treaties, does not provide for any flood-controlling mechanism.[95] Yet flooding is a real problem in the Nile Basin, and its frequency is projected to be exacerbated by climate change.[96]

Further, the 1959 Agreement does not have amendment-and-review provisions. It does, however, envisage the revision of the net benefit generated from the HAD.[97] Both Parties are allowed to revise the net benefit "at reasonable intervals to be agreed upon as from the date of the operation of the complete" HAD.[98] Although the intended revision is important for building flexibility, it has not been pragmatically applied throughout the Basin's history. Moreover, as the subject of revision is only "the net benefit," but not "the established rights" of the two States, the Agreement's ability to tackle severely diminished river flows due to climate change is questionable. Also, the Agreement does not have a termination clause and hence does not permit the riparian States to end their treaty obligations.

Indeed, the establishment of the PJTC is the most important achievement of the 1959 Agreement.[99] But the authority given to the Committee is restricted to administrative matters like overseeing construction and storage works, including the HAD.[100] The PJTC has no authority to adopt, amend, or extend the existing arrangements between riparian States. Moreover, this Agreement neither provides a dispute settlement procedure, nor does it give the PJTC authority to resolve regional disputes concerning the Nile watercourse. Additionally, it does not oblige Egypt and Sudan to share hydrological data.[101] In a nutshell, it can be said that rigidity is the salient feature of the 1959 Agreement, and that it lacks the intrinsic capacity for dealing with the ramifications of climate change.

C. *The Cooperative Framework Agreement*

The CFA does not use the fixed volumetric allocations strategy, does not provide a minimum flow to the downstream States, and does not allocate the Nile waters proportionally. Instead, it uses equitable and reasonable utilization as an allocation strategy. By allowing all riparian States to use the Nile waters equitably,[102] the CFA illustrates the relevant factors for determining equitable and reasonable utilization of the water resource.[103]

The climate, hydrology, and other physical characteristics of the Nile River System are among the factors listed for determining equitable and reasonable utilization.[104] The CFA lists "[c]onservation, protection, development and economy of use of the water resources"[105] as factors, thus potentially providing the basis for more efficient uses as part of adaptation to decreased flows. Moreover, in recognizing that these factors, including climate, might change over time, it requires riparian States to "keep the status of their water utilization under review in light of substantial changes in relevant factors and circumstances."[106]

The CFA does not, however, guide as to how to weigh the various factors, including climate. It simply asserts that the weight to be given to each factor must be determined by comparing it to the other factors, all of which must be considered as a whole.[107] It also empowers the Council of Ministers (COM), one of the organs of the Nile Basin Commission (NBC), to determine equitable utilization of waters in each riparian State.[108] As discussed below, while empowering the Commission is essential for treaty flexibility, the composition of the COM and the absence of specific review periods under the CFA would hinder the role of the NBC.

The CFA provides for an amendment process by setting forth procedures that States are to follow. Article 35 of the CFA sets forth two distinct rules for approving proposed amendments, one requiring consensus and another requiring a two-thirds majority vote.[109] Specifically, proposals to alter Articles 1, 2, 3, 4, 5, 8, 9, 14, 23, 24, 33, and 34 can only be approved by consensus.[110] All other provisions and any protocol can be amended by a two-thirds majority vote if States cannot reach an agreement by consensus.[111] However, adopting a new proposal requires consensus.[112]

The first amendment procedure of the CFA is quite rigid because it requires consensus.[113] The consensus requirement appears too idealistic and does not consider the hydro-political landscape of the Basin. There are intricacies that would make it hard for the Basin States to arrive at a consensus. Some of these intricacies include issues such as alarming population growth, suspicion and misunderstanding between the Basin States, high dependency

94. *See* 1959 Agreement, *supra* note 69, art. II, para. 4 ("But if the average yield increases, the resulting net benefit from this increase shall be divided between the two Republics, in equal shares.").
95. Goldenman, *supra* note 10, at 754-55.
96. *See* United Nations Environment Programme, *supra* note 24, at 13-14. *Compare* Conway, *supra* note 24, at 106 (analyzing climate models that predict drier scenarios), *with Dam Bluster: How Climate Change Might Affect the Nile*, Economist, Aug. 3, 2017, https://www.economist.com/news/middle-east-and-africa/21725802-egypt-ethiopia-and-sudan-will-have-learn-share-water-or-their-people-will (analyzing a climate model that predicts wetter scenarios).
97. *See* 1959 Agreement, *supra* note 69, art. II, para. 5.
98. *Id.*
99. *Id.*
100. *Id.* art. IV, para. 1.
101. *See* Goldenman, *supra* note 10, at 755 (indicating how "Egypt regards its data on Nile flows and its consumption of those waters to be highly confidential matters of national security"). *See generally* 1959 Agreement, *supra* note 69.
102. CFA, *supra* note 82, art. 4, para. 1.
103. *Id.* para. 2.
104. *Id.* para. 2(a).
105. *Id.* para. 2(f).
106. *Id.* para. 5.
107. *Id.* para. 4.
108. *Id.* art. 24, para. 12.
109. *Id.* art. 35, para. 3.
110. *Id.*
111. *Id.*
112. *Id.* art. 34, para. 4.
113. *Id.* art. 35, para. 3. For insistence, due to the threats of climate change, the Nile Basin States may find it appropriate to change the allocation strategy followed in the CFA from equitable utilization (Article 4) to proportional allocation. But because of the requirement of consensus, they may not be able to amend Article 4 of the CFA. Although consensus does not necessarily mean unanimity, it does require at least the non-objection of some Basin countries (Egypt, Sudan, and Ethiopia), giving them the opportunity to hinder the amendment process.

on the river, coercive hegemonic policy, and emphasis on military solutions. Moreover, reaching a consensus, if at all possible, requires painstakingly lengthy diplomatic negotiations. Yet, addressing rapid climate change may often require prompt responses, which in return requires building more flexibility into the amendment procedures.

Other procedural issues, such as developing new protocols and periodically reviewing existing agreements, are also important mechanisms to deal with future climatic uncertainties. Although Article 34 of the CFA allows the Nile Basin States to adopt new protocols by consensus, no instrument shall be inconsistent with the provisions of the CFA.[114] Moreover, the CFA does not provide for periodic review. It does, however, empower one of its organs, the COM, to "review and revise . . . rules, procedures, guidelines and criteria for the implementation of the provisions of" the CFA.[115] While flexibility is implicit in this provision, the fact that the COM is not empowered to review the CFA itself and the absence of a specified period within which the CFA would be reviewed could render this call for flexibility of limited value.

Concerning extreme events, the CFA has an explicit provision that includes all "steps of the [climate change] adaptation chain—prevention, preparedness, response, and recovery."[116] In this respect, Article 12 of the CFA governing emergencies states:

> 1. For the purposes of this provision, "emergency" means a situation that causes, or poses an imminent threat of causing, serious harm to Nile Basin States or other States and that results suddenly from natural causes, such as floods, landslides or earthquakes, or from human conduct, such as industrial accidents.
>
> 2. A Nile Basin State shall, without delay and by the most expeditious means available, notify other potentially affected States and competent international organizations of any emergency originating in its territory.
>
> 3. A Nile Basin State within whose territory an emergency originates shall, in cooperation with potentially affected States and, where appropriate, competent international organizations, immediately take all practicable measures necessitated by the circumstances to prevent, mitigate and eliminate harmful effects of the emergency.
>
> 4. When necessary, Nile Basin States shall jointly develop contingency plans for responding to emergencies, in cooperation, where appropriate, with other potentially affected States and competent international organizations.[117]

As demonstrated in this Article, the CFA addresses the possible ramifications of climate change by incorporating the most recent "sophisticated global climate change discourse."[118] The CFA is unique in underscoring that "the response to climate extreme events must be collective, and not only at [a] national level."[119]

However, Article 12 of the CFA does not include flooding as an emergency. The CFA addresses flooding in Article 11 concerning the prevention and mitigation of harmful conditions.[120] Article 11, in relevant part, requires the Nile Basin States "to take all appropriate measures to prevent or mitigate conditions related to the Nile River System that may be harmful to the other Nile Basin States . . . resulting from . . . causes, such as . . . drought or desertification."[121] While this provision requires the prevention and mitigation of possible harms resulting from drought, it does not guide as to how the riparian States shall use the Nile water during the time of drought. Nor does it address how the waters of the Nile would be allocated during the low years.

Examining such gaps and considering the failure of the CFA to use a proportional allocation strategy, one may wonder, during the time of drought, what kind of uses, such as domestic and sanitation, irrigation, or generation of hydroelectric power, will be given priority. Another question is how riparian States will share the water deficiencies occurring during the time of drought. There is no doubt that the lack of concrete guidance regarding priorities among such uses, along with the absence of a proportional allocation strategy, will pose a significant challenge for the NBC to determine the equitability of the uses in each riparian State.

Concerning termination, the CFA allows the Basin States to withdraw from the Agreement any time after two years from the date of its entry into force.[122] The only requirement is that the State terminating its treaty obligation shall give written notifications to the depositary.[123] "The withdrawal shall take place upon expiry of one year after the date of its receipt by the Depositary . . . ."[124]

The time limit in which States can withdraw from the Agreement is very short. This abbreviated time line would cause a fundamental funding problem with the overall CFA. One of the considerations behind the negotiations of the CFA was identifying how the Agreement would provide security for international financial institutions and donor countries. Indeed, ensuring financial security would require a great deal of certainty and predictability within

114. *Id.* art. 34, para. 3. To address the ramification of climate change, the Nile Basin States may need to renegotiate the CFA and change some of its principles by adopting a new protocol that reflects current circumstances. Article 34 forecloses this possibility by requiring such a protocol to conform with the principles of the CFA.
115. *Id.* art. 24, para. 11.
116. Earle et al., *supra* note 24, at 143.
117. CFA, *supra* note 82, art. 12.
118. Earle et al., *supra* note 24, at 143.
119. *See id.* at 121 (Among others, this discourse considers climate change as a cross-border issue, and suggests adaptation measures will be more effective when undertaken in coordination (joint measures) with the neighboring countries.).
120. CFA, *supra* note 82, art. 11.
121. *Id.*
122. *Id.* art. 39, para. 1.
123. *Id.*
124. *Id.* para. 2.

the terms of the Agreement. Yet ultimately, the termination clause hinders the needed certainty by enabling any riparian State to terminate its treaty obligations within one year, effectively.

Ironically, it is even difficult to justify the termination clause on the grounds of treaty flexibility. As indicated above, owing to the certainty and predictability required for the operation of dams and reservoirs, building flexibility through a termination clause is found to be inappropriate for watercourse treaties "involv[ing] permanent structures."[125] The CFA involves permanent structures, dams, and reservoirs, and is therefore unsuitable for such a termination clause.

The CFA would establish, if and when it enters into force, the NBC as a joint body for the management and sustainable development of the Nile River Basin. The NBC comprises five organs: (1) Conference of Heads of State and Government; (2) COM; (3) Technical Advisory Committee (TAC); (4) Sectoral Advisory Committees; and (5) secretariat.[126]

While the Conference of Heads of State and Government is the supreme policymaking organ of the NBC,[127] the COM is the governing body of the NBC.[128] The COM is empowered to make binding decisions by consensus.[129] It also has a wide range of powers, which, among others, includes overseeing the implementation of the CFA[130]; the power to review and reverse rules, procedures, guidelines, and criteria for the implementation of the provisions of the CFA[131]; the power to examine and decide the determination of equitable utilization in each riparian State in accordance with the factors provided under the CFA[132]; and the power to resolve disputes between the Nile Basin States on the interpretation and application of the CFA.[133]

The COM makes its decisions based on the recommendations of the TAC.[134] Relevant to climate change, for instance, the TAC is empowered to "advise the [COM] on technical matters relating to the use, development, protection, conservation and management of the Nile River Basin and the Nile River System, including protection from drought and floods."[135] Noticeably, the functional scope of the NBC encompasses multiple issues ranging from promoting the rights and obligations of the Basin States to the development, protection, conservation, and management of the Nile River Basin and its waters. Certainly, such a wide range of authorities will enable the NBC to ensure integrated river basin management addressing various aspects like environmental protection and water allocation under one institutional umbrella. This will, in turn, give the NBC the potential to deal with changes in the river basin and address the ramifications of climate change.

Moreover, as indicated above, there is much uncertainty as to future water availability in the Nile Basin and studies are projecting both flooding and water scarcity.[136] The CFA seems to address this very issue by empowering the TAC to propose, and submit to the COM, various strategies for adapting to the two possible ramifications of climate change: floods and drought.[137] Also, while determining equitable utilization, it may reduce or increase allocations in response to changing levels of precipitation or flow and consider other changing conditions.

The NBC is also empowered to control data and information management. It has the power to develop procedures through which the Nile Basin States shall regularly and readily exchange available and relevant data and information on existing measures and the condition of water resources of the Basin.[138] The Basin States also agree to exchange information concerning planned measures through the NBC.[139] Concerning data management, one of its organs, the secretariat, is tasked "to compile available data and information and coordinate . . . monitoring of information relating to the Nile Basin, including the environment, review . . . and synthesize . . . the information with a view to integrating it into basin-wide databases and establishing standards, and develop . . . mechanisms for the regular exchange of information where needed."[140]

The existence of this formal information exchange system in the CFA will bring about more resilience and adjustment to climate change by enhancing reliable recordkeeping, honest disclosures and notifications, and good-faith efforts to accommodate the concerns of fellow riparian States.[141] Certainly, the sharing of data between the Basin States will "give decision-makers the flexibility to continuously review strategies, policies as well as activities and change management if necessary."[142] This, in turn, will boost the capacity of the NBC to conduct adaptive water management when environmental and social changes require change.

Additionally, the Commission may serve as a mediator or conciliator to settle disputes between the Nile Basin States on the interpretation and application of the CFA.[143] It is likely that the ramifications of climate change, such as floods and droughts, will exacerbate potential disputes over water resources. Hence, the existence of clear conflict resolution mechanisms in the CFA is a highly commendable one and important for adaptive transboundary water governance.[144]

125. McCaffrey, *supra* note 5, at 160.
126. CFA, *supra* note 82, art. 17.
127. *Id.* art. 21.
128. *Id.* art. 24, para. 1.
129. *Id.* art. 23, paras. 5-6.
130. *Id.* art. 24, paras. 3-4.
131. *Id.* para. 11.
132. *Id.* para. 12.
133. *Id.* para. 13; *see also id.* art. 33, para. 1(a).
134. *Id.* art. 26.
135. *Id.* para. 6.
136. *See* Shih & Stutz, *supra* note 26, at 10789.
137. *See* CFA, *supra* note 82, art. 26, para. 6.
138. *Id.* art. 7, paras. 2-3.
139. *Id.* art. 8.
140. *Id.* art. 30, para. 9.
141. *See* Goldenman, *supra* note 10, at 801.
142. *See* Susanne Schmeier & Sabine Schulze, *Governing Environmental Change in International River Basins—The Role of River Basin Organizations* 7 (2010), *available at* https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1690244.
143. *See* CFA, *supra* note 82, art. 34, para. 1(a).
144. *See* Goldenman, *supra* note 10, at 795.

As indicated above, the COM also has rulemaking authority. All decisions of the COM are binding on the Basin States if they are made by consensus.[145] Since adaptation requires prompt decisions to respond to changing conditions, the COM decisionmaking procedure, particularly the requirement of consensus, will pose significant challenges to successful adaptation. Although consensus does not necessarily mean unanimity, it does require at least the non-objection of the Nile Basin States. This in effect will allow any of them "to obstruct the majority of actors from passing a decision,"[146] and thus compromise the COM's ability "to react in a timely manner in cases of urgency such as of abrupt environmental change."[147]

The composition of the COM, which comprises the minister for water affairs of each Nile Basin State,[148] will also be a big challenge for the flexibility needed to respond to climate change. This is because the ministers are political appointees who will advance the interests of their respective State, and critical decisions need to go through time-consuming diplomatic negotiations. Yet, such "ordinary diplomatic mechanisms will be inefficient to deal with the volume of decisions that climate change will bring."[149] Reaching agreements through diplomacy has proven to be challenging in the Nile Basin, and controversial decisions have rarely been made in the Basin's history. This trend will significantly slow down the process of adaptation to climate change. Unless the Basin States are willing to invest the NBC with authority to make at least provisional decisions, it is unlikely to build the flexibility needed to accommodate climate change successfully.[150]

Membership is the other significant problem ahead for the NBC. As indicated above, Egypt and Sudan have not ratified the CFA. When the CFA enters into force, the NBC will succeed to all rights, obligations, and assets of the NBI upon the entry into force of the CFA.[151] If the CFA enters into force, "[w]hat will happen to the rights and obligations under the NBI of the States that are not parties (and do not plan to be parties) to the CFA?"[152] There is no doubt that this impedes effective adaptation since the lower riparian States are not integrated into the CFA, leaving their actions as to the utilization of the Nile waters and climate change adaptation outside the NBC. Moreover, the insufficiently developed cooperation between Egypt and upstream States, the absence of commitment concerning the exchange of hydrological data, as well as the disagreement as to the filling and operation of the GERD are likely to become significant impediments to successful integration in the river basin.

D. The Declaration of Principles

The DoP is the most important legal instrument regarding the use of the Blue Nile and GERD negotiations. Like the CFA, the DoP uses equitable utilization as an allocation strategy. The DoP does not allocate fixed volumetric water for any of the riparian States. Instead, it simply allows the three States to use their shared water resources in their respective territories equitably and reasonably.[153] It also lists the factors provided in the CFA as the relevant factors to be considered in determining equitable and reasonable utilization.[154]

However, unlike the CFA, the DoP does not establish any organ responsible for assessing these factors and determining what amounts to equitable use in individual cases. Nor does it provide any guidance for the equitable allocation of "the shared water" during the filling and operation of the GERD. The DoP also neither provides an amendment-and-review process, nor does it include a revocation clause and establish any institution for data exchange and information. It does, however, provide a framework for the three States to agree on rules and guidelines for the filling and annual operation of the GERD, which the owner of the dam may adjust from time to time.[155] It also contemplates the establishment of an appropriate coordination mechanism for data and information exchange.[156]

Based on the framework, the three States negotiated over the filling and annual operation of the GERD for about five years but failed to strike a way-forward deal acceptable to all of them. Hence, there is currently no mechanism governing how Ethiopia shall fill the GERD reservoir, and especially no mechanisms governing filling and annual operation during times of flood and drought. The next part examines the extent to which flexibility and adaptation to climate change are contemplated in the forthcoming rules and guidelines of the GERD.

145. *See* CFA, *supra* note 82, art. 23, paras. 5-6.
146. *See* Schmeier & Schulze, *supra* note 142, at 6.
147. *Id.*
148. *See* CFA, *supra* note 82, art. 22.
149. *See* Goldenman, *supra* note 10, at 801.
150. This proposal could be considered as an erosion of the Basin States' sovereignty. But in its first judgment, the Permanent Court of International Justice said in the *Wimbledon* case that entering into a treaty is not giving up sovereignty, it is an expression of sovereignty. This should be treated the same way, with regard to conferring the necessary powers on the Commission. Moreover, as responding to the ramifications of climate change requires an urgent decisionmaking process, activating the Commission's "dormant" authority for the limited purpose of dealing with climate emergencies is imperative.
151. *See* CFA, *supra* note 82, art. 31.
152. *See* Salman, *supra* note 63, at 23. In relation to this, the legal consultant of the CFA project, Professor McCaffery, said:
> The legal situation seems clear enough. How it will play out is another question. As between States that are not parties to a CFA in force, the old regime will govern their relations. Same for relations between those States and States that are parties to the CFA. It is only as between States, all of which are parties to a CFA in force that that will govern their relations.

Interview with Professor McCaffrey, *supra* note 72.
153. DoP, *supra* note 16, princ. 4.
154. *Id.*
155. *Id.* princ. 5.
156. *Id.*

III. The GERD Negotiation: Toward a Climate-Proof Agreement?

A. *Flexible Tripartite Agreement: First Filling and Annual Operation of the GERD*

In Principle V of the DoP, Ethiopia, Sudan, and Egypt agreed to agree on rules and guidelines on the first filling and annual operation of the dam and set up an appropriate coordination mechanism. In relevant part, the Principle stipulates:

1. That the three States "[a]gree on guidelines and rules on the first filling of GERD . . . in parallel with the construction of GERD."
2. That the three States "[a]gree on guidelines and rules for the annual operation of GERD, which *the owner of the dam may adjust from time to time*."
3. That Ethiopia will "[i]nform the downstream countries of any unforeseen or urgent circumstances requiring adjustments in the operation of GERD."
4. That the three States "set up an appropriate coordination mechanism" through the line ministries responsible for water, and coordinate on the annual operation of GERD with downstream reservoirs.[157]

Approached from the five mechanisms of building flexibility in the watercourse treaty, the Principle does not contemplate any water allocation strategy in the forthcoming GERD agreement. As noted, the DoP follows equitable and reasonable utilization as an allocation strategy. Since the forthcoming agreement is about the first filling and annual operation of the GERD, the flexible allocation strategy discussed above may seem inappropriate for the agreement. However, given the need for developing adaptive strategies to respond to the two contradictory scenarios, either increase in water availability and flooding or water scarcity and drought, it will be extremely important that the three States use a proportional filling strategy in the forthcoming treaty. This is especially imperative because the first filling of the dam might occur during a flood or drought time as the Nile watercourse is experiencing an "increase in the flow variation from year to year"—flood in one year, and drought in another.[158]

Although the proportional filling strategy would enable Ethiopia, Sudan, and Egypt to respond to the two scenarios and manage both wet and dry conditions by proportionally sharing the possible water deficiencies and surplus, they are following the drought mitigation mechanism discussed above. Since there is no water-sharing agreement in the Nile case, drought mitigation is one of the sticking points in the GERD negotiation between the three States. The recent proposal tabled by the United States and World Bank, for instance, provides three types of drought mitigation mechanisms.

According to the proposal, drought is when the GERD's release is below 37 BCM. If a drought coincides with the filling years, Ethiopia is expected to release the "flow" of the Nile River and supplemental water from the GERD. Prolonged drought is when the release from the GERD is below 39 BCM for four years. During the filling period, a prolonged drought requires Ethiopia to release the river flow and 62.5% of the water above 603 meters above sea level (MASL) of the GERD for the following four years. Prolonged dry years are when the GERD's release is below 40 BCM for four consecutive years. Ethiopia must release the flow and 50% of the GERD storage above 603 MASL for the next four consecutive years in the event of prolonged dry years during the dam's filling.[159]

The proposals have two common features: (1) Ethiopia is expected to release the "flow" of the Blue Nile to the downstream States, which constitutes all of the Blue Nile's water that reaches the GERD reservoir, and (2) Ethiopia can incur certain quantities of water debt that must be paid from the reservoir of the GERD. The first feature forecloses Ethiopia's right to use the Blue Nile's flow—which includes the waters of its tributaries—prohibiting Ethiopia from using the waters above the GERD equitably and reasonably.

The second feature is similarly adverse to Ethiopia's interests. Analogous international practice shows that upstream States are allowed to deliver below the minimum quantity of water during severe drought seasons and repay the water during normal seasons.[160] However, water debt and repayment are relevant only when there is a water-sharing arrangement between riparian States. Here, there is neither a water-sharing arrangement nor a minimum water quantity allocated to Egypt and Sudan. Therefore, the concept of water debt is inappropriate. International treaty law demonstrates that the riparian States must help shoulder the burden caused by drought. The proposals for the GERD's filling and operation impose the burden of drought solely on Ethiopia.

The implication of agreeing to release water from the GERD's reservoir is nothing short of recognizing the inequitable water-sharing scheme under the 1959 Agreement. In other words, if Ethiopia is required to release water from its own reservoir, it does not have any share from the Nile waters. And if Egypt does indeed have "established

157. *Id.* (emphasis added).

158. Kavya Balaraman, *A New Dam on the Nile Reveals Threats From Warming*, E&E News, May 5, 2017, https://www.scientificamerican.com/article/a-new-dam-on-the-nile-reveals-threats-from-warming/.

159. *Why Ethiopia Rejected the U.S.-Drafted GERD Deal*, Ethiopian Insight, Apr. 2, 2020, https://www.ethiopia-insight.com/2020/04/02/why-ethiopia-rejected-the-u-s-drafted-gerd-deal/.

160. As noted, the 1944 Agreement between the United States and Mexico on the Rio Grande and Colorado Rivers has provisions governing possible problems resulting from drought. With respect to both the Rio Grande and Colorado Rivers, the Treaty allows upstream countries to deliver below the minimum quantity of water during severe drought seasons and to repay the water during the normal seasons. *See* 1944 Colorado Treaty, *supra* note 37, art. 4, paras. B(c)-(d), and art. 10, paras. (a)-(b).

rights" in the flow of the Blue Nile, against whom are such rights enforceable? Egypt does not have a treaty right vis-à-vis Ethiopia; under the 1959 Nile Treaty, Egypt only has such a right against Sudan. Therefore, any right Egypt has against Ethiopia must derive from customary international law. Ethiopia did not exercise forbearance in constructing a GERD-type dam earlier out of any sense of legal obligation (*opinio juris*).[161] Any such forbearance was due to a combination of other factors, including threats from Egypt[162] and a lack of funding from international financial institutions.[163] Thus, any Egyptian right to a given flow of the Blue Nile is enforceable only against Sudan.

Given that drought is a natural phenomenon that should be addressed collectively,[164] the burden of drought mitigation is not solely Ethiopia's to bear. Egypt, Sudan, and Ethiopia should support one another in mitigating drought, without placing the entire burden on any one State. To that end, they should follow a proportional filling strategy and share the burden or the possible water deficiencies (and surplus) proportionally.

Regarding the amendment-and-review process, Principle V stipulates that the annual operation guidelines and rules of the GERD can be "adjust[ed] from time to time" by "the owner of the dam."[165] Unlike the CFA, which contemplates the amendment of the important provisions through consensus, the DoP explicitly gives Ethiopia the discretion to amend and review the forthcoming agreement on filling and annual operation of the GERD. As indicated above, the requirement of consensus for amending and reviewing an agreement is not convenient to address the ramifications of climate change, which often require prompt responses.

The DoP seems to address this problem by giving Ethiopia the sole authority to amend and review the forthcoming agreement on the GERD. This would enable the forthcoming agreement to address unforeseen circumstances, and have the resilience needed to revise filling and operational guidelines, as hydrological and existing conditions change. As such, the forthcoming agreement should have an explicit provision allowing Ethiopia to amend the operational rules of the GERD. It is also important that the agreement specify the time limit within which Ethiopia would review the operational rules.

Principle V also seems to give the discretion for Ethiopia to terminate or withdraw from the forthcoming annual operational rules and guidelines of the GERD. While this is important for the flexibility needed for adapting to climate change, it must be noted that revoking a treaty through an abbreviated period of notice—say six months or one year—is inappropriate in a treaty regulating a permanent structure such as the GERD.[166] So, the forthcoming agreement must reconcile the flexibility required for adapting to climate change with the certainty required for the proper management of dams by requiring a long period of notice, anywhere between 10 to 15 years, to withdraw from the treaty.

Regarding an RBO, Principle V recommends the three States set up an appropriate coordination mechanism through the line ministries responsible for water, and coordinate on the annual operation of the GERD with downstream reservoirs.[167] While the kind of institutional mechanism, ad hoc or permanent, envisaged is not clear, the Principle has made it abundantly clear that the three States should exchange data and information.[168] The power of the institution contemplated in the Principle is limited only to facilitating data and information exchange, which means that the institution will not have other functions including rulemaking authority.

Generally, it can be argued that the DoP contemplates a flexible legal instrument on the first filling and annual operation of the GERD that would be adjusted by Ethiopia from time to time. However, given that the scope of the forthcoming agreement is restricted on the filling and annual operation of the GERD, the other eight Nile Basin States will not be party to the agreement and their actions as to the utilization of the Nile waters and climate change adaptation will be outside the joint body. This will impede effective adaptation. Effective adaptation to climate change would ultimately require Ethiopia, Sudan, and Egypt (and the other Nile Basin States) to coordinate the long-term operations of their dams and reservoirs, including the GERD and HAD through the CFA and NBC.

B. *The CFA: Long-Term Operation and Basin-Wide Cooperation*

The CFA, if accepted by Sudan and Egypt, will establish a new legal regime governing the use and allocation of the Nile waters. The CFA also foresees the establishment of the NBC as an institutional framework for Nile Basin

161. *See* North Sea Continental Shelf Cases (Ger. v. Den.; Ger. v. Neth.), Advisory Opinions, 1969 I.C.J. 44, para. 77 (Feb. 20) (discussing the two elements of customary international law, state practice and *opinio juris*).

162. Egyptian officials have previously been willing to threaten war on Ethiopia in their attempt to safeguard Egypt's hegemonic status in the Nile Basin. Early on, Anwar el-Sadat signaled that Egypt was ready to go to war to avert "any action that would endanger the water of [the] Blue Nile." In 1988, Boutros Boutros-Ghali, then-Egyptian minister of state of foreign affairs, also stated that "the next war in our region will be over the waters of the Nile, not politics." Hosni Mubarak, former Egyptian president, threatened to "bomb Ethiopia" if it built any dam on the Blue Nile. More recently, President Mohamed Morsi, who took power following President Mubarak, emotionally revealed that Egypt would trade a drop of blood for every drop of its Nile waters. *See* Tekuya, *supra* note 23, at 11.

163. For instance, Egypt blocked African Development Bank funds meant to aid Ethiopia in exploiting the Nile. *See* Ashok Swain, *The Nile River Basin Initiative: Too Many Cooks, Too Little Broth*, 22 SAIS Rev. 293, 298 (2002); *see also* Roger Thurow, *Ravaged by Famine: Ethiopia Finally Gets Help From the Nile*, Wall St. J., Nov. 26, 2003, https://www.wsj.com/articles/SB106979937643978400 ("Modern geopolitics have favored Egypt because of its strategic position in the Middle East. Major international lenders and development agencies have been loath to support anything upstream on the Nile that might disrupt the vital flow of water to Egypt. . . .").

164. Kaori Tembata & Kenji Takeuchi, *Collective Action and Cooperation in Drought Response*, Glob. Water F., June 18, 2018, https://globalwaterforum.org/2018/06/18/collective-action-and-cooperation-in-drought-response/.

165. DoP, *supra* note 16, princ. 5.

166. McCaffrey, *supra* note 5, at 159.

167. DoP, *supra* note 16, princ. 5.

168. *Id.*

governance.[169] The NBC would possess a wide range of powers, including the ability to examine and determine optimal water use and distribution among the Nile Basin countries.[170] It would also have a broad scope[171]; it would be entrusted with rulemaking authority[172] and empowered to resolve disputes within the Nile Basin.[173] Considering the need for coordinated dam operation and integrated water resource management, the NBC is best positioned to manage the long-term operation of dams and reservoirs in the Nile Basin, including the GERD and HAD. But for this to happen, Egypt and Sudan must accede to the CFA and concede that their dams and reservoirs would be managed by the NBC. Ethiopia should also offer that the long-term operation of the GERD should be administered by the NBC.

If the NBC is to manage the long-term operation of dams and reservoirs in the Nile Basin, the following adjustments to the CFA would be necessary. As noted, equitable utilization is the allocation strategy followed by the CFA. With the anticipated impacts of climate change, what is equitable today could very well be inequitable tomorrow. The CFA attempts to address this problem by empowering the COM to determine the equitable utilization of each riparian State by considering the factors provided therein. Given the COM's composition, determining equitable utilization is likely to be highly politicized. In the COM's attempt to arrive at consensus, "national interests [would] trump equitable considerations or become disguised in a party's weighting of factors."[174] An explicit provision governing how to weigh various factors, and determining priorities among uses, therefore, is extremely necessary, as it will "greatly ease the process of determining an equitable utilization of a river's waters in the event of climate-related alterations in flow."[175]

More specifically, since the drought provision of the CFA does not address the allocation or reallocation of the water, ensuring equitable utilization during the low years would be extremely difficult. One possible way out of this problem is to provide a minimum water quantity for lower riparian States and allow the upstream States to deliver below such quantity during drought seasons. However, given Egypt's dependency on the Nile, this approach is unrealistic. Hence, including a percentage allocation strategy in the CFA and sharing the possible water deficiencies, and surplus, proportionally among the Basin States is imperative to build the flexibility needed to accommodate climate change successfully.

The ramifications of climate change can be expected to necessitate the reallocation of the Nile waters. Periodic review is important to ensure equitability in the face of extreme climate uncertainty. The CFA does not provide for periodic review and, thus, ensuring equitable allocation of the Nile during extreme climate events is hardly possible. It is imperative to include explicit provisions in the CFA concerning the adjustment and review of the Agreement in general, and, in particular, regarding the equitable allocation of the Nile waters to adapt to the ramifications of climate change. Moreover, the CFA should define what constitutes "climate change" and specify when adjustments would be necessary. The latter can be done by establishing "triggers" (magnitude of climate change) that would activate treaty adjustments or by merely providing specific periods when the Agreement should be reviewed.[176]

The Nile Basin States should also consider the need for certainty and predictability while developing more flexibility into the CFA. They should reconsider the provision that allows any riparian State to withdraw from the CFA upon a one-year period of notice. This termination clause, albeit important for treaty flexibility, is in strict contrast with the predictability and certainty required for the effective management of the Nile watercourse, especially where infrastructure is involved. It also defeats the purpose of the CFA, as it compromises the security needed by the riparian States and the donor communities. The flexibility required for adapting to climate change and the certainty required for smooth operations of dams would be reconciled if a long period of notice, say 10-15 years, is required to withdraw from the Agreement, while at the same time empowering the NBC to review the equitable allocation of the waters periodically.

Although the NBC has rulemaking authority, the requirement of consensus along with the composition of the COM will cause a big challenge for the flexibility needed to respond to climate change. One way out of this problem would be reorganizing the structure and the composition of the NBC. Instead of the Conference of Heads of State and Government, the revised form of the CFA should empower the COM as the supreme policymaking organ of the NBC.

Moreover, it should establish a new Technical Committee with independent authority. The Technical Committee should be composed of experts, not political appointees, and the Committee should be given all powers of the COM under the current CFA. To efficiently respond to the ramifications of climate change, the Committee should be empowered to make provisional binding decisions as to the use and management of the Nile waters, including review and amendments, and its decisions should be effective immediately until and unless disapproved within six months by the COM.

IV. Conclusion

The global climate change discourse has two risk-reduction strategies: mitigation and adaptation.[177] Mitigation focuses on resolving the root causes of climate change by rolling

169. CFA, *supra* note 82, art. 15.
170. *Id.* art. 24, para. 12.
171. *See id.* art. 24.
172. *Id.*
173. *Id.* art. 24, para. 13, and art. 33.
174. Goldenman, *supra* note 10, at 785.
175. *Id.*
176. *Id.* at 798.
177. *See supra* note 27 and accompanying text.

back greenhouse gas (GHG) emissions. The rub is that the benefits of mitigation will not kick in for centuries,[178] making the strategy ill-suited to address the ramifications of climate change on freshwater resources.[179] "Because of their centuries-long residency time in the atmosphere, GHGs will be warming the planet and causing climate disruptions, [ranging] from droughts and floods to stronger hurricanes, glacial melting, and sea-level rise, for centuries to come."[180]

If water-sharing States are to live with these changes for centuries to come, the existing transboundary freshwater resource management regimes should adapt to climate change, abandoning many past assumptions about water availability, drought, and flood cycles.[181] Watercourse States should "abandon the assumption of a bounded stationary world and accept that water availability and use projections must assume a non-stationary one."[182] They should reevaluate "all fundamental hydrologic assumptions upon which water allocation, water pollution control and aquatic ecosystem conservation science and law are premised."[183] More importantly, watercourse States should build flexibility into watercourse treaties.

The existing legal regimes governing transboundary watercourses were developed before climate change became a global problem. As such, most of the existing watercourse treaties, locked in rigid rules and procedures, do not have the intrinsic capacity for dealing with the ramifications of climate change. Yet, as the case of the Nile Basin clearly demonstrates, the impacts of climate change on shared watercourses are uncertain, and governing shared watercourses under such climatic uncertainty would require States to build flexibility into watercourse treaties. Ethiopia, Sudan, and Egypt seem to understand this fact while signing the DoP, which contemplates a flexible agreement for governing the first filling and annual operation of the GERD.

The CFA, albeit a big step forward for governing the Nile Basin under climatic uncertainty, lacks the flexibility needed for addressing the ramifications of climate change. Among other things, the CFA falls short of providing a review period and guidance as to how the Nile waters should be allocated in low times or drought seasons.

The CFA also has some features of rigidity in its amendment and decisionmaking processes. The rather unrealistic requirement of consensus, both for altering the Agreement and issuing binding decisions, will significantly undermine the CFA's ability to adapt to climate change. It will also foreclose the possible role of the NBC in building more flexibility into the Agreement. The Nile Basin States should therefore reorganize the structure and composition of the NBC in such a manner as will ensure an expedited decisionmaking process that is capable of responding to rapid developments brought on by climate change. They should also empower a commission, comprising experts, with independent authority to make at least provisionally binding decisions.

For many years, the Nile Basin States and other water-sharing States have been using the existing rigid legal regime to protect their narrow self-interests. But now, with the ever-increasing threats of climate change, the time seems ripe to set aside such egoistic national interests and address the ramifications of climate change by developing flexible and climate-proof treaties.

178. Edith Brown Weiss et al., International Law for the Environment 457 (2016).

179. According to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, climate change will cause significant reduction of renewable freshwater resources in most dry subtropical regions, whereas in regions with snowfall, climate change is already altering observed stream flow seasonality. Moreover, in regions that are presently dry, climate change is predicted to exacerbate the frequency of meteorological droughts (less rainfall) and agricultural droughts (less soil moisture) by the end of the 21st century. Climate change is also adversely affecting freshwater ecosystems by changing stream flow and water quality. *See* Arnell et al., *supra* note 4, at 232-33.

180. Interview with Professor McCaffrey, *supra* note 72. States may be able to slow climate change, but they cannot stop it with currently available tools. "Like King Kong, Godzilla, or the proverbial Genie, once unleashed, climate change cannot be put back in a cage, buried in Mururoa Atoll in the South Pacific, or put back in the bottle." Interview with Professor McCaffrey, *supra* note 72.

181. A. Dan Tarlock, *International Water Law and Climate Disruption*, *in* Research Handbook on International Water Law 186 (Stephen C. McCaffrey et al. eds., Edward Elgar 2019).

182. *Id.*

183. *Id.*