

Groundwater resources and environmental management in Niger Basin Authority and Lake Chad Basin Commission agreements.

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Abstract: This paper examines the adequacy of the groundwater and environmental management aspects of the agreements reached among member states of the Niger Basin Authority and Lake Chad Basin commission. It discovers that these agreements are fairly adequate with respect to environmental protection when compared to similar shared basins agreements worldwide but they are limited in their provisions on groundwater management. This limitation is not peculiar to these agreements in that similar agreements for most shared basins agreements are equally lacking in their provisions for groundwater management. The paper suggests that future revisions of these agreements should incorporate the essentials of proper groundwater management clauses.

Introduction: The objective of this paper is to call attention to the areas of strength and weakness of the Niger Basin Authority (NBA) and Lake Chad Basin Commission (LCBC) agreements with respect to the emphasis they place on groundwater resources and environmental management. Whether these weaknesses and the strengths are peculiar to them could be investigated by comparing the statutes of other transboundary compacts and agreements such as the Revised SADC Protocol (2000) as well as with the United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses (UN convention) (1998).

As declared by Green Cross International (2000), transboundary groundwater is an important and often neglected area of the debate on the implication of national sovereignty in relation to the management of international watercourses. Transboundary groundwater is important particularly because of its relative abundance compared to surface water and its greater susceptibility to effectively irreversible pollution, contamination and depletion. Green Cross International goes on to note that activities in one state can have far reaching consequences on groundwater resources in other states, and for surface water, and yet development of international law in this area is unclear and has been slower than that for surface water. Furthermore, the tapping of groundwater is a discrete and hard-to-monitor activity, and related activities in a basin can indirectly affect shared aquifers. Finally, while it has become more and more accepted that absolute territorial sovereignty is not the most appropriate system for international rivers whose transboundary nature is quite visible, it is more difficult for states to acknowledge that they have duties regarding other states as to how they utilize groundwater literally in their territory.

Background: The Niger Basin Authority (NBA) is one of the oldest intergovernmental organizations which was created in 1964 as the River Niger Commission. The River Niger Commission functioned for 17 years and the results achieved were considered unsatisfactory. Consequently, it was transformed into the NBA by a Convention agreed to by the nine member states (Chad, Cameroon, Benin, Cote d'Ivoire, Burkina Faso, Guinea, Mali, Nigeria and Niger) in Faranah in 1980 and NBA has a mandate that covers a geographical area of 2,200,000 square kilometers.

The Lake Chad Basin Commission was established in 1964. A revised two-part treaty was executed in 1990. The founding members of the Commission are Cameroon, Chad, Niger and Nigeria. The Central African Republic (CAR) and Sudan joined the Commission in 1994 and 2000 respectively. With the admission of CAR and Sudan, the Conventional Basin area first went up to 984,455 and then to 1,053,455 square kilometers.

The Chad Basin covers an area of about 190,000 km² of the northeastern corner of Nigeria and it lies between longitudes 7° 45' E and 14° 50' E and latitudes 9° 50' N and 13° 30' N. It is bordered by the Benue Basin to the south, Sokoto Basin to the West, Cameroon Republic to the East and Niger Republic to the North. The Chad Basin in Nigeria constitutes about 8% of the total land area of the hydrographic Chad Basin in West and Central Africa.

Niger Basin Authority and Lake Chad Basin Commission: An overview:

A careful analysis of Chapter II, Articles 3 and 4 of the 1980 version of the NBA Convention that contain the aims and objectives of the Authority gives a clear picture of how this Convention treats groundwater resources and environmental management. The Authority aims to promote cooperation among member states and to ensure an integrated development of the Niger Basin in all fields by developing its resources including water. To achieve this aim, the Authority shall focus on the harmonization of national development policies in the Basin through the implementation of integrated development projects and programs. Considering the size of the Membership of the Authority it is doubtful if this lofty aim can be achieved. It has been observed that some of the main difficulties of the NBA arise because there are too many member states (nine) and that the Authority has never been seen by its member states as responding to clearly-defined need (Rangeley, et al. 1994).

Whatever objectives are set, there is the possibility of it not being in line with the interest of some member states. Only a few of the nine states are ever likely to share a common interest in any one mode of water resources development in the basin. This has led to the feeling that the Basin should probably be divided into two or more collaborating smaller and more manageable river basin organizations (RBOs) with the three collaborating closely. These are the Upper Niger made up of countries upstream of the internal lake/delta, an RBO for countries downstream of the internal lake and a completely new RBO for the Benue River as there is no significant connection between the Niger and the Benue sub basins.

Article 4, 1 states that the Authority shall be responsible for six things, one of which (item 1,d) deals with surface and groundwater resources – “the initiating and monitoring of an orderly and rational regional policy for the utilization of the surface and underground waters in the basin”. It is doubtful if any of the nine member states has any national water policy – Nigeria which seems to be ahead of the other member states in national water policy development is just in the process of adopting a national water policy. Rangeley, et al. (1994) noted that the NBA was not operational and that its associated organization, Hydroniger, was in danger of suffering the same fate. It is difficult to perceive how an organization that is operationally weak can initiate and monitor an orderly and rational regional policy for the utilization of the surface and ground water resources especially when none of its members has a national policy.

Article 4, 1a states that the Authority shall be responsible for “the harmonization and coordination of national development policies in order to ensure an equitable policy as regards sharing of the water resources among Member States.” This is the only part of the Convention’s objective in which water resources is mentioned and in which by implication, groundwater is included. However, the scope of work required with respect to harmonizing and coordinating national development policies in nine sovereign states makes this objective overly ambitious because the institutional, technical and financial capacities for such an exercise are not available.

To achieve the six lofty objectives listed under Article 4, the agreement states under Article 4, items 2 a – g that the Authority shall undertake seven main activities whose scopes are hardly realizable because of the size of the basin in terms of area and available capacities. These nine activities that are further broken down into sub-activities are statistics and planning, infrastructure, water control and utilization, environment control and preservation, navigation control and regulation, land and agro-pastoral development and financing the projects and works. Of interest to this discussion are the activities listed in Article 4 items c and d.

Item c is on water control and utilization. The six activities in this section are (i) Regulation of the flow and drainage of the main waterway; (ii) Flood control; (iii) construction and maintenance of dikes; (iv) Prevention and control of drought and desertification; (v) Prevention of soil erosion and sedimentation; (vi) Setting up of structures and works for and development including salt water and drainage control. None of these six activities has anything to do with groundwater. For example, there is neither a reference to regulation of flow from artesian wells nor to a regulation of groundwater abstraction. Instead, virtually all of these activities have very strong bearing on the environment. It is interesting to note that one of the activities listed under Article 4, item 2f (Land and agro-pastoral development deals with rational use of ‘waters’. Waters here implicitly include groundwater.

Article 4 item 2d gives three activities that deal with the environment – (i) Protection of the environment comprising the establishment of norms and measures applicable to the States in alternative uses of waters in the Basin; (It could be safely assumed that the ‘alternative uses’ include the use by the environment); (ii) Prevention and reduction of water pollution; (iii) Preservation of human health and genetic resources (fauna and flora). However, Article 4 item 2c, which is meant to dwell on water, is also strong on the environment. It has always been claimed that water and the environment share common issues. Article 4, item 4 also caters to environmental management – “Moreover, they pledge not to undertake any work on the portion of the River, its tributaries and sub-tributaries under their territorial jurisdiction which pollute the waters or modify the biological features of the fauna and the flora.”

The following Articles of the Lake Chad Basin Commission (LCBC) are relevant to the management and protection of the environment – Chapter II, Articles V and VI. Article V states that “The Member States undertake to abstain from taking, without prior consultation with the Commission, any measures likely to have an appreciable effect either on the extent of the loss of water or on the nature of the yearly hydrogramme and limnigramme and certain other features of the Basin, the conditions subject to which other riparian States may utilize the water in the Basin, the sanitary conditions of the waters or the biological characteristics of its fauna and flora...” This article is without doubt adequate.

Article VI states that Member states, in order to achieve maximum cooperation in connection with the provisions of Article V, undertake to inform the Commission at the earliest stage of all studies and projects upon which they propose to embark. This article is very similar to the provisions of Part III, Article 11 of the “Convention of the Law of the Non-Navigational Uses of International Watercourses” (UN Convention).

The only area where reference is made to groundwater in the LCBC Convention is in Chapter I, Article IV which states that “The development of the said basin and in particular the utilisation of surface and ground waters shall be given its widest connotation, and refers in particular to domestic, industrial and agricultural development, the collection of the products of its fauna and flora.”

The LCBC submitted a memorandum to the meeting of its Convention's Permanent Technical Committee on Water Resources, in Niamey, Niger, 11 – 14 September 2001 on 'Draft agreement on the equitable utilization, development, conservation, management and protection of the international waters of the Conventional Lake Chad Basin'. This memorandum was put forward because of the threatening water scarcity in the sub region that has been a product of two major factors: persistent drought and poor resource management.

The memorandum noted that there are gaps in the statutes of the Convention. For example, the Convention does not have any legal instrument to ensure that a member state does not just consult before embarking on a proposed project but also have to conclude an agreement with the other members before it may proceed. Another gap noted is that the Convention fails to offer any water allocation rules. It can be assumed that this gap as mentioned here is possibly merely referring to surface water allocation because of the complex nature of dealing with groundwater allocation. Matsumoto (2001) in his discussion on the issue of transboundary groundwater management noted that the reasons for the absence of transboundary water law according to Krishna and Salman (1999) are the inadequacy of scientific data and the complexity of the issues of groundwater.

The LCBC Memorandum of 2001 noted that the water resources management problem within the Basin gave rise to two bilateral agreements of water utilization: one between Chad and Cameroon (Mondou Agreement) and the other between Nigeria and Niger (brokered by the Nigeria-Niger Joint Commission –NNJC). It appears that these bilateral agreements are better with respect to catering to the issues on groundwater and environmental management that were not satisfactorily dealt with in the LCBC Convention. Even groundwater/surface water interaction was acknowledged in Part I, Article 1.3 of the NNJC agreement in that this part of the agreement covers the ground waters contributing to the flow of surface waters. Matsumoto (2001) feels that this part of Article I as well as Article 1.2 define groundwater under limited conditions. Article 1.2 states that "The shared river basins to which this Agreement applies are: a) the Maggia/lamido River Basin; b) the Gada/Goulbi of Maradi River Basin; c) the Tagwai/El Fadama River basin; and c) the lower section of the Komadougou-Yobe River Basin, and that each river shall be defined by reference to the maps annexed to, and forming an integral part of this agreement."

Article 9 of the NNJC agreement deals with groundwater resources – "groundwater resources shall not be accounted for the purpose of equitable sharing determination unless: a) such are part of shared river basins within the meaning of Article 1, paragraph (3); or b) such resources lie in whole or only in part within the shared river basins and are bisected by the common frontier between the Contracting parties. Currently, the locations of transboundary ground waters in the basins under consideration in this paper have not been concretely identified in contrast to surface waters. Thus future reviews of existing agreements should for starters pay as much attention to transboundary groundwater as is paid to surface water. Such transboundary groundwater management requires the identification and location of aquifers.

A key aspect of water resources and environmental management is data monitoring and information sharing. Systems of data collection and exchange, including information regarding availability of water resources, water users, hydro-systems and land management are essential to any cooperative system. How data and information management is treated in the two Conventions, NBA and LCBC, is indicative of whether enough emphasis is placed on proper management of the resources in these two basins. The NBA agreement Article 4, item 2a states that "Collection, centralization, standardization, exploitation, dissemination, exchange of technical and related data" shall be undertaken in harmony with the development plans of States

relating to Niger Basin and in accordance with the general objectives of integrated development of the Basin.

Apparently, the only section in which mention is made with regard to collection, evaluation and dissemination of information in the LCBC Convention is Article IX b, and here it is not with regard to collection of information for the purposes of monitoring the resources with respect to proper management – “To collect, evaluate and disseminate information on proposals made by Member States and to recommend plans for common projects and joint research programmes in the Chad basin.”

Table 1 provides a clear picture of the kind of emphasis the two international agreements place on data with respect to surface and ground water management. As indicated in the table data collection and processing is a principal activity at the NBA, whereas this activity does not even feature at the LCBC. This brings up the issue of Hydroniger of the NBA which Rangeley, et al. (1994) reported to be initially one of the few successes of the Authority that eventually ran into problems. However, Hydroniger is only meant for surface water monitoring. Current available information on the web on the status of this NBA agency is not encouraging.

Table 1: Principal Functions of RBOs

Name of Organization	Member States	1	2	3	4	5	6	7	8
<i>FOCUSED ON DEFINED RIVER BASIN</i>									
NBA	Benin, Burkina Faso, Cameroon, Chad, Guinea, Cote d'Ivoire, Mali, Niger, Nigeria	•	•		•	•	◦		◦
<i>COVERING WATER AND OTHER ACTIVITIES</i>									
LCBC	Cameroon, CAR, Chad, Niger, Nigeria, Sudan		•		•				◦
<p>Key:</p> <ol style="list-style-type: none"> 1. Data collection and processing 2. Planning 3. Water allocations 4. Raising funds for studies and projects 5. Cost sharing 6. Implementation of projects 7. Project operation and maintenance 8. Monitoring water use, control of pollution and protection of environmental conditions <p>• Principal activity ◦ Partial activity</p> <p><i>(Modified after Rangeley, et al., 1994)</i></p>									

Article 9 of the UN Convention provides a clear guidance as to what most international waters agreement should contain with respect to management of shared basin resources – 1) “Watercourse States shall on a regular basis exchange readily available data and information on the condition of the watercourse, in particular that of a hydrological, meteorological, hydrogeological and ecological nature and related to the water quality as well as related to forecasts. 2) If a watercourse State is requested by another watercourse State to provide data or information that is not readily available, it shall employ its best efforts to comply with the request

but may condition its compliance upon payment by the requesting State of the reasonable costs of collecting and, where appropriate, processing such data or information. 3) Watercourse States shall employ their best efforts to collect and, where appropriate, to process data and information in a manner which facilitates its utilization by the other watercourse State to which it is communicated.” It is important to note that the UN convention defines watercourse as a system of surface waters and groundwaters constituting by virtue of their physical relationship a unitary whole and normally flowing into a common terminus. As can be deduced from this portion of the UN Convention, the RBOs are not obligated to collect data, but member states of RBOs are expected to collect and exchange data. The position taken by the Revised SADC Protocol is similar to, but not as elaborate as that of the UN Convention as stated in its 6th General Principle which states that “State parties shall exchange available information and data regarding the hydrogeological and environmental condition of shared watercourses.”

Current activities in the Niger River Basin and Lake Chad Basin with respect to groundwater management and environmental protection underscore the need to revise the statutes of the NBA and LCBC in order to arrest the land and water degradation. Such activities include uncontrolled exploitation of groundwater, poor watershed management, uncontrolled grazing, slash and burn farming. Although reserves are abundant in the region, due to the recent declines in recharge aquifers are currently vulnerable to over abstraction that exceeds recharge rate. Surface water scarcity during the drought increased the abstraction of groundwater for human, agricultural and pastoral purposes. There has been indiscriminate sinking of boreholes that has also led to a decrease in groundwater reserves. Groundwater drawdowns of several tens of meters have been reported in the Maiduguri area of Nigeria due to the over-pumping of water. Isiorho et al. (2000), estimates that 10-25% of water in the region is utilized inefficiently and attempts to improve the situation have achieved little. The droughts of the 1980s triggered the mass drilling of 537 wash boreholes between 1985 and 1989 (CBDA in Isiorho et al. 2000). Most of these deep boreholes are uncapped and freeflowing. Normally the local authorities cap artesian wells, but local people uncap them and allow the water to flow out and pool so that their animals can use it. This free flow of water is very inefficient and results in vast amounts of water being lost due to the high rates of evaporation in the region (Isiorho et al. 2000). Water points at Ala near Mante (Nigeria) monitored on a routine basis by the Lake Chad Basin Commission, have shown a sharp decline of about 4.5 m within a period of one year attributable to the general decline in the artesian pressure within the Basin.

The BRGM-CBLT 1992 project estimated that 438 million cubic meters of was used per year at the beginning of the 1990s over all the administrative zones of the Lake Chad Conventional Basin (before the CAR became a member). Of this quantity, 252 million cubic meters came from groundwater. During the same period, unmeasured losses from artesian sources was estimated to be 28 million cubic meters. In essence the unmeasured losses from artesian sources accounts for 10% of total groundwater used per year. This kind of management practice is unsustainable.

Upstream construction of dams without due consultation with the downstream riparians and without consideration for the downstream uses have contributed to land wand water degradation within this basins. A case in point is that of the 19 dams constructed in the upper reaches of the Hadejia-Jama’are River and the adverse impacts on extent and duration of the inundation of the wetlands and how these have affected groundwater recharge of the phreatic aquifer in the Chad Basin.

It has been acknowledged that the most important environmental function of the Hadejia-Nguru wetlands is its role in recharging the groundwater aquifer of the Chad Formation. Evidence presented by Hollis et al. (1993) shows that a reduction in floodplain inundation leads to a lower

rate of groundwater recharge. Since 1983 when the extent of flooding dropped appreciably, groundwater recharge fell by an estimated aggregate amount of 5 000 km³. Continual loss of groundwater storage and recharge will have a significant impact on the numerous small villages throughout the region that depend on well water from the aquifer for domestic use and agricultural activities (Barbier 1997).

Although GEF is championing the reversal of the land and water in these two basins, what would guarantee a sustainable protection of their environmental and water resources is to have essential guidelines in the transboundary resources agreements of these basins.

In conclusion, though both the NBA and the LCBC international waters agreement are adequate with respect to environmental management, they may not be really adequate in scope with respect to how groundwater is treated even if their contents are satisfactory when compared with other international waters agreements. Other international treaties and compacts have not fared better.

A review of transboundary treaties by Matsumoto noted that while surface water has been given considerable attention as a transboundary natural resource, groundwater has not received the same recognition. International legal doctrines regarding water, such as the 1997 United Nations Convention on the Law of the Non-Navigational Uses of International Watercourses, only recognized one aspect of groundwater, excluding confined aquifers. While the issue of transboundary groundwater in international treaties is becoming increasingly relevant as disputes over groundwater resources come to the fore, it is usually only indirectly mentioned in treaties. Furthermore, according to Mamner and Wolf (1998) only three transboundary waters agreements deal with groundwater supply: the 1910 convention between Great Britain and the Sultan of Abdali, and the 1994 Jordan–Israeli and 1995 Palestinian-Israeli agreements.

Finally, it is instructive to note that GIWA assessment of the Niger River Basin identified lack of efficient governance as one of the root causes responsible for ecosystem depletion in the Niger River Basin. Thus for the sustainable management of the water resources of these two basins that have substantial parts in the semi arid/arid climatic regions, it will be necessary for the two Conventions governing the use of water resources to incorporate the essentials of proper groundwater management clauses in future revised agreements.

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