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Fostering international and trans-boundary cooperation in the management of Lake Chad fisheries, wildlife and flora: the role of a trans-boundary Ramsar conservation area

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Abstract – The Lake Chad basin is one of the most politico-ecologically complex regions in Africa. The rapid global climate change caused by decades of unsustainable resource utilization has not only impaired the ecosystem function but has escalated further conflict with the associated terrorism in the region. This paper reviews the notion of environmental peacebuilding through the introduction of trans-boundary conservation as a mechanism to achieve peace and harmony in the Lake Chad region. The proposed trans-boundary conservation area will restore ecosystem services, conserve biodiversity, improve livelihood, and reduce poverty in the Lake Chad basin. The paper provides justification for the establishment of the "Lake Chad trans-boundary Ramsar site" as an example of how a trans-boundary conservation area could act as a catalyst for improved political cooperation using inter-linkage with other Multilateral Environmental Agreements in the region.

Keywords: International cooperation / trans-boundary conservation / Lake Chad basin / peace / conflict

1 Introduction

Trans-boundary conservation has been described as a means to remove barriers between international state borders (Vasilijevic and Pezold, 2011). Environmental conservation as a common goal has resulted in an increased number of global commitments aimed toward addressing serious environmental issues threatening our own survival. Examples include the 1972 United Nations Conference on Environment and Development (UNCED), and the 1992 adoption of the Convention on Biological Diversity (CBD). Furthermore, at the regional level, it has been found that environmental issues can be an important entry point for conservation which can help promote peace between adversaries (Ali, 2007, 2013).

One definition of trans-boundary conservation and development area (TBCDA) that has enjoyed wide acceptability is "any region of land and marine ecosystem that borders on a single or even more boundaries amongst states, sub-national units such as provinces and regions, autonomous territories, and/or locations outside the limits of national sovereignty or jurisdictions, whose component elements produce a matrix that contributes to the conservation of biodiversity, natural and cultural assets, as well as enhancement of the socio-economic development of the environment, and which are governed mutually through legal or other efficient processes" (Global Trans-boundary Conservation Network (GTCN), 2012). This definition clarifies that the purpose of establishing trans-boundary conservation areas (TBCAs) which are somewhat synonymous with trans-boundary protected areas (TBPAs) is far beyond achieving the conservation goals but also cultural, socio-economic development, peace, and harmony.

The first officially designated TBCA connection is usually accepted as the Waterton-Glacier International Peace Park which lies on the border between the USA, and Canada (Braack et al., 2006) in the 1930s. Ever since then, the number of

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trans-boundary complexes has increased dramatically, particularly over the last two decades (Sandwith et al., 2001). The number of TBPAs has considerably increased from 59 in 1988 to more than 200 in 2007 (Schoon, 2014). The number has kept rising as a result of programs like the Peace and Biodiversity Dialogue Initiative (PBDI), which encourages international transboundary collaboration in protected areas. The PBDI allows Parties to the Convention on Biological Diversity (CBD) to exchange information and best practices for cross-border cooperation. With the assistance of the CBD Secretariat and other partners with pertinent experience, they may also expand current collaboration mechanisms or create new ones. The PBDI outlined its roadmap for the years 2022–2024 at the CoP 15 side event and solicited feedback from partners. Expert lectures on how transboundary conservation areas (TBCAs) might enhance international relations and collaboration, promote peace, and contribute to the implementation of the post-2020 global biodiversity framework (GBF) followed this. Additionally, it was mentioned that the PBDI's focus is on transboundary biodiversity conservation, highlighting the fact that TBCAs would usher in a new era of productive bilateral and multilateral cooperation (International Institute of Sustainable Development (IISD), 2022). Transnational cooperation for biodiversity conservation and better diplomatic ties also increased significantly (Vasilijevic and Pezold, 2011). As of 2007, the United Nations Environment Program World Conservation Monitoring Center (UNEP-WCMC) identified 227 TBPAs as operational in the world (UNEP WCMC, 2007). These protected areas include those established between countries having different political systems and complex geographic structures.

The daunting nature of environmental changes which knows no political boundaries, has threatened the Lake Chad basin region in the last few decades. There are many indications and observations of such changes both in terms of frequency and impact. Most notable of these are climate change, desertification, environmental degradation, and increased levels of conflict. These changes have resulted in the loss of biodiversity at an alarming rate as well as loss of grazing land which has given rise to incessant farmers-herdsmen conflicts due to inadequate grazing and the attendant incursion into farmland by herds.

Therefore, taking the increasing global commitments towards environmental conservation in mind and considering biodiversity loss as a major environmental issue of our era, a united effort such as a trans-boundary conservation area is necessary to achieve a sustainable human society that is strongly based on the concept of environmental peacebuilding. Such can be achieved through "the development of conservation zones in which the sharing of physical space may build and preserve peace" (Ali, 2007). Therefore, in order to transform the issues of environmental concerns especially that of biodiversity loss into broader aspects of social life across various political boundaries, we need a mechanism like the trans-boundary conservation initiative aimed at achieving the goals of biodiversity conservation while also promoting peace and cooperation among the nation-states.

Plachter (2005) asserted that the concept of establishing collaborative protected area projects across national borders was one of the most noble and persuasive ones in contemporary times. This is particularly so when the establishment of various protected areas within the state borders has proved inadequate to effectively address conservation of biodiversity while on the other hand, there are numerous benefits from the conservation of protected areas when these areas are managed by neighboring countries. Shared costs of management might make the implementation of conservation initiatives easier, faster, and more effective. Examples of such experiences exist in sub-Saharan Africa: Burkina Faso, the Republic of Benin, and the Republic of Niger have agreed to collaborate in the management of six Ramsar Sites on both banks of the Niger and Pendjari Rivers. They have thereby established the third African "transboundary Ramsar Site" covering 2.95 million ha of Sudano-Sahelian zone which includes the following Ramsar Sites: "Parc National d'Arly" and "Parc National du W" (Burkina Faso), "Zone Humide de la Rivière Pendjari" and "Site Ramsar du Complexe W" (Benin), and "Parc National du W" and "Zone Humide du Moyen Niger" (Niger). When a wetland is designated as a Ramsar site, it gains acknowledgment on a national and worldwide level for its importance to humanity. The "W" Park is formed by three nearby protected areas in Burkina Faso, Benin, and Niger Republic; River Niger serves as the complex's eastern border. The region gets its name from the way the river flows there, which resembles a big W shape. In their natural habitat, which was shared by the three nations, the elephant population used to be evenly divided. The elephant population has increased in the Niger sector in reaction to anthropogenic pressure and its impact on the habitat quality in Burkina Faso and Benin. This has consequences for the management of habitat and tourism potential in each nation. Riverine systems are shared by the protected sites of the "W" Park complex. In Burkina Faso, community rights to seasonal fishing have also been recognized (van der Linde et al., 2001).

The member countries of Lake Chad have adopted the concept of protected areas individually in the past, but this has proved inadequate in conserving the regional biodiversity. For instance, the national protected area (PA) authorities of Chad have not established conservation objectives for the country's national PA network, which was built opportunistically over time without a predetermined vision or a network approach. The National Strategy and Conservation Action Plan for the conservation of biodiversity in Chad (Ministère de l'Environnement et de l'Eau (MEE), 1999) recognizes PAs as a crucial tool for biodiversity conservation and calls for improvements in their management, but it fails to specify qualitative and quantitative objectives for the national network. Similar to this, the conservation goals of the network were not mentioned in the 2008 IUCN study of the Chadian PA's management efficacy (IUCN/PAPACO, 2008). According to the gap analysis of the PA network presented by Brugièrea and Scholte (2013), two additional ecoregions have PA coverage of less than 10%, and three of the seven ecoregions in the nation are not at all represented. The national PA system does not include three of the 29 selected large animal species, and five have only been encountered once. The following four States are concerned by the Convention on Wetlands (Ramsar Convention) entered into in Niger on 30th August, 1987 (14 sites designated as Wetlands of International Importance and Ramsar sites, with a surface area of 7,534,289 hectares in 2021), in Chad on 13th October, 1990 (6 Ramsar sites designated with a surface area of 12,405,068 hectares in 2021), in Cameroon on 20th July, 2006 (7 Ramsar sites designated with a surface area of 827,060 hectares in 2021, and in Nigeria on 2nd February, 2001

(11 Ramsar sites designated with a surface area of 1,076,728 hectares, in 2021).

Niger, Chad, and Nigeria have granted protected status on their sides of the basin as Ramsar sites in the past. Cameroon recently declared its portion of Lake Chad, a Wetland of International Importance (World Wildlife Fund (WWF), 2010). With this, the entire lake is now protected by the Ramsar Convention for wetlands protection, albeit, by individual member states. Similarly, Cameroon, Chad, and Niger had listed their own portion of the Lake Chad basin under the World Heritage Convention (UNESCO, 2017). What is now needed is for individual member states to explore the feasibility of establishing a cohesive regional network of conservation areas at the basin level that will form the foundation for long-term management of the Lake Chad basin. This is consistent with Eleanor Ostrom's rule of governing a pooled resource such as a trans-boundary basin like Lake Chad (Ostrom, 1990) through the engagement of riparian countries in decision-making.

The coordination of Lake Chad basin protected areas under the Ramsar Convention is justifiable since the Convention is founded on three key pillars: listing of wetlands of worldwide significance, global collaboration, and the sustainable use of wetlands (United Nations University Institute of Advanced Studies on Sustainability (UNU-IAS) Report, 2004). Furthermore, the promotion of international cooperation supported by the Ramsar Convention is where regional integration comes into play among the member states that constitute the Lake Chad basin.

This paper proposes the use of the Ramsar Convention to stimulate international cooperation and trans- boundary management of the whole Lake Chad basin through the establishment of "Lake Chad trans- boundary Ramsar Site". This will help the member states to promote trans-boundary wetland management at all levels. This approach could lead to increased understanding and cooperation that will not only contribute to peace and harmony in the region but also a shared commitment to managing the lake basin sustainably in terms of enhancing the ecosystem services through improved access to food, water, and other natural resources while also establishing a framework to achieve this goal.

This is where the initiative called "Using the concept of trans-boundary biosphere reserves and World Heritage sites to foster peace in the Lake Chad basin through sustainable natural resource management" is timely (UNESCO, 2017). The project provides an opportunity to achieve an inter-linkage approach of biodiversity-related conventions in Lake Chad particularly strong interconnections between the Ramsar Convention due to its potential to restore biodiversity and associated ecosystem services and the World Heritage Convention due to the cultural value of Lake Chad basin thus both are interrelated in terms of promoting conservation, culture, and poverty eradication.

The Ramsar COP9 Resolution IX .14 refers to Ramsar guidance available in the Handbook for the wise use of Wetlands in helping to promote the wise use of wetlands and thus contribute to poverty reduction. The resolution urges all contracting parties and other governments to take action to contribute to poverty reduction (Ramsar, 2005). Lake Chad supports the livelihoods of over 30 million people in Cameroon, Chad, Niger, and Nigeria for centuries. The lake has supported agricultural production and has also been a lifeline for fishing, crop farming, and livestock production. Crop, livestock, and fish production has supported local economies in terms of income generation and household consumption (Usigbe, 2019).

The local economy in the upper part of the catchment is based on fishing, agriculture, and pastoralism. More than 150,000 fishermen live on the lake's shores and its islands and fishing provides a major source of livelihood for them. However, as a result of environmental changes since the 1970s, including fluctuations in lake levels, there have been considerable changes in fish diversity and abundance (World Wildlife Fund, (WWF), 2022). This is why the implementation of the Ramsar Convention could re-stimulate the livelihood of the area through unprecedented whole-of-basin management and protected area establishment for Lake Chad through the promotion of restoration efforts and management planning in the countries of the upper catchment area of the basin.

Furthermore, through the restoration and preservation of the Lake area using UNESCO's World Heritage Convention (WHC), the rehabilitation could help preserve the oases and could also, in the long run, prevent the drying up of water supplies by restoring ponds. Income-generating activities such as the production of spirulina, and algae traditionally harvested by women will also boost economic activities, especially through the designation of two world heritage sites: Manovo-Gounda, in St. Floris National Park in the Central African Republic and Lakes of Ounianga in Chad (UNESCO, 2018).

2 About the biodiversity in Lake Chad

According to Bila (2011), the biodiversity in Lake Chad was documented – in 2010–as including flora that generates 2.5 million t y^{-1} of assorted grains and 20.3 million bovine, ovine, caprine, camelid, equine, and porcine. Furthermore, there were 76 fish species from 26 families with a potential catch of 295,000 t y^{-1}, 65 wild animal species, and 400 birds, many of them migrating between many internationally protected areas. This shows the huge economic potential of the biodiversity in Lake Chad as well as important ecosystem services offered for migratory birds such as a feeding bay and breeding nest.

In addition, the Lake Chad Basin also includes several ecosystems including deserts, shrub steppes, savannahs, forests, lakes, wetlands, and mountains. The lake's humid zones are distinctive habitats in this part of the Sahel and a haven for biodiversity of international significance. The combination of terrestrial and aquatic ecosystems creates a unique habitat for the rich wildlife diversity of the region (Okali and Bdliya, 1997).

Okali and Bdliya (1997) reported that the Lake Chad ecosystems, apart from migratory birds, contain a large population of water birds and waders that flourish in the river valleys, relying mostly on the waters of the numerous tiny lakes generated during flood retreat. As an example, 140 species of fish and 372 species of birds have been reported, with only about a third of the birds being migratory. The integrity of the ecosystems and the preservation of biodiversity is a vital defense against desertification.

In the light of the above, this ecoregion has demonstrated a high biological relevance to many migrating birds that make use of the territory, particularly ducks and waders that spend the Palearctic winter season in Africa, with the lake serving as a critical sanctuary for birds moving between the Palearctic

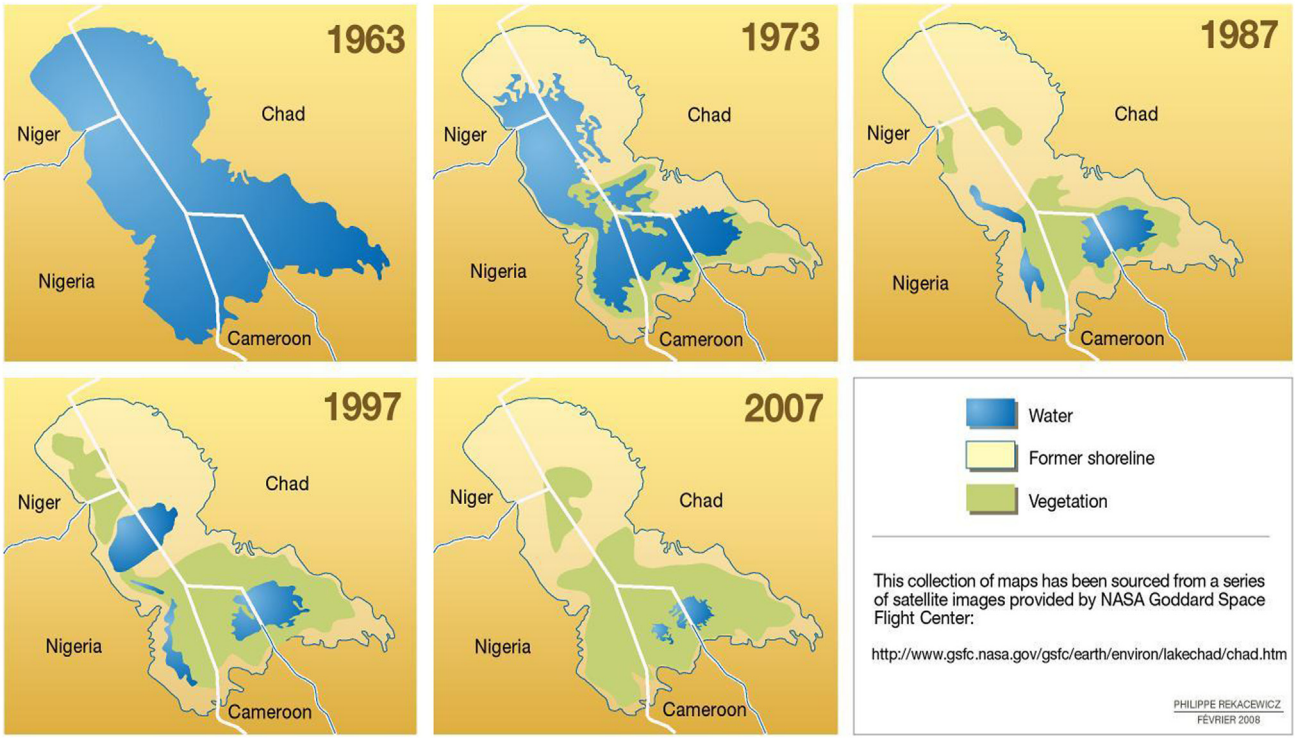

Fig. 1. The shrinking Lake Chad basin. (© Philippe Rekacewicz, February 2006 at https://www.grida.no/resources/5593).

and Afro-tropical realms, hence justifying the protection of this huge biodiversity hotspot.

3 The trans-boundary problem of Lake Chad Basin

The Lake Chad Basin impact assessment (Impact Assessment Inc. (IAI), 2006) observed that the demand for irrigation water is four times higher because of oscillations in the basin because of climate cycles that have led to significant changes in the environment. The lake had a surface area of 25,000 km^2 in 1963, presently, it occupies 1350 km^2 (Fig. 1). As a result of anthropogenic influences such as humans harvesting wood biomass for fuel, vegetation in the northern section of the lake has also vanished, and sand dunes have sprouted on the dry lakebed. Water diversion and stream-flow modifications connected with the building of major irrigation and water development projects in the Chari-Logone and Kamadugu-Yobe Rivers have contributed to the decrease of the basin between 1970 and 2013 (United States Geological Survey [USGS], 2014).

The degradation of the environment affects the livelihoods of the basin's inhabitants. Pastureland is barely bearing 66% of its carrying capacity before the drought (Bila, 2011). Economic activities like fishing, animal husbandry, and agriculture were significantly affected, with many people migrating as environmental refugees. The impact assessment report further summarized the problem as including fluctuation of the hydrological regime and freshwater availability; water pollution; diminished viability of biological resources; biodiversity loss; habitat change and disappearance; deposition in rivers and water bodies; and the introduction of exotic species (Impact Assessment Inc. (IAI), 2006). This has severe implications for an estimated 4 million people who directly depend on the basin for their livelihood. These problems showed that a single member state cannot address the problems though there are individually protected sites, policies, and laws by respective states. The nature of the trans-boundary problem of this scale deserves a trans-boundary cooperation in addressing the ecological problems around the basin.

The above trans-boundary problems, as noted in the Lake Chad Basin Trans-Boundary Diagnostic Report (Transboundary Diagnostic of Lake Chad Basin (TDA), 2010), represent the past, present, and future social dangers to the people using that water body (about 38 million people). These challenges are the result of the synergistic effects of rapid global climate change and unsustainable resource use practices by an expanding population, exacerbated by institutional failures. This demonstrates how environmental factors, coupled with inactions can lead to natural resource degradation. Consequently, the difficulties have had the net impact of worsening poverty in the sub-region. The scenario has degenerated into conflict in the region with attendant loss of human lives and huge infrastructure (Okpara et al., 2015).

4 Way forward through the establishment of a trans-boundary conservation area

According to the Transboundary Diagnostic of Lake Chad Basin TDA report (2010), there is indeed a lot of evidence that the Lake Chad Basin Commission (LCBC) member countries place a high priority on trans-boundary and international collaboration. Their determination to establish the LCBC as a platform for common advocacy of the lake's water resources is evidence of this. International accords and conventions involving

coordinated international action to address issues about resource consumption, such as the Ramsar Convention, have been signed and ratified by the member countries individually. Regrettably, individual member states' adherence to the letter of the convention is deficient, as evidenced by the current deterioration of the basin's environment. The World Bank conducted a review in May 2018 that identified some crucial issues with the planning of regional integration projects for the recovery of the Lake Chad Basin (The World Bank, 2020). The issues included some of the challenges that led to the deterioration of the Chad Basin: (a) the capability and capacity of the regional coordinating organization saddled with the responsibility of managing the project's regional components; (b) the difference in the readiness of participating countries to take action; (c) the extremely complex financing mechanisms for projects involving regional collaboration; (d) regional integration projects require more time to prepare than projects involving just one country; and (f) there is complexity in regional component integration when multiple countries are involved in coordinated actions and investments.

The lack of commitment by Lake Chad member countries is also demonstrated in other international Multilateral Environment Agreements (MEAs) like the Convention on Biological Diversity (CBD). Perhaps, one area to show commitment to most of the International Environmental Agreement is to demonstrate at the regional level through the establishment of the Lake Chad Basin regional Ramsar site as a means of strengthening the political commitment of member countries towards joint conservation of the trans-boundary conservation area. Such regional demonstration has already been seen by the leaders of the Government of the respective countries that constitute the LCBC in tackling the insurgency created by terrorism in the region through the creation of regional force to address the issue of the presence of Boko Haram (African Union, 2018). More cooperation is needed in tackling the basin problems vis-à-vis the effect of climate change, loss of biodiversity, declining livelihood, and provision of water both for drinking and agriculture in the region. This kind of collaboration could be accomplished through the development of a collaborative conservation area- "the regional Lake Chad basin Ramsar site".

5 Link between trans-boundary conservation area, bioregionalism, and higher diplomacy in the region

Trans-boundary Conservation Area (TBCA) has been previously defined above. Bioregionalism, as defined by Sale (1983) is a term composed of separate words, "bio", which comes from the Greek word for life; "regional", which is the Latin word for the territory to be dominated; and "ism", which comes from the Greek word for doctrine. Further, Woo (2011) defines Bioregionalism as a process that tries to identify oneself with the community, make them aware of its natural resources, and finally make them committed to restoring these resources. Finally, higher diplomacy is referred to as the "skill in handling affairs without arousing hostility" to achieve mutually beneficial goals (e.g. environmental conservation) right from the central level.

Putting bioregionalism in perspective, it has been illustrated that people (the central element of the process) first get to familiarize themselves with the condition of the natural environment as well as other resources (e.g., cultures, norms, traditions, values, and practices) existing in the region. People's familiarity with the region increases the prospects of trans-boundary conservation as they perceive it to be a regional asset. In turn, the development of a TBCA gives beneficial outcomes to the people (e.g., community empowerment, ecological integrity, and tourism promotion, among others). Similarly, a functional TBCA influences the diplomacy between states at the central level because of the commonality of the environmental problems (e.g., biodiversity loss, water uses), the perception of natural resources as the common good, and the binding global commitments (Dinesh, 2013).

Also, the success of the TBCA in the Lake Chad region in the long run depends upon the response of the major stakeholders (especially the authorities at the central level) in the respective countries. In the same vein, people's familiarity with the biological resources existing in the region and more knowledge about the benefits from their uses develops in them a feeling to protect these resources. This influences and urges the higher-level authorities to show more concern for their maintenance and preservation. And effective diplomacy can help address the problem on the ground by strengthening the prospects of bioregionalism.

This approach has been adopted by Pantanal Wetland, the largest trans-boundary protected wetland in the world. The Pantanal wetland is a trans-boundary protected area traversing over 81,000 sq miles (209,789 km^2) and is shared by three nations: Brazil, Bolivia, and Paraguay. This wetland demonstrates a strong interlinkage between social, political, economic, and ecological paradigms in natural resource management and thus provides a good framework for analyzing the interrelatedness of peace, democracy, and regional development in conservation issues (United Nations University Institute of Advanced Studies on Sustainability (UNU-IAS) Report, 2004). The approach used in Pantanal is an integrated and transboundary type of water resource management. According to Michele Thieme, principal scientist, and deputy head of freshwater initiatives for WWF-US, the Pantanal provides "a haven for a plethora of species not found in other locations". The Pantanal is not only a gem for the environment, but it is also a wealth of human resources. In terms of services supplied to humanity, the Pantanal is one of the most crucial locations on the globe. It is also one of those regions that supply the world with food (World Wildlife Fund, (WWF), 2020). Currently, the Pantanal is mostly intact, supporting more than 270 communities, or 1.5 million people, in addition to its flora and fauna, and contributing to the regional and global climate's stability (World Wildlife Fund, (WWF), 2020). This is like the Lake Chad case and this management strategy, which is effective in the Pantanal wetland can be adopted for the sustainable exploitation of Lake Chad.

The main goal of TBCA is to improve the chances for bioregionalism. A higher diplomacy between the states is then anticipated to benefit from this enhancement. The development of the TBCA with the aim to achieve long-term peace and international cooperation in the region is anticipated to be facilitated by effective diplomacy between the states and a strong sense of regional identity. This is the notion of international cooperation through the establishment of TBCA in the Lake Chad basin. Figure 2 shows how regional cooperation can be actualized through a consultative process as well as documents needed to achieve the framework mechanism of building a TBPA.

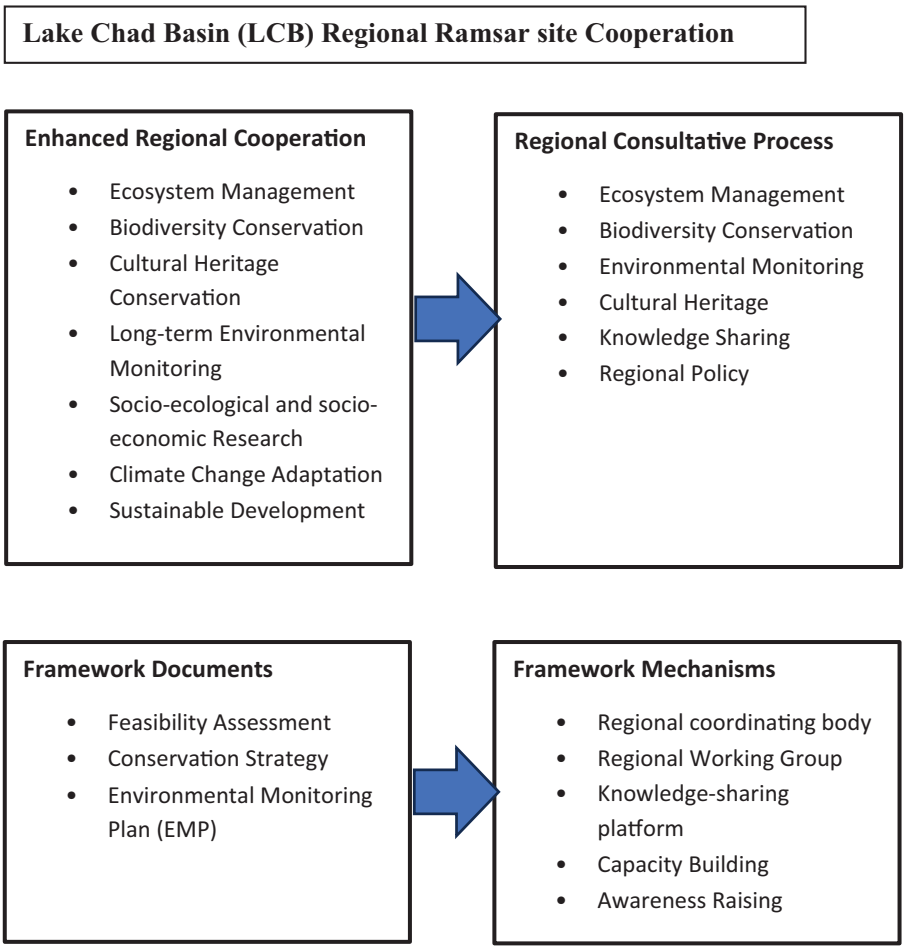

Fig. 2. Proposed cooperation framework of Lake Chad basin regional Ramsar site (adapted from Dinesh, 2013).

6 Ramsar convention framework

Since this article argues that Ramsar Convention would play a crucial role in the development of trans-boundary cooperation, it is important to understand the general framework of the Ramsar Convention.

Wetlands conservation and responsible usage are the focus of the Ramsar Convention, which is a worldwide pact. The Ramsar Convention on Wetlands of International Importance (Ramar Sites) commits member countries to protect and conserve their wetlands via responsible management and collaboration on trans-boundary wetlands and other areas of mutual concern. The convention encourages international cooperation to save and wisely use wetlands to help achieve sustainable development. As part of the convention's three pillars, wetland sites are designated as Wetlands of International Importance, and international collaboration between parties is encouraged. As a legally binding agreement, the Ramsar Convention calls on its member countries to conserve and maintain their internationally significant wetlands' ecological character and develop plans for the sustainable use of all their territories' wetlands (Gardner and Davidson, 2011).

7 Mechanisms to support policy coordination around the Ramsar Convention on Wetlands

The proposed conservation approach for the trans-boundary wetland ecosystem will be an integrated and holistic regional approach that offers an efficient framework for the management of the Lake Chad basin. The Inter-linkage method is a strategic process which is used to manage sustainable development, which encourages increased interaction and connection between ecosystems and social actions, and this can be utilized to create effective environmental management in the Lake Chad basin (Malabed, 2001), especially with regards to other Multilateral Environmental Agreements (MEAs). This will lead to more effective and integrated management methods based on synergies present in a complex ecosystem such as the Lake Chad basin. In addition, it will also lead to the creation of a regional management structure as well as regional and national cooperation among major MEAs. If the entire Lake is preserved under the Ramsar Convention on Wetlands, established in 1971 (172 Contracting Parties in 2021),

it will prioritize the biological needs of migrating birds, which rely on a vast network of wetlands for their nesting, migration, and wintering grounds. So, all the African riparian countries can designate the wetland in their geographical areas of jurisdiction, as Ramsar sites, thus forming a cluster of trans-boundaries Ramsar sites in the entire basin.

8 Considering the convention on biological diversity

Another key Multilateral Environmental Agreement, the Convention on Biological Diversity (CBD), was signed during the 1992 Rio Earth Summit and is one of the most important agreements ever signed (Guruswamy, 1999). The CBD has three essential goals: biodiversity conservation, sustainable use of biodiversity components, and equitable allocation of useful benefits of genetic resources. Since wetlands support a significant level of biodiversity, their protection falls under the CBD's objective (scope) for conservation. The Conference of Parties (COP) decision on CBD advocated an ecosystem-based approach to the protection of biodiversity. The concept is a strategic approach to integrated aquatic resource management, terrestrial resource management, and living resource management with the goal of promoting fair conservation and sustainable use of natural resources. The ecosystem approach would be useful in conserving the biodiversity in the Lake Chad basin. Ramsar and the CBD have enhanced their information-sharing cooperation. For example, The CBD COP6 created guidelines/recommendations on an impact assessment that were adopted by the Ramsar COP8 with special annotations to the Ramsar environment. Information sharing between the two conventions has been further strengthened through more participation in the joint technical working group. Ramsar's National Report has been largely used to report on the CBD. In 2021, COP 15 (CBD) and COP 14 (Ramsar) should be an incentive to accelerate efforts dedicated to this area of the world.

The CBD consistently recognizes that the sustainable use of living resources and the flora of which they are a part is a requirement for biodiversity conservation. Still, it is also accepted that specific components of biodiversity conservation require special attention and treatment. Also, commitments frequently pertain to specific biological resources rather than biodiversity. The CBD seeks to treat the sources rather than the signs of biodiversity loss while also emerging as a crucial instrument in sustainable development. Furthermore, the responsibilities imposed by the CBD, which deals with conservancy and sustainable exploitation, are demanding when taken in their purest form, without any qualifications. Biodiversity is currently being lost at up to 1000 times the natural rate and this poses a serious threat to our health and wellbeing despite the designation of protected areas, a cornerstone of biodiversity conservation. There is a need to allocate funds to sustainably manage protected areas and to enforce relevant legal frameworks establishing such. There is a need to implement a landscape approach in the conservation planning of the Lake Chad Basin. This will improve the sustainability of the basin through the integration of social, economic, and environmental initiatives (UNESCO, 2022).

9 Considering the United Nations framework convention on climate change

Despite several cooperation projects related to Lake Chad, with regards to climate change, the Lake Chad basin could be said to be the zero ground for concern about the influence of climate change in that region, as climate change has been observed to harm the basin's ecosystems and species (Okpara et al., 2018). Hence, the sustainability of numerous wetlands in Lake Chad in their current state, as well as the species that depend on them, is therefore intimately related to the prevention of catastrophic climate change. However, these wetlands could potentially play a crucial role in climate change mitigation. In light of the foregoing, it can be said that the Ramsar Convention and UNFCCC have developed an excellent working relationship. For instance, the Ramsar (2002) – COP8 adopted a resolution on climate change and wetlands with three objectives: establishing a foundation for future collective action to prioritize significant cross-cutting challenges, reiterating Ramsar parties' commitment to the protection, sustainable use, and management of inland and coastal wetlands, and establishing existing mechanisms for climate change adaptation and mitigation of a framework for discussion and action. Furthermore, in view of the fact that climate change has the potential to significantly alter the natural character of wetlands and their long-term usage, COP8 Resolution VIII.3 encourages parties to:

- Prioritize wetland management to increase resilience to climate change and extreme weather events.
- Promote the restoration and management of peatlands and other wetlands, which serve as significant carbon sinks and reservoirs by sequestering carbon.
- Investigate the function of wetlands in carbon storage, sequestration, and mitigation of sea-level rise.
- Focus on institutional capacity building and synergies to address climate change and wetland issues.

10 Considering the convention on migratory species (CMS)

To safeguard these migratory birds and animals, the CMS Convention encourages local and worldwide protection of migratory species and the preservation of migration pathways like the Lake Chad Basin (Okpara et al., 2018). Lake Chad is home to Sahel's biggest bird populations (Ikusemoran et al., 2018). The lake serves as a key stopover point for migrating waterbirds from Europe and Asia, with at least 70 different species of birds passing through each year. There are also Afro-tropical species present. In addition, Chad Lake Bay is also a shelter for all West African species of vultures (Rondeau and Thiollay 2004). Migratory species may become vulnerable as a result of long migrations, necessitating collaborative conservation efforts between countries. The proposed trans-boundary Ramsar site in the Lake Chad basin will help in reducing risk from human activities such as habitat reduction, fragmentation, bulk hunting, and illegal trade in wildlife as the basin hosts a wide range of migratory birds. The Ramsar Convention and the CMS signed a Memorandum of Cooperation in 1997, and the two organizations have worked

together ever since. This resulted in a Joint Work Plan between CMS and the African-Eurasian Migrating Waterbird Agreement (AEWA), which focuses on migratory waterbirds, turtles, and other crosscutting issues. This essentially utilizes the Ramsar Convention's capacity to establish site networks to help CMS deliver conservation outcomes in the basin.

11 Contribution of the World Heritage Convention to the Lake Chad issue

The World Heritage Convention (WHC) is an international binding tool that establishes the conditions under which both cultural and natural heritage of globally recognized value should be preserved for the benefit of present and future generations. For example, Spirulina is a seaweed found in Lake Chad, and it is growing in global relevance and recognition because of its detoxifying and nutritional properties (UNESCO, 2019). A sacred tree called Chari Kandra has grown in the place of a human grave. Consuming its leaves causes death and cutting its branches results in calamity. In order to enjoy this protection, it must be offered foods like butter, eggs, or flour. Another heritage in the lake is Ngamaram, a half-human, half-fish creature that can be either male or female. It offers protection to the people who live around the lake and worship it, but it attacks foreigners who are disrespectful to the lake's deities. The inhabitants make offerings to it, which they bury afterward (UNESCO, 2019)... The World Heritage Sites are regularly monitored by the World Heritage Center and the World Heritage Committee is informed of any threats to their integrity. It may then require the country concerned to take measures to ensure that these concerns can be removed. Once there is cooperation established among the riparian countries, the Lake Chad basin could be inscribed on the World Heritage List, ensuring that the values for which the site has been designated are maintained. Taking into consideration the substantial overlap between World Heritage and Ramsar sites, along with the potential for further growth of this overlap, the secretariats of the two conventions formalized their cooperation by signing a Memorandum of Understanding (MOU) during the Ramsar COP7 meeting in Costa Rica, which took place in 1999. This demonstrates the desire for cooperation and synergy to help the countries conserve sites recognized by the Conventions as well as to build collaborative work plans for information exchange, database sharing, preparing, and participating in joint expeditions. The MOU between the Ramsar Convention and WHC proposes "activities to be carried out include information sharing in order to identify possible wetland locations capable of fulfilling the criteria for appointments to World Heritage and/or internationally significant wetlands, including trans-boundary sites..." The World Heritage Secretariat and the Ramsar Convention's stakeholders have a strong potential to promote more concretely the construction of a transboundary framework for coordinating Lake Chad basin management efforts (McInnes et al., 2017).

12 Impacts of environmental problems on the economy of Lake Chad

Food insecurity and scarcity of potable water are two of the socioeconomic consequences of environmental problems in Lake Chad. This has affected the Lake Chad Basin population's health. In addition, conflicts over who has the right to exploit the depleting water resources have arisen upstream and downstream due to the freshwater shortages. The influx of individuals fleeing the drought has exacerbated social tensions by increasing the strain on resources. As a result of hydrological instability and water diversions, drought has increased the number of people fleeing their homes. The most severe problem in the Lake Chad Basin is the decline in freshwater supplies, driving nearly all environmental concerns in the region. As the lake and other wetland areas dry up, the species living there will be displaced; ecosystems, particularly aquatic ones, will be altered or destroyed. The eutrophication of water bodies invaded by invasive species is also a result of pollution from agricultural chemicals. Due to deforestation and soil degradation, biodiversity loss and a decrease in the amount of freshwater accessible are evident.

13 How transboundary cooperation between states could improve biodiversity conservation

Thousands of people in Nigeria, Chad, Niger, and Cameroon benefited from the provision of agricultural resources such as fisheries and pastures by the project completed in 2012. Desiccation caused by climate change poses a severe threat to the ecosystems of the region. As a result of the reduction in the size of the water column of Lake Chad from 25,000 km^2 in 1963 to only 2000 km^2 in 2010, the region has faced numerous problems such as water scarcity, environmental contamination, and biodiversity loss, among other issues. This has exacerbated the national security challenges in the affected countries and heightened the regional security situation in West and Central Africa.

A successful strategy for combatting Boko Haram groups in and around Lake Chad depends on the countries' capacity to enhance living standards and develop confidence among residents. However, a more coherent joint force can make a considerable contribution. Nigeria's main issue was how the Chadian conflict permitted the large influx of weapons and ammunition into the country, particularly from France and the United States. Nigeria is uncomfortable if any of its neighboring countries are heavily armed. Nigeria became increasingly wary of Chad as a result of this.

International cooperation amongst the four countries that borders the Lake Chad Basin, if strengthened, would not only address violence in the region but could possibly lead to long-term peace and development in the region. Collaboration among these countries would improve data accuracy and knowledge sharing, ultimately facilitating capability development. Additionally, cooperation would provide an opportunity to reconstruct the ecology, restore the lake, re-establish its biodiversity, and protect the lake. This would also facilitate the sharing of operational management plans. To ensure that water resources are managed equitably and sustainably and the fulfillment of SDG-6, international cooperation on the transboundary Lake Chad is essential. The countries of the Lake Chad basin have made commendable attempts to harmonize against Boko Haram militants by forming a Multinational Joint Task Force (MNJTF). However, the force's productiveness has

been hampered because of their fluctuating loyalty, budget issues, and disorganized arrangement (Albert 2017).

14 Transboundary management area and peace-keeping

Transboundary Protected Areas (TBPAs) has emerged as a concept to reconcile the goals of peace and biodiversity conservation and represent a unique opportunity to promote peace in a region like Lake Chad. "Park for peace" is a designation that may be applied to TBCAs, which is dedicated to promoting peace and cooperation. The Cordillera del Condor is an example of how conservation efforts can help foster peace and improve relationships between partner countries through working together (International Union for Conservation of Nature (IUCN), 2015). Part of the objectives of peace park include: (i) supporting long-term cooperative conservation of biodiversity, ecosystem services, and nature values across boundaries; (ii) promoting landscape-level ecosystem management through integrated bio-regional land-use planning and management; (iii) building trust, understanding, reconciliation, and cooperation between/ among countries; (iv) promoting and/or resolving tension as well as resolution of armed conflicts and reconciliation (Ali, 2007). Hence, peace park creation is a form of bio/ ecological diplomacy and the creation of TBPAs in the Lake Chad region will not only address the environmental degradation in the region but also help foster cooperation among the riparian countries in addressing the "Boko Haram" insurgency with the aim of fostering peace in the region.

15 Conclusion

Biodiversity loss refers to one of the global commons which would then be lost. Given its importance in providing essential ecosystem services, the conservation of biodiversity at the local and regional scales described becomes imperative. The development of a TBPA around the Lake Chad basin will have a global impact due to the ecology as well as the biodiversity of the region. Perhaps, a regional body like the Lake Chad Basin Commission (LCBC) could facilitate the idea aimed toward environmental conservation and peace building within the region. When the countries agree to an initiative of this nature, apart from promoting regional peace, it has the potential of addressing other environmental threats at trans-boundary scale like illegal trading, hunting, poaching, and illegal movement of animals across the border, which promotes herdsmen-farmers conflict as these could be tackled at a regional scale. Furthermore, other economic opportunities like resource trade and ecotourism sectors provided through such regional platforms could further enhance regional integration among the member countries.

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Data availability statement

The data that support the findings of this study are available on request from the corresponding author.

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