

[illegible][illegible]

Call Number: X18 .N56;X18 .N56;X18 .N56;X18 .N56;X18 .N56;X18 .N56;X18 .N56;X18 .N56;X18 .N56;

ISBN/ISSN: 03313646

Title: Nigerian journal of international affairs.

SHARES

Article Exchange

Part Pub. Date: 2008

Pages:

Pub. Place: Lagos, Nigerian Institute of International
Affairs

Borrower: ULA0

Address: Center For Science & Social Science
(CSSSI) ILL
219 Prospect St.
PO Box 208111
New Haven , CT
06520-8111

Email:

Patron Name: YALE\ai245 - Abdul-Majeed Ibrahim

Patron e-mail:

Service Level: Priority - Extended Search

~~Service Type: Copy non-returnable~~

Delivery Method: UPS

Max Cost: USD50

Request Notes: PLEASE NOTE NEW ODYSSEY

Payment Type: IFM

ADDRESS: ill.library.yale.edu; Max Cost:
\$50 OCLC Req. Ex. Affiliations: SHARES
OCLC Req. Ex. Source: ILLiad

Need By:

Verification Source: <TN:1148866><ODYSSEY:ill.library.yale.edu/
CSSSI> OCLC

Copyright Info: US:CCL

Supplier Reference:

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 528 529 530 531 532 533 534 535 536 537 538 539 540 541 542 543 544 545 546 547 548 549 550 551 552 553 554 555 556 557 558 559 560 561 562 563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578 579 580 581 582 583 584 585 586 587 588 589 590 591 592 593 594 595 596 597 598 599 600 601 602 603 604 605 606 607 608 609 610 611 612 613 614 615 616 617 618 619 620 621 622 623 624 625 626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 649 650 651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675 676 677 678 679 680 681 682 683 684 685 686 687 688 689 690 691 692 693 694 695 696 697 698 699 700 701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775 776 777 778 779 780 781 782 783 784 785 786 787 788 789 790 791 792 793 794 795 796 797 798 799 800 801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825 826 827 828 829 830 831 832 833 834 835 836 837 838 839 840 841 842 843 844 845 846 847 848 849 850 851 852 853 854 855 856 857 858 859 860 861 862 863 864 865 866 867 868 869 870 871 872 873 874 875 876 877 878 879 880 881 882 883 884 885 886 887 888 889 890 891 892 893 894 895 896 897 898 899 900 901 902 903 904 905 906 907 908 909 910 911 912 913 914 915 916 917 918 919 920 921 922 923 924 925 926 927 928 929 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 946 947 948 949 950 951 952 953 954 955 956 957 958 959 960 961 962 963 964 965 966 967 968 969 970 971 972 973 974 975 976 977 978 979 980 981 982 983 984 985 986 987 988 989 990 991 992 993 994 995 996 997 998 999 1000 1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017 1018 1019 1020 1021 1022 1023 1024 1025 1026 1027 1028 1029 1030 1031 1032 1033 1034 1035 1036 1037 1038 1039 1040 1

Supplier Reference: LLN-JM-17-044865

Requester Symbol: OCLC

Local request number: ILLNUM:171844668

Owned By: UCLA Young Research Library - ILL

Return To: Interlibrary Loans
UCLA Young Research Library
280 Charles E. Young Dr.
Los Angeles, CA,
90095-1575

SCANNED

SEP 29 2016

Ariel

Relais #

ky:

Saving Africa's shrinking Lakes through Water Transfer Projects: Reflections on the Proposed Lake Chad Replenishment Project

Freedom C. Onuoha*

Abstract

For many decades, the Lake Chad has been a vital source of freshwater and other resources sustaining millions of people whose livelihoods are directly linked to the ebb and flow of this important transboundary watercourse. However, in the last 40 years, the lake has witnessed unprecedented diminution. This drastic shrinkage has impacted heavily on the basin's economic activities. In a bid to salvage the lake from extinction, an inter-basin water transfer project was proposed to replenish the lake. This article, therefore, examines the confluence of factors that conduced to the dramatic shrinkage of the lake. It further highlighted some of the contending issues inherent in the proposed inter-basin water transfer projects. It does this with a view to steering informed debate on the general issues of the practicability and sustainability of the proposals for inter-basin water transfer for the basin as "the only option at the disposal of mankind".

Introduction

Africa is endowed with about 677 major lakes. Although, Africa's lakes hold about 30,000 cubic kilometers of water and yield 1.4 million tonnes of freshwater fish each year, they are among the most heavily exploited of all the continent's freshwater resources. Recent satellite photographs taken by the United Nations Environmental Programme (UNEP)¹ reveal that more

* Freedom Onuoha is a Research Fellow with the African Centre for Strategic Research and Studies, National War College, Abuja, Nigeria.

¹ UNEP, 'Impacts on Africa's Lakes Case Studies of Africa's Changing Lakes'[online] <http://na.unep.net/AfricaLakes/AtlasDownload/PDFs/Africas-Chapter3-0-Screen.pdf> [Accessed 4 July 2007].

than 600 lakes in Africa have shrunk dramatically over the past decades; raising fears that water shortages could soon trigger new conflicts across a continent where millions of people still lack access to safe drinking water. The Nile delta and the Lake Chad have been identified as the hardest hit in terms of the dramatic shrinkage.

Formerly the fourth largest lake in Africa and sixth largest in the world, Lake Chad is a very important large body of water in Africa which has immense significance to the basin countries. Like any other transboundary lake, the Lake Chad is a source of human-interdependence; it transverses the national borders of four independent states, linking different users across borders, and supporting different economic livelihoods within a shared system. For many decades, the Lake Chad has been a vital source of freshwater and other resources sustaining millions of people whose livelihoods are directly linked to the ebb and flow of this important transboundary water body. Initially spanning 25,000 km², the lake is now a mere 532km², due to a combination of several factors. According to Coe and Foley², the size of the lake has gone from 25,000 km² to less than 1,500 km² between 1966 and 1997. It has fluctuated greatly during this period shrinking by up to 80 per cent in 1985, but reaching 1,900 km² once more in 2007. The drastic shrinkage of the lake with the attendant water shortage has impacted heavily on the basin's economic activities including the fisheries, agriculture, animal husbandry, fuel wood provision and wetland economic services.

Since the progressive diminution of the Lake Chad became more palpable and devastating in the 1980s, it is envisaged that the conditions in the Lake Chad basin call for measures beyond management of the available water resources in the basin. It requires a major water transfer to the region to restore the lake, improve base flow and channel storage, arrest groundwater recession and falling water table, and enhance groundwater recharge. It is also one of the priority areas identified by the countries and the Lake Chad Basin Commission (LCBC) Regional Council. This project is now being vigorously canvassed as the lasting solution to the diminishing water resources and continued ecosystem decline of the Lake Chad area.

It is in the light of the foregoing that this discourse is set to provide an overview of the natural and anthropogenic factors affecting the Lake Chad, and to reflect on some of the likely priority issues that will define the practicability and sustainability of the proposed inter-basin water transfer

² M. T. Coe, and J. A. Foley, "Human and Natural Impacts on the Water Resources of the Lake Chad Basin", *Journal of Geophysical Research*, 2001, pp. 3349-3356.

project as a strategy for the restoration of the Lake Chad. It is important to state on the onset that this discourse is not ambitious of providing an alternative model of water transfer, and at best, does not claim to contain final answers to the plethora of issues that inter-basin water transfer is bound to raise in our peculiar circumstances. Rather, it tries to bring to the fore the major contending issues that must be factored in and carefully resolved if the practicability and sustainability of the transfer project is to be assured.

The Lake Chad: Overview of the Environment and Economic Livelihoods

The Lake Chad hydrological basin is located between latitudes 6° and 24° N and longitudes 7° and 24° E. The entire geographical basin covers an area of 2,434,000 km² or 8% of the surface area of the African continent, shared between the countries of Algeria, Cameroon, Central African Republic, Chad, Libya, Niger, Nigeria and Sudan³. About 20% of the total area of the Lake Chad basin, or 427,500 km², is called the Conventional Basin (42% in Chad, 28% in Niger, 21% in Nigeria and 9% in Cameroon), which is under the mandate of the Lake Chad Basin Commission (LCBC).

The Lake Chad is the single most important geographical feature of the conventional basin. The lake is situated on a plateau at an altitude of about 283 m above mean sea level. The lake occupies less than 1% of the drainage basin, and it is shared by Cameroon, Chad, Nigeria and Niger as the riparian countries. The Lake Chad area is currently at its minimum physical size of 1350 km².

The Lake Chad Basin is drained by numerous rivers, including the Chari-Logone, Komadugu-Gana or Lesser Yobe Ebeji, Ebeji Mbuli, Botha El Beed, the Yedseram, Ngadolu, Ngadda, Komaduguyobe, Taf-taf and Serbewel. By virtue of its location, the Lake Chad region has limited surface and groundwater resources. Of the above rivers, the river Chari- along with its tributary, the Logone- provides 90 per cent of the inflow to the lake, while the remaining 10 per cent comes from the Komadougou-Yobe river system. Three-quarters of the water entering the lake north of N'djamena originate from headwaters in the Central African Republic and, to a lesser extent, Cameroon.

³ UNESCO, Water Portal Weekly Update No. 178 (March 2007) 'Lake Chad Basin' [online] <http://www.unesco.org/water/news/newsletter/178.shtml#pub> [Accessed 4 July 2007].

Following the attainment of independence in the 1960s by the four riparian states, an inter-governmental agency, the Lake Chad Basin Commission (LCBC), was established by the Fort Lamy (now N'djamena) Convention and Statutes on May 22, 1964, by the Heads of States of the four countries that share the lake – Cameroon, Chad, Niger and Nigeria. It was not until March 1994 that the Central African Republic (CAR) was admitted as the fifth member state. Sudan indicated interest in joining the Commission and was admitted as a member during the tenth Summit of the Heads of States held on 28th July 2000. However, Sudan has not ratified the Convention establishing the Commission, a necessary precondition for partaking in the activities of LCBC.

According to the Fort Lamy Convention and Statutes, the primary objectives of the LCBC are to regulate and control the utilization of water and other natural resources in the basin; to initiate, promote and coordinate natural resources development projects and research within the basin area; to examine complaints; and to promote the settlement of disputes, thereby promoting regional cooperation⁴. Since its inception, member states of the Commission have signed various protocols and initiated various plans that seek to ensure sustainable and equitable exploitation of the resources of the basin.

The lake which is located in the semi-arid region of the Sahara Desert is a vital source of freshwater and other resources for human, livestock and wildlife communities. The main economic livelihoods in the basin include fishing, hunting, farming and pastoralism. Both the Lake and the Chari flood plains support a rich terrestrial and aquatic fauna. Fishing is one major occupation around the lake and all four riparian states heavily depend on supplies from the lake. It is believed that over 150,000 fishermen live on the lake shores and its islands⁵. Over 100 species of fish have been recorded from the upper Chari system, while over 120 species are known from the lake itself and the lower reaches of the Chari River.

In addition to the fish fauna, the waters of the lake and its surroundings also have enormous bird population comprising many seasonal migratory and resident species. The lake offers migration route for birds moving between Africa and Palaearctic. At least, 70 species of bird make stopovers each year in the lake area. Although their numbers are lower than those reported

⁴IMF 'Lake Chad Basin Commission', April, 2002 [online], <http://www.imf.org/external/np/sec/decdo/lcbc.htm> [Accessed 31 May 2007].

⁵Living Waters, 'Managing Water Wisely: Lake Chad' [online], <http://assets.panda.org/downloads/mrwlakechadcasestudy.pdf> [Accessed 25 October 2006].

in the 1960s, they constitute a source of protein for local residents and are still significant to qualify the lake for inclusion in the Ramsar List of Wetlands of International Importance.

In contrast to the fish and bird faunas, the mammalian fauna is not so rich in species and most of them are quickly disappearing. Before the indiscriminate use of firearms and modern hunting techniques rendered some of them virtually extinct, the Sahelian large mammal species that used to be common in the Lake Chad eco-region include red-fronted gazelle, dama gazelle, and dorcas gazelle (*Gazella rufifrons*, *G. dama*, *G. dorcas*), patas monkey (*Erythrocebus patas*), striped hyena (*Hyaena hyaena*), cheetah (*Acinonyx jubatus*), caracal (*Felis caracal*), and the endangered wild dog (*Lycaon pictus*). Other species found include the African elephant (*Loxodonta Africana*), two species of otter (*Lutra maculicollis*, *Aonyx capensis*), hippopotamus (*Hippopotamus amphibious*), sitatunga (*Tragelaphus spekei*), and kob (*Kobus kob*). Two near-endemic rodent species, *Mastomys verheyeni* and the Lake Chad gerbil *Taterillus lacustris*, are also found⁶.

Apart from fishing, the raising of cattle, sheep and camels by local as well as nomadic herders provides additional means of economic livelihood in the basin. The Lake Chad which provides water and grazing lands for pastoralists and herders has been the traditional convergence point for the pastoralists: Tuareg, Toubou, Feda, Kanembu, Shuwa, Fulani and Wadai from Chad, Niger, northern Cameroon and northern Nigeria⁷

Some people raise livestock, typically moving closer to the lake for grass in the dry season, then moving away in the rainy, mosquito season; some graze their animals up to 100km away. After the droughts of the 1970s, many herders shifted from grazing animals (cattle and camels) to browsing animals (sheep and goats), which adversely affected the area's vegetation by consuming the woody plants.

In addition to direct support to livelihoods, the lake serves as a veritable source of freshwater for drinking, sanitation, and irrigation. Although the lake's surface water and underground aquifers provide freshwater for wells

⁶ E. Odada, L. Oyebande, and J. Oguntola, "Experience and Lessons Learned: Brief for Lake Chad", [online], http://www.ilec.or.jp/eg/lbmi/reports/06_Lake_Chad_27February2006.pdf [Accessed 18 November 2006].

⁷ J. Ibrahim, Lake Chad as an Instrument of International Co-operation, A.I Asiwaju and P. O Adeniyi (eds.), *Borderlands in Africa: A Multidisciplinary and Comparative Focus on Nigeria and West Africa*, Lagos, University of Lagos Press, 1989, p.309.

and boreholes for the local inhabitants, people living around the lake lack access to safe drinking water and proper sanitation. The Lake Chad provides the water and the agricultural springboard for the cultivation of some traditional crops such as cotton, groundnuts, sorghum, cassava, millet, rice maize and onions. The most common system is lake-bottom cropping or receding moisture cultivation; an unhealthy agricultural practice which has contributed to the contraction of Lake Chad. Also, the two principal rivers that feed the lake (Chari-Longone and -Komadugu-Yobe Rivers) provide freshwater for both small and large scale irrigation projects by the riparian states in the lake region.

Factors Responsible for the Diminution of the Lake Chad

The Lake Chad as earlier noted is one of Africa's largest lakes which have shrunk dramatically over the last 40 years as a result of a combination of several factors. The drastic diminution of the lake is attributable to three sets of factors: climatic variability, unsustainable exploitation of its resources by the riparian states, and increased water use as a result of demographic pressure.

Climatic variability is one important factor driving the lake to extinction. The impact of climatic variability and fluctuations on the Lake Chad dates back to many decades. The climate around Lake Chad is hot and dry, with highly variable annual rainfall ranging from 565 mm (22 in) in 1954 to just 94 mm (4 in) in 1984. One of the early studies on the hydrological history⁸ of the lake has found that the balance between water intake and evaporation is continually fluctuating, with the result that Lake Chad, because it is so shallow, is continually changing its size and shape. These fluctuations may be seen as of three different kinds: long-term, short-term and seasonal. They reflect variations in rainfall not only in the area of the lake itself but particularly in the watershed areas of the feeder rivers.

The impact of climatic variability particularly the significant decrease in rainfall in the basin since the 1960s has adversely affected the lake. There has been decrease in the number of large rainfall events and in river inflows into the lake. In the late 1960s, rainfall became intermittent at Lake Chad, culminating in two major droughts in 1972-74 and 1983-84. In the mid-1990s, rainfall again increased with several good years ensuing. Areas of the

⁸ Graham Connah, *Three Thousand Years in Africa: Man and his Environment in the Lake Chad Region of Nigeria*, London, Cambridge University Press, 1981, p.21.

lake that once experienced a mean rainfall of 320 mm (13 in) currently receive less than 210 mm (8 in).

The UNEP⁹ has recently argued that the size of the region affected by this change and its duration are without precedent in hydro-climatic chronicles. Fluctuations in the Lake Chad are thus a fairly sensitive indicator of climatic change over a substantial area of Africa. Over the last 40 years, the discharge from the Chari/Logone river system at the city of N'Djamena in Chad has decreased by almost 75 per cent, drastically reducing the inflow into the lake. As a result of consecutive years of rainfall deficits marked by significant decreases in inflows to the lake, the maximum flooded area of the lake indeed decreased from 37, 000 km² in the early 1950s to 15, 000 km² in the early 1990s while the areas flooded from consecutive months shrunk from 23, 000 km² to only 2, 000 km² during the same period¹⁰. Coupled with this reduced rainfall is the problem of intermittent droughts. The region has experienced a series of devastating droughts which have contributed to the shrinkage of the lake over the last few decades. The back-to-back droughts of the 1970s and the 1980s have left serious degradational impacts on the lake which include, shrinkage of the lake and decreased flows in the major rivers that fed into the lake; falling of groundwater tables; disappearance of specific plant species and reduction of canopy cover; loss of wildlife populations; increased soil erosion and/or loss of fertility, among others.

If climatic variability and occasional extreme drought in the region negatively affected water availability in the lake, unsustainable exploitation of water resources of the lake by both the riparian countries and increased water use by local inhabitants obliterated the carrying capacity of the lake to replenish itself. Large and unsustainable irrigation projects and impoundments built by Niger, Nigeria, Cameroon and Chad which have diverted substantial water from both the lake and its two major feeder rivers- Chari-Longone and Komadugu-Yobe Rivers, have greatly contributed to the shrinking of the lake.

The signing of the LCBC convention as far back as 1964, to a large extent, signaled an early willingness by the riparian countries to promote and

⁹ UNEP, op.cit.

¹⁰ M. Niasse, 'Climatic-Induced Water Conflicts Risks in West Africa: Recognizing and Coping with Increasing Climatic Impacts on Shared Watercourses', Paper presented at an *International Workshop on Human Security and Climatic Change*, Asker, 21-23 June 2005.

regulate the joint development of the resources of the Lake Chad area and to strengthen the idea of developing closer neighbourly relations for the purpose of the economic development for the mutual advantage of all member states. Regrettably, the patterns of exploitation of the resources of the lake by the various riparian states have been in sharp contrast to the institutional provisions envisaged in the Convention that created the LCBC.

Shortly after the establishment of the LCBC, the riparian countries resorted to unilateral and unsustainable exploitation of the water resources of the lake. By mid-1970s, the riparian countries were devising unilateral projects to harness the waters of the lake for sustenance of development projects in the form of construction of dams and large water impoundments to enhance irrigation of agricultural lands. Most significant was the construction of both the Yaguou-Tekele dyke (on the Chari-Logone) and the Maga dam by Cameroon in 1979, and a series of dams by Nigeria such as the Tiga Dam on River Yobe, the Alau Dam on River Ngadda, and the Yedersdam Dam on River Yedersdam. Other examples of such projects include the South Chad Irrigation Project (SCIP) in Nigeria and the MAMDI Polder Project in the Republic of Chad.

For instance, Coe and Foley¹¹ contend that the competing demands for freshwater by the four riparian countries of Lake Chad, mostly through massive irrigation projects account for almost 30 percent of the observed decrease in lake area since the early 1960s. Until about 1979, irrigation had a modest impact on the hydrology of the region. But between 1983 and 1994, the amount of water diverted for irrigation quadrupled over water used for the previous 25 years, accounting for 50 percent of the additional decrease in the size of the lake. In addition to the radically reduced lake surface area, the flow of water from the primary river system that feeds it has decreased by almost 75 percent over the past 40 years.

Thus, the shrinking of Lake Chad results from excessive irrigation projects by the riparian countries to support an unsustainable agricultural industry, in a bid to enhance food security. These projects have led to significant reductions in the flow of rivers that feed the lake, causing the drastic shrinkage of the lake. While irrigation projects have contributed to the drying up of the lake, the decreasing water level has in turn affected irrigation projects. For instance, the SCIP was designed to irrigate 67,000 hectares, but as water levels in the lake dropped in the late 1980s, no irrigation could take place.

¹¹ Coe and Foley, *Op. Cit.*

Consequently, the project which depends on water abstracted from the lake became stranded by the receding lake shore and had to be abandoned. The SCIP had an unintended spin-off. Its dried-up canals have been taken over by the *Typha australis*; a rhizomatous plant that has offered a convivial habitat for the dreaded quelea bird. The regular loss of rice and other grain crops to large flocks of quelea birds has added additional pressure on the already fragile livelihood system of the lake basin population.

Beyond the vagaries of climate and unsustainable exploitation of the water resource of the lake by riparian countries, population growth is an important factor in estimating the effect of human activities on the resources of the Lake Chad. The surge in human population in the last few decades has conducted to increased exploitation and degradation of the water resources of the lake. For much of our history, human impacts on the earth's surface have been relatively minor. However, during the past fifty years, these impacts have grown exponentially. Harden¹² has long hypothesized that Africa's growing population is the major cause of the degradation and pollution of most of the continent's lakes. Africa's population has more than doubled in three decades, from 266 million in 1960 to 609 million in 1990¹³. It is expected to grow by 2.21 per cent from 2005-2010, and the growth rate is expected to decline by 1.8 per cent from 2020-2025. This compares to expected world population growth of 1.2 per cent from 2005-2010, and 0.8 per cent growth from 2020-2025¹⁴. As evident in the table below, the population of the four riparian countries of the Lake Chad is indicative of this population surge.

¹² G. Harden, "The Tragedy of the Commons", *Science*, Vol.162, No.1,1968, pp.243-248.

¹³ A. Singh, A. M. Dieye, M. Finco, M. S. Chenoweth, E. A. Fosnight and A. Allotey, 'Early Warning of Selected Emerging Environmental Issues in Africa: Change and Correlation from a Geographic Perspective, [online], <http://na.unep.net/publications/early.pdf> [Accessed 26 October 2006].

¹⁴ UNEP, 'People and Lakes: Human Influences on Africa's Lakes'[online], <http://na.unep.net/AfricaLakes/AtlasDownload/PDFs/Africas-Chapter2-Printer.pdf> [Accessed 4 July 2007].

**Table 1: Population Growth of the Four Riparian Countries:
1975-1997 (with Projection for the Year 2025)**

Population, (millions)	1975	1997	2025	1st Increase (%)	2nd Increase (%)
Cameroon	7,5	13,9	29	85 %	108 %
Chad	4,0	7,2	13	77 %	82 %
Niger	4,8	9,8	22	105 %	125 %
Nigeria	61,2	117,9	238	93 %	102 %

Source: World Bank, 1999: World Development Indicators 1999, CD.

The population growth rate of the riparian countries is believed to be high- the average population growth within the basin is quite high being 2.4-2.6%. Since the 1960s, human demands for water near Lake Chad have grown rapidly. Between 1960 and 1990, the number of people living in the lake's catchment area has doubled from 13 million to 26 million¹⁵. The IRIN put the population of the basin in 2003 at 20 million. These include 11.7 million in Nigeria, 5.0 million in Chad, 2.5 million in Cameroon, 634,000 in CAR and 193,000 in Niger¹⁶. According to UNESCO, the population of the basin is currently over 37 million¹⁷. In relation to other riparian states, there is no doubt that Nigeria's overall large population account for the dominance of her citizens in the basin even though her territory covers only 21% of the total conventional basin area.

¹⁵ UNEP, *Global Environment Outlook 2000* [online], <http://www1.unep.org/geotext/0056.htm> [Accessed 12 September 2006].

¹⁶ IRIN, 'Replenishing Lake Chad' (March 2003) [online], <http://www.scienceinafrica.co.za/2003/march/chad.htm> [Accessed 31 May 2006].

¹⁷ This current estimate is from UNESCO, Water Portal Weekly Update No. 178, 'Lake Chad Basin' [online], <http://www.unesco.org/water/news/newsletter/178.shtml#pub> [Accessed 4 July 2007].

Table 2: Percentage Area of Riparians in Relation to Nationals in the Basin in 2003

Riparian Countries Basin area	Percentage of Basin in 2003	Nationals in the
Cameroon	9%	2.5 million
Chad	42%	5.0 million
Niger	28%	193, 000 thousand
Nigeria	21%	11.7 million

Source: IRIN, 2003.

The rapid growth of human exploitation of freshwater from Lake Chad and the rivers that flow into it has significantly affected the lake's equilibrium. Growing human population in the lake region has necessitated the raising of increased number of livestock to feed the teeming population. The combined effect of the surge of both human and livestock populations is the accelerated exploitation of the resources of the lake by local inhabitants to sustain their survival and that of their livestock. Given this context, the dramatic shrinkage of the lake in the last four decades has been attributed to *domino effect*. In spite of the worsening state of the lake, researchers predict some 75% population increase by 2025¹⁸. Going by this prediction, it seems likely that the lake will shrink further and perhaps even disappear altogether in the course of the 21st century if nothing is done to save it.

The plight of the Lake Chad today affects the existence of over 37million people whose livelihood is directly linked to the ebb and flow of this important transboundary watercourse. Consequently, the dramatic shrinkage of the lake has left adverse impacts on the environment, economic activities and livelihoods of the local people who depend on the lake for sustenance. It is pertinent to point out that apart from the establishment of the LCBC in 1964; the riparian states have failed to cooperate as strongly as they should to ensure the sustainability of the Lake Chad. In a bid to arrest this situation, the riparian countries in collaboration with development

¹⁸ A. B. Sambo, "Introductory Remarks", Paper presented at the *International Workshop on Current Challenges and Future Prospects of Lake Chad Basin*, organised by the Regional Parliamentary Committee on Lake Chad Basin, Transcorp Hillton Hotel, Abuja, October 27-28, 2007.

partners have articulated a number of initiatives, and some are still underway to reverse land and water degradation trends in the Lake Chad area. The most critical one remains the proposed inter-basin water transfer project.

The Lake Chad Replenishment Project: Context and Objectives

The recent years has witnessed renewed commitments on the part of the riparian countries to safeguard the Lake Chad from extinction. Beyond the establishment of the Regional Parliamentary Committee on June 2004 by the national Parliament of the five member countries of the LCBC to provide legislative support for the management of the basin in general and specifically, the activities of the LCBC, a number of initiatives, including studies and environmental projects have been undertaken to salvage the lake. One of the initiatives on which the LCBC has been concentrating seeks to reverse land and water degradation trends and regenerate the lake's ecosystem. Its implementation is expected to cost US \$ 10.6 million, using funds provided by the World Bank through the Global Environment Facility (GEF). This initiative falls within the LBCB/GEF Project on the Integrated Management of Lake Chad that aims to integrate projects carried out in the Lake Chad basin and avoid duplication.

Consequently, a sequence of inter-related studies focusing on combating the effects of drought have been carried out and monographs written thereon. These studies culminated in a Master Plan and Action Programme which then led to developing the Strategic Action Plan (SAP). The Master Plan identifies water transfer project to Lake Chad ranking second in terms of priority among a list of 36 projects. The SAP also identified the water transfer project among the category of priority projects within the eight-year programme¹⁹. Although the proposed replenishment project only gathered momentum in the recent times, the water transfer project has a long standing history, dating back to November 1989 when the issue of saving Lake Chad was first put on the table at the conference of Ministers of the Environment. For past 15 years, the Lake Chad Basin Commission has been talking about diverting water from the Oubangui River to the Chari River, which feeds into the lake²⁰.

The project which hopefully has left the conference table to the conduct of pre-feasibility study is tagged 'Lake Chad Replenishment Project'.

¹⁹ Executive Summary, 'Lake Chad' [online], http://www.uneca.org/panafcon/executive_sum.htm [Accessed 31 May 2006].

²⁰ UNDP, 'Human Development Report 2006' [online], <http://hdr.undp.org/hdr2006/pdfs/report/HDR06-complete.pdf>, p.128 [Accessed 23 July 2007].

It would entail the damming of the Oubangui River at Palambo in Central Africa Republic and channeling some of its water through a navigable canal via the Chari River to the Lake Chad. The project has already been approved by the Democratic Republic of Congo and the Republic of Congo, which share the River Congo, into which the Oubangui flows. This large scale project is estimated to cost six million dollars for feasibility studies alone. While the riparian states have generated \$1 million, they depend on donors to contribute the remaining US \$5 million²¹ for the feasibility study.

The water transfer project is intended to restore Lake Chad to its pre-drought condition and to give access to the four riparian countries who share the lake. The Oubangui solution has been identified after a thorough investigation of alternative possibilities. A lot of preliminary work has already gone into it to confirm its technical feasibility. Dam sites for water regulation have subsequently been identified. The study has advanced to the point of tentatively locating the alternative open-canal routes for water transfer by gravity which is also envisaged to provide all season navigation that will open up CAR and enhance the regional communication in the Northern parts of the Republic of Congo Brazzaville, the north of the Democratic Republic of Congo and south of the Republic of Chad²². In this regard, it is reckoned that the project would contribute significantly to improving the navigation conditions on the Oubangui which have deteriorated since 1972.

The pre-feasibility study conducted by the LCBC reveals that the project will serve as an opportunity to rebuild the ecosystem, rehabilitate the lake, reconstitute its bio-diversity and safeguard it for future generations. It is hoped that with the replenishment of the lake, irrigation will boost agricultural production, fishing and reforestation. The canal to be used for water transfer will also serve to facilitate transportation of goods and services within the region. It would also facilitate communication among countries by allowing year round navigation. The water transfer project is envisaged to deter environmental degradation, enhance environmental and ecosystem equilibrium and reduce migration of people and conflict among settlers and environmental refugees. Other expected benefits of the project include about 702 megawatts of electricity that will be generated from the proposed dam and this will contribute towards meeting the region's energy requirements²³.

²¹ IRIN, 'Replenishing Lake Chad' (March 2003).

²² Executive Summary, 'Lake Chad', Op. Cit.

²³ *Game Rangers Association of Africa*, 'Lake Chad - Race Against Extinction' [online], http://www.gameranger.org/cs_2406.htm [Accessed 24 July 2007].

Having highlighted the key thrust of the current proposals for inter-basin transfer agreed upon by the riparian countries of the Lake Chad as well as approved by the governments of Democratic Republic of Congo and the Republic of Congo as the donor countries, and the objectives which it could had filled, we now go on to briefly dilate on some of the priority issues which will define its applicability and sustainability as a lasting solution to the disappearing lake.

The Replenishment Project: Some Contending Priority Issues

The proposed water transfer project has been widely lauded by government officials, politicians, donor institutions, and water experts, among others. In a pre-convention address to journalist by the Honourable Minister of Water Resources and the Executive Secretary to the Lake Chad Commission, the Minister described the proposed replenishment project as "the only option at the disposal of mankind"²⁴. The replenishment project "will be the first of its kind in Africa," Martin Gbafolo, the LCBC's director of water resources and environment, told IRIN in Kyoto²⁵. Similarly, after a two-day International Workshop on Current Challenges and future Prospects of Lake Chad Basin, at Abuja, in October 2006, members of the Regional Parliamentary Committee on Lake Chad Basin, alongside international donor partners, academia, water experts, media and LCBC members present, agreed to facilitate an accelerated implementation of the Oubangui-Lake Chad Water Transfer Project by ensuring that all the necessary and financial support are provided by all concerned stakeholders; and to work with the World Bank on its pledge in organizing a donor round-table conference on Strategic Plan of Action²⁶. Given the fact that the replenishment project has become the creed in terms of alternative options to the redemption of the Lake Chad, it is important to examine some of the contending issues that will define the practicability or sustainability of the proposed replenishment project as one of the strategies of salvaging the Lake Chad.

The first issue relates to the comprehensiveness and depth of feasibility study carried out before the proposed replenishment project. This is essentially because water transfer schemes are unlikely to be a sustainable solution to water scarcity in a basin, particularly when it is not preceded by a comprehensive environmental and socio-economic impact assessment. Under

²⁴ O. Adeolu, "Salvaging Lake Chad Basin", *The Guardian* (Lagos), July 19, 2007.P.77.

²⁵ Cited in IRIN, 'Replenishing Lake Chad' (March 2003).

²⁶ *Game Rangers, Op.Cit.*

the principles of the Rio Declaration agreed at the 1992 World Summit on the Environment in Brazil, impact assessments are required for all projects likely to have adverse effects on the ecosystem. In terms of impact assessment in most African countries, emphasis is usually laid on environmental impact assessment with marginal attention to socio-economic impact assessment. By way of definition, environmental impact assessment is a necessary strategic project assessment needed to evaluate potential and actual impacts of policies, programmes and plans with the purpose of mapping out directions and preparing plans for the mitigation of adverse results and/or totally abandoning proposed paths of action²⁷. On the other hand, socio-economic impact assessment requires similar assessment of a proposed course of development policy, programme or project to identify, evaluate and estimate any form of direct or indirect alteration to the socio-economic and cultural life of the people where such activity is to be carried out with a view to mitigating the adverse effects and/or totally abandoning the proposed action.

In this context, views have been expressed that the water transfer scheme may cause serious socio-economic and environmental harm on the communities where the canal will traverse. Usually, when such high-impacts projects are to be embarked upon in Africa, attention is mainly focused on the environment without adequate analysis of the socio-economic impacts of such projects on people's lives, livelihoods and survival. Yet, these projects engender forced migration, resettlement and loss of economic livelihoods with attendant implications for poverty aggravation and exposure to human insecurity. Consequently, the comprehensiveness and depth of such impact assessment carried out, as well as the extent to which it is made open to permit public scrutiny and input before the project will be embarked upon is one serious issue facing the replenishment project.

As a corollary to the above, is the issue of contradiction between riparian countries' interests and the interests of local inhabitants on one hand, and the conflict between the interests of international donor agencies and the non-governmental organizations in relation to huge-impact water development projects in a basin. In the management of water resources in a basin, the prime concern of local population is usually to safeguard their livelihood. However, the national government bodies may focus on broad issues of interests to the country as a whole, foreign capital or the ruling class.

²⁷ Bassey, cited in G. Haruna, 'Maintaining a Balance between Development, Environmental Impacts', *Thisday*, April 17, 2007.P.22.

More so, in situation of disagreement between governments and local people in the management of river basins, international donor agencies often side with the national governments. They may do so because they like the national plans, but they may be other reasons: they may simply want to ensure that projects are implemented or to show concrete results back home. They may also have a desire to secure contracts for consultancy firms and construction firms based in their home²⁸. However, non-governmental organizations (both local and international) usually support the local people in order to mitigate the impact of such development projects on the environment, local population, and livelihoods. This situation evidently confronts the Lake Chad replenishment project. While the riparian countries and donor agencies (World Bank for example) are averse to embarking on the projects, non-governmental organizations and environmentalists are very critical about the project. They criticize it on the grounds of being an outmoded engineering, infrastructural vision that has failed to deliver sustainable solutions in other parts of the world²⁹. Since the 1970s, hydrological engineering in the form of water transfer have been used to supplement water-scarce basins with water from different hydrological basins. It has been argued that 59 schemes of water transfers have been completed in various countries mainly in Canada, USA, Iraq, Czechoslovakia and these involve a transfer of up to 246 km³ annually in Canada, 37 km³ per year in the USA and 45 km³ per year in Iraq and 6 km³ per year in Czechoslovakia³⁰. Reconciling these conflicting interests in the Lake Chad basin is one such challenge that must be surmounted if the water transfer project is to be sustainable.

Another issue confronting the sustainability of the project is the long-term certainty or continuity of any relevant institutional and legal frameworks multilaterally negotiated to guarantee such inter-basin water transfer projects. In Africa where governments scarcely consult local people or allow the participation of local people in such huge projects that affect their lives, the sustainability of these transfer projects may not be guaranteed if in the future, the projects significantly disrupt the livelihoods of local communities in the

²⁸ E. Mosert, "Conflict and Co-operation in International Freshwater Management: A Global View", *International Journal of River Basin Management*, Vol. 1, No. 3, 2003, P.6.

²⁹ Living Waters, 'Managing Water Wisely: Lake Chad' [online] <http://assets.panda.org/downloads/mrwlakechadcasestudy.pdf> [Accessed 25 October 2006].

³⁰ The Institute of Engineers (India), 'Theme Paper on Inter-basin Transfer of Water in India: Prospects and Problems' [online], <http://www.supportnarmadadam.org/inter-basin-transfer-water-india-prospects-problems.htm> [Accessed 25 July 2007].

donor basins/states. Experience in water management has shown that problems usually emanate first at the local, grassroot level and they may also be caused there. Thus, when such projects assume their usual top-down approach as evident in much of past government policies and programmes in Africa, revolt by local population may force donor governments in the case of water transfer projects to renege on earlier promises, or fail to reach, ratify or implement international agreements.

Thus, in the case of the replenishment project for the Lake Chad, the project has already been approved by the donor countries: Democratic Republic of Congo (DRC) and the Republic of Congo, which share the River Congo, into which the Oubangui flows. However, the sanction of the local people whose livelihoods the project may undermine will figure in only marginally. Given this context, when legal aspect of such transfer schemes are concluded without accurate or proper estimation or projection of water availability in donor states, particularly in relation to population growth and demand, it may lead to conflict between donor basins and receiving basins as resource use rises and scarcity threatens supplies in the donor basins. Such threat of conflict and to continued water flow offers a weak basis for sustainable development. Some water transfer schemes have already significantly disadvantaged downstream states leading to demands for the revision of agreements that form the basis of such transfer or stream diversion³¹. In this sense, it may be rewarding to place the proposed 'Lake Chad Replenishment Project' side by side with other redemptive proposals canvassed as sustainable solutions to salvaging the Lake Chad. One of such proposals³² is the dredging of the Lake and its feeder rivers to remove obstructions and siltation which have accumulated over the years.

The issue of financing the project is another problem that merits attention. The financing of the project would not only require huge sums of money, but also careful consideration in order to ensure that it is sustainable. For instance, the existence of the LCBC has not led to a strategic basin-wide approach to water resources exploitation in the basin. One of the major reasons for this stems from weak financial base of the Commission³³. Lacking

³¹ A. Mutembwa, *Water and the Potential for Resource Conflicts in Southern Africa* (February 1998) [online], <http://www.dartmouth.edu/~gsfi/gsfweb/htmls/papers/text3.htm> [Accessed 25 October 2006].

³² For a proposal on the dredging of the Lake Chad, see O. Adeolu, "Salvaging Lake Chad Basin", *The Guardian*, July 19, 2007.P.77.

³³ A. Ogbu, 'Lake Chad Commission Raises Alarm over Funds' Monday, November 01, 2004[online], <http://www.worldlakes.org/shownews.asp?newsid=1859> [Accessed 31 May].

financial support, it could not regulate and control the utilization of water and other natural resources in the basin as well as initiate, promote and coordinate natural resources development to attain regional cooperation, as envisaged in its remit. Expectedly, much of the finance would have to come from the public finance or through soft loans from international funding agencies. Aid money has equally not helped in this regard. Transboundary management has attracted very little international aid financing. Of total development assistance spending on water and sanitation of about \$3.5 billion, less than \$350 million is allocated for transboundary water resources³⁴. Yet, reliance on international assistance has two major unintended spin-offs: it may create room for donor agencies to initiate and execute the kind of water development policies and projects that may conflict with the interests of the local inhabitants; and also, it makes the success and continuity of the project dependent on aid flow.

One other issue that needs to be addressed in both the feasibility study and the actual transfer scheme is the development of a robust system that can guide against the intrusion of foreign and incompatible constituents of a water formation of the donor basin into the Lake Chad which may have serious negative effect on the biodiversity of the lake. For instance, the Lake Chad and the River Congo belong to different basins, and linking them will definitely marry the two watercourses in a manner that may well not be captured in the feasibility studies. The very nature of inter-basin transfers could lead to inadvertent introduction of flora and fauna alien to the recipient basin from the donor basin. This introduced flora and fauna could assume unforeseen nature where it becomes a menace to both the ecology and the hydrology of the recipient area and can upset the ecological balances in the recipient basin. Like in blood transfusion context, where adequate precaution is not taken in water transfer project, it may run the risk of transmitting *hydro-immunodeficiency virus* (HIV) from the donor basin into the recipient basin; with the propensity of generating unprecedented adverse effect on the recipient basin. Before embarking on such large proposals, the available alternatives require careful consideration. In this regard, Adeolu³⁵ has advised that a model of physical features of the part of Africa covered by Longitude 10° E and Longitude 24° E and between the Equator and Latitude 15° N be built in order to confirm conclusively what chance there are for the project to be successful and beneficial. Failure to address this issue may have a serious

³⁴ UNDP, Human Development Report, Op.Cit.

³⁵ O. Adeolu, Op. Cit.

impact on biodiversity, since species occurring in the 'donor' system might threaten the continued existence of species that are endemic to the Chari River. Other threats include the spread of invasive alien grasses, which have formed a dense mat covering greater part of the lake, impeding the transportation of goods within the basin.

Other issues that may impede the success of the water transfer project include how to adjudicate and resolve disputes arising from exploitation, regulation and apportionment of water resources between and within donor and recipient basins; how to re-orient and entrench a change of perception of ownership among the local people who inhabit the communities where the canal will transverse, given the fact that water particularly in Africa is still largely being viewed as a common and free gift of nature; and how to ensure effective resettlement of people who will be displaced by the construction of dams, canals and dykes. These and other issues are among the stumbling blocks that the replenishment project must surmount if its practicability and sustainability is to be attained.

Concluding Remarks

The Lake Chad as we have attempted to show in this article is an important transboundary watercourse whose ebb and flow serves as the lifeline of over 37 million people straddling the boundaries of four independent countries in Africa. In the last forty years, the size of the lake has continued to diminish as a result of climatic variability, unsustainable extraction of water by the riparian countries, and increased pressure on the lake's water resources as a result of population surge. Concerns to salvage the lake from extinction have led to the initiation of various redemptive initiatives which may appear feasible and practicable but raises serious issues of suitability and sustainability. Top on the list of these measures is the envisaged inter-basin water transfer from the Oubangui River to the Lake Chad to replenish this important water body.

The riparian countries, the LCBC and international donor agencies such as the World Bank have presumed that the Replenishment Project is the main option for saving the lake; however, in actual practice the scheme may be unsuitable or at best unsustainable for the region on the grounds of certain technical, social, legal, political and economic constraints. This article has, therefore, highlighted some of the contending issues inherent in the

proposed inter-basin water transfer projects. It has done this with a view to steering informed debate on the general issues of the practicability and sustainability of the proposals for inter-basin water transfer for the basin as "the only option at the disposal of mankind".