Historical background

Jean-Pierre Carmouze

The first available data about the hydrography of Central Africa date back to the 14th century. At that time, a Moor born at Granada in 1483 and known by the name of Leo Africanus, first spoke of a great lake situated in a desert region and fed by underground water coming from an arm of the Nile. He suggested that the River Niger originated from this lake.

In 1632, a map drawn by a Dutch geographer, Guillaume Blavew, from the description made by Leo Africanus and new data, pointed out a *Borno lacus*, situated approximately at the site of present Lake Chad and fed by a river from the southern hemisphere, north of Lake Zaire. The Niger has its source in the western part of this lake and moves along an east–west line. In this document, the Shari, Yoobé and Niger rivers form a part of the *Niger Fluvius*.

At the beginning of the 19th century, Ali Bey, the son of the Prince of the Abassides argued that a large inland sea must exist in the centre of Africa. He thought that the Niger must disappear into this 'African Caspian' and he gathered numerous facts to support this hypothesis. For his part, the Englishman, Jackson, also noticed the observations made by travellers which corroborated the existence of a connection between the Nile from Egypt and the Nile from the Sudan (Niger). This connection took place in a region called Bahr Kulla. This name is comparable with that of Koulou 'great mass of water' by which the Kanembous describe present Lake Chad. The two authors came to the same conclusion concerning the situation of this inland sea: it would be situated at a 15-day walk east of Tombouctou.

At the same time, a German, Frederic Hornemann, appears to be the first European who heard the name of Zad during his travels in Fezzan and Egypt (1797–1800). It was not a lake but a very wide river (at an 8-hour journey). He also learnt about the existence of the Boudoumas, considered as primitive people and always found in the middle of this river. According to Hornemann, the Zad was nothing more than the name given to the Niger by the population of Bornou, and flowed into the Nile south of Darfou.

So, at the beginning of the 19th century, the existence of a great lake in

J.-P. Carmouze et al. (eds.) Lake Chad

ISBN 90 6193 106 1. Printed in the Netherlands

Central Africa was still not certain. On the other hand, there was the prevailing notion of the Zad as a river connecting the Niger with the Nile.

But the idea of an 'African Caspian' aroused imagination and stirred up much enthusiasm.

Ritchie from England, and his colleague Lyon left Tripoli for Central Africa in March 1819, but Ritchie died at Mourzouk and Lyon did not go much further. His notes inform us that the Zad described by Hornemann had to be a lake and not a river.

The nature of Lake Chad became more clear for geographers, but the first Europeans to reach Lake Chad from Tripoli in 1822, by following the western side to Kouka, were three English travellers: Denham, Clapperton, and Oudney. Denham passed around the southern part of the lake, crossing the Shari downstream at Showy (Fig. 1), passed the foot of Hadjer el Hamis and reached Tangalia in the dried up grooove of Bahr el Ghazal. He considered Lake Chad to be an overflow of the Nile. Then he went down the Shari to its mouth, and entered the lake on February 3rd, 1824. Upset by strong waves which filled up the boats, he sought refuge in the delta after covering a distance of about two miles, without even being able to see the nearest islands inhabited

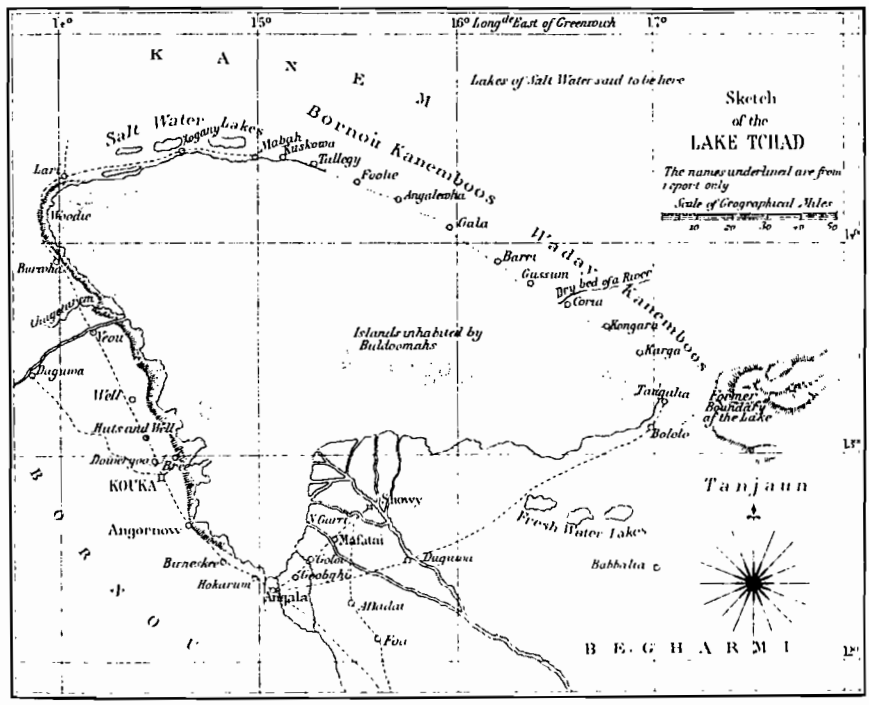


Fig. 1 Map of Lake Chad according to Denham (1824).

by the Boudoumas, whose existence was known to him. After resting at Kouka, he again set out in May, with the aim of going around the lake, with a Bornouan expedition army fighting against the Assalé Arabs in the region of Kanem. He was stopped at Tangalia near the mouth of Bahr el Ghazal after Bornouan troops suffered a defeat and he had to give up the pursuit of his journey northwards. He persisted in his determination to survey the periphery of the lake and he again set out northwards on August 16th, 1824. At Woodie, he again met the Bornouan troops whom he had accompanied some months earlier, now on their way back from Kanem, tired out and defeated Yet he pursued his journey, but he had to turn back at Kiskaoua (Kuskowa) because of lack of security in this area. Finally, he reached Tripoli on January 26th, 1825. Despite a 19-month trip around Lake Chad, Denham could not draw a map of the whole contour. He left an unfinished map (Fig. 1). No offshore surveying was done and islands were not seen even in the distance.

So, on March 30th, 1850, when the Englishman Richardson left Tripoli with the Germans Barth and Overweg, he took a boat called 'The Lord Palmerston' which was specially intended to sail on Lake Chad. This boat was divided into four parts in order to be carried on a camel. Richardson, exhausted by the climate, died in Bornou before seeing the lake. Barth took over and arrived at Kouka on April 2nd, 1851. When he set out for Adamaoua, Overweg undertook to survey the lake aboard the 'Lord Palmerston'. He visited several islands after a two-month journey (Fig 2). Then he went with Barth, who wanted to survey the regions surrounding Lake Chad, up to Bahr el Ghazal in order to resume Denham's project. But they also encountered the hostility of the population and returned to Kouka. Then, Overweg undertook to study the Komadougou Yobé and he specified that it was a tributary and not an effluent. Completely exhausted he returned to Kouka, and was taken to Madouari on the shore of the lake where he died on September 27th, 1852 without being able to give a detailed report about his travels through the lake. However, 'he can boast of having been the first European who sailed and visited part of the Archipelago' (Tilho 1910).

Barth continued to survey the western regions of Bornou alone. When he returned to the shores of the lake two years later, he noted that the shore had suffered profound changes from Baroua to Nguigmi as a result of the flood of the lake. He returned to London on September 6th, 1855 after travelling through the Black continent for five and a half years, two of which were spent in the regions near the lake without going around it. As Overweg's notes could not be completed, several aspects of Lake Chad remained unknown.

Vogel, who was sent to meet Barth, reached Kouka in early 1854 with the sole task of exploring the lake. His astronomical observations made through the sextant were the only basic point that were used by the cartographers of these regions for fourteen years. He was murdered during a journey through the Ouadai in February 1856.

Gerhard Rohlfs, also a German, went on a long journey through Africa from

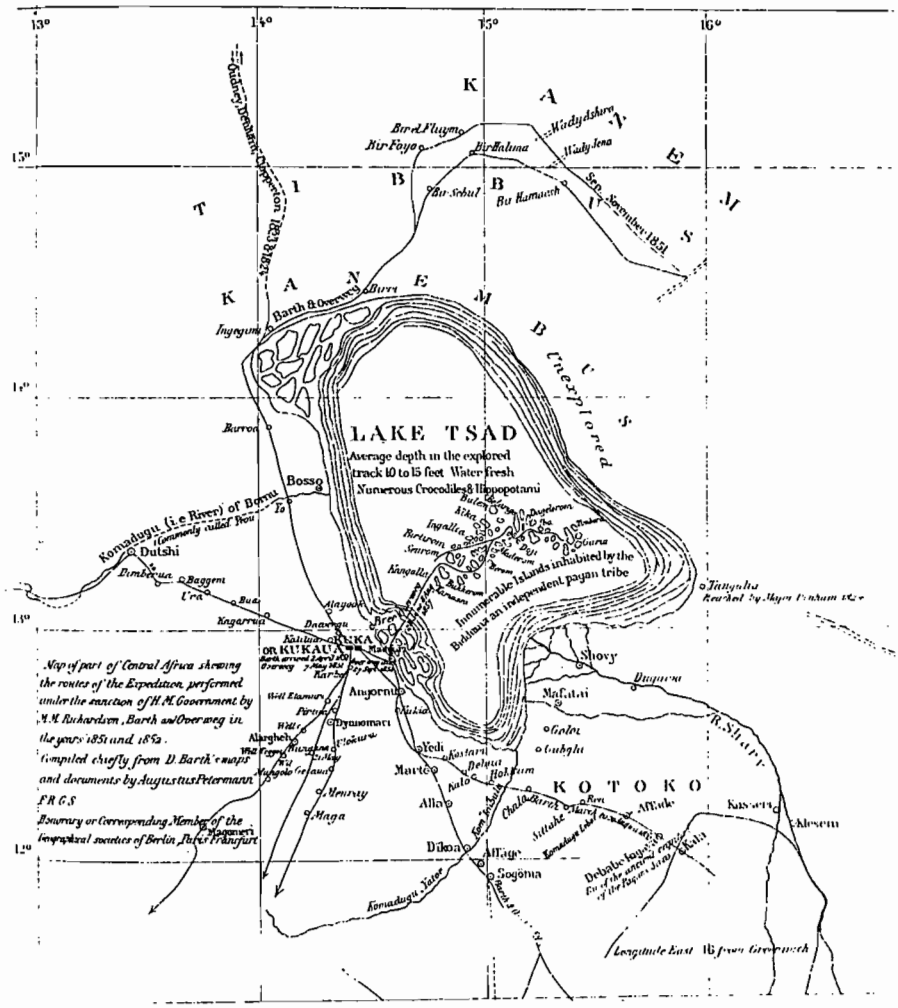


Fig. 2 Map of Lake Chad according to Barth (1851).

1865 to 1867. He reached Nguigmi on July 14th, 1866. His observations relate only to a small number of points on the northern and western sides. According to him, at that time the lake had reached a level higher than those which were previously observed. He thought that part of the water which did not evaporate flowed underground through the Bahr el Ghazal.

Nachtigal, a German doctor, undertook a journey through Central Africa in 1869. He arrived at Nguigmi on June 28th, 1870 where he caught his first glimpse of the lake. He stayed at Kouka for one year, then visited the northern side of the lake on his way to Kanem and Borkou. On a trip through Baguirmi,

he passed along the southwestern side. Four years later, he returned to Europe through the Ouadai and the Nile, and so had the opportunity of going through the Bahr el Ghazal. He could not sail on the lake or visit its archipelago, but he brought back considerable information about the geography of Chad, its islands and its inhabitants (Fig. 3).

On April 10th, 1891, Monteil, a French lieutenant colonel, reached Kouka (or Koukaoua) by following the road towards the west (Saint-Louis–Karo) for the first time. Meanwhile, Gentil succeeded in reaching the lake from the south aboard a small steamer called the 'Léon Blot' which sailed from the basin of the Oubangui to that of the Shari. But, there was a lack of wood! Moreover, Rabah, the leader of the Lower Shari, forced Gentil to go back to the Shari. Seventy-five years after Denham's first attempts, it was once more impossible to sail far from the lake and to visit the archipelago. But this period of dangerous raids by the European explorers was coming to an end. France decided to occupy the Chad basin and sent three missions there, led respectively by Gentil, Joalland-Meynier and Fourreau-Lamy. On April 22nd, 1900, the powerful Rabah, the 'Emir of the believers' was overthrown at Kousseri and the exploration of the environment resumed.

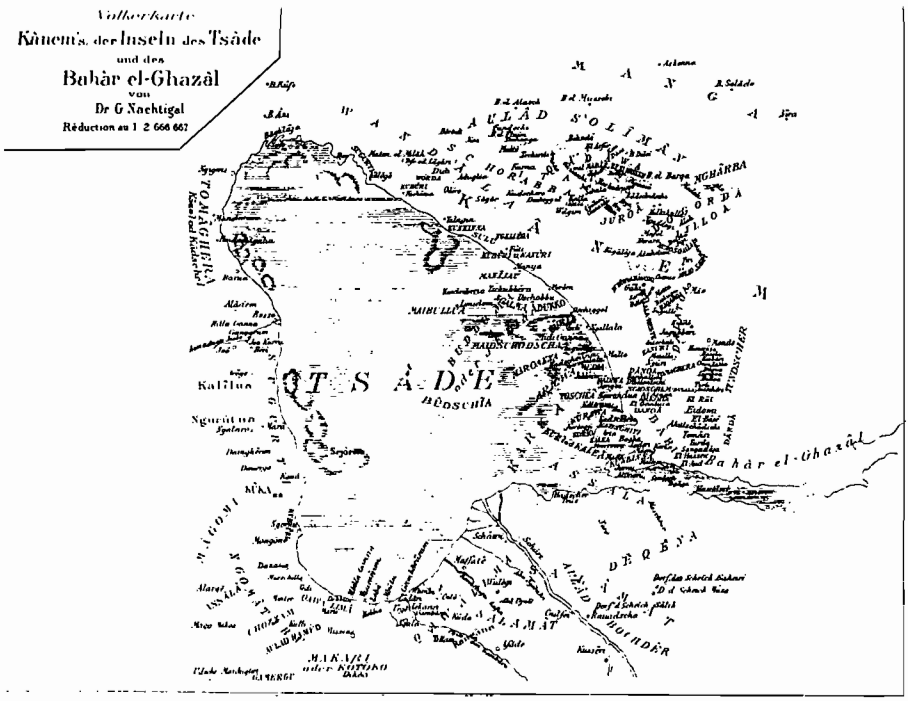


Fig. 3 Map of Lake Chad according to Nachtigal (1870–1873).

At that time, Lieutenant Colonel Destanave ordered scientific explorations to be made in the whole archipelago, from the mouth of the Shari to the delta of Bahr el Ghazal and on the southwestern, western and northwestern sides of the lake which were still not well known. They showed the existence of an archipelago including several hundred islands, occupied by about 45 000 inhabitants and many droves of oxen. Consequently, a fairly complete map of the archipelago was drawn for the first time.

Commander Largeau carried on similar explorations. A series of cross routes provided information about the area and the depth of the open waters of the lake. The increasing dryness of this period and the resulting development of vegetation led them to consider Lake Chad as more of an immense marshland than a lake.

At the end of 1903, Delevoye came from the mouth of the Shari sailing alone through the open waters aboard a big steel barge called the 'Benoît Garnier', starting from the basin of the Oubangui (as was the case for the 'Léon Blot' twelve years earlier).

Finally, the Franco English Commission led by Captain Tilho (mission Moll) arrived at Koukaoua in January 1904. They were in charge of delimiting the borders between Niger and Chad and established the first precise map of the whole region. The circumstances did not allow him to study the southern shore. However, he did identify the zone of shallows spreading from the archipelago to the open waters and that separating the southern and the northern basins (Fig. 4).

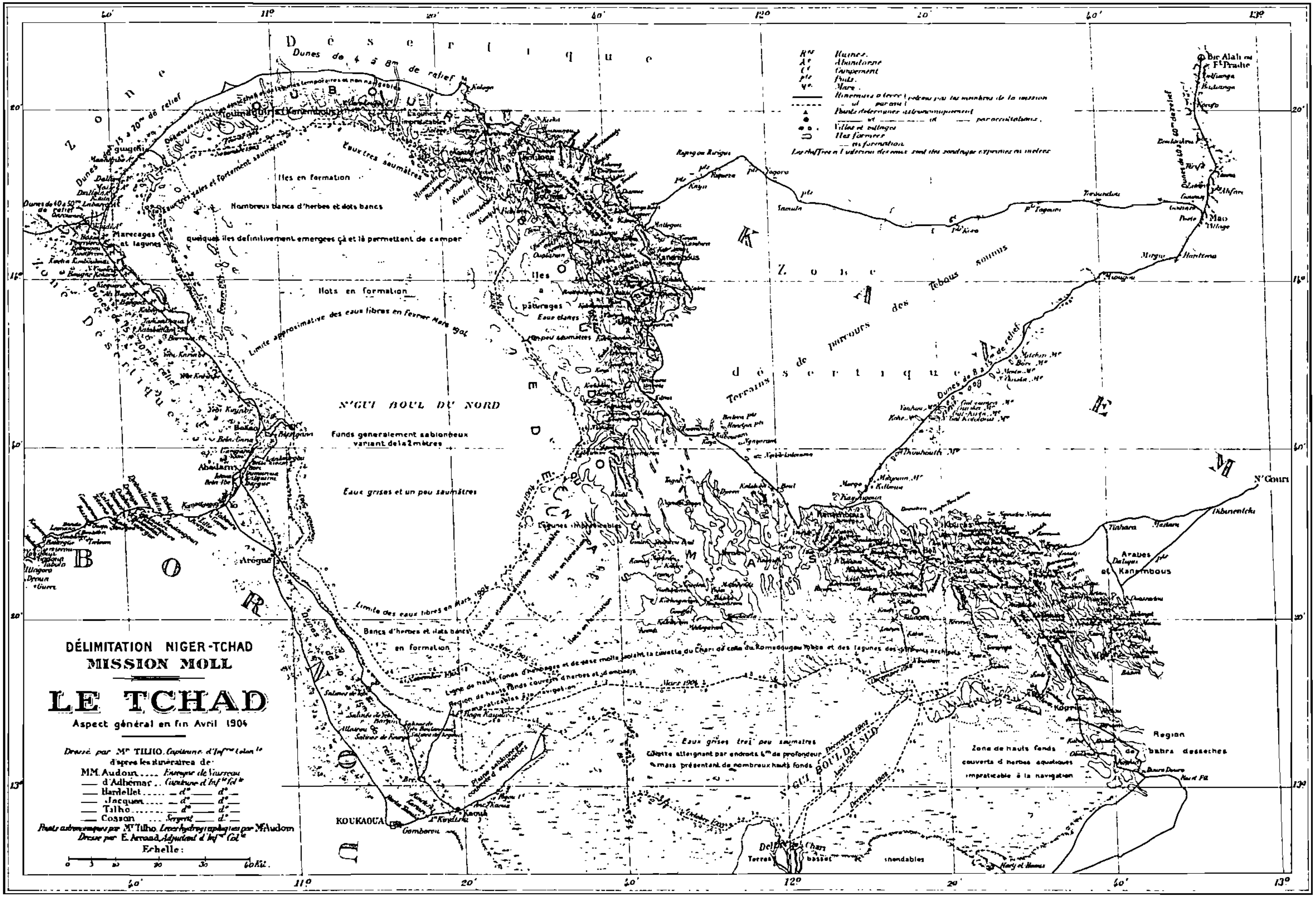
The Anglo-German Commission which was in charge of delimiting Yola-Lake Chad studied the still poorly known southwestern part of the lake. Therefore the southern side of the lake which had been positioned 15 kilometers too far south by Vogel was modified in its position.

Although the geographic situation of the lake was finally defined, the lake continued to astonish the travellers and scientists who ventured into the area, because of the constant changes in its appearance and zones which occurred in relation to the variations in water level.

Explorations continued, and in 1904 and 1905, Boyd Alexander, leading an English expedition visited the mouth of the Komadougou Yobé and the reed islands of the northern archipelago. He gave up attempting to reach the island inhabited permanently because the lowering of water made navigation very difficult. He then visited the archipelago of the southern basin after dismounting and carrying his boats up to Seyorom and ended his journey after reaching the mouth of the Shari. He could only make very limited explorations since he arrived during the period of very low water.

Meanwhile, the French officers from the military territory of Chad continued

Fig. 4 Map of Lake Chad and its archipelago according to Tilho (1904).


DÉLIMITATION NIGER-TCHAD
MISSION MOLL
LE TCHAD
Aspect général en fin Avril 1904
Dressé par Mr TILHO, Capitaine d'Infrie Colonle
d'après les itinéraires de:
MM. Audoin ..... Enseigne de Vaisseau
___ d'Adhémar .. Capitaine d'Infie Colle
___ Bardellet ... ___ dº ___ dº
___ Jacquen ... ___ dº ___ dº
___ Tilho ... ___ dº ___ dº
___ Cosson ... Sergent ___ dº
Points astronomiques par Mr Tilho. Levés hydrographiques par Mr Audoin
Dressé par E. Arnaud, Adjudant d'Infie Colle
Echelle:
0 5 10 20 30 60 Kil.
Dunes de 4 à 8m de relief
Zone de Dunes de 15 à 20m de relief
Dunes de 40 à 50m de relief
Iles en formation
Nombreux bancs d'herbes et ilots bancs
quelques îles définitivement emergées çà et là permettent de camper
Ilots en formation
Limite approximative des eaux libres en Février Mars 1904
N'GUI BOUL DU NORD
Funds généralement sablonneux variant de 1 à 2 mètres
Eaux grises et un peu saumâtres
Eaux très saumâtres
Marécages et lagunes
Iles à pâturages
Eaux claires
Lagunes impraticables
Limite des eaux libres en Mars 1904
Bancs d'herbes et ilots bancs en formation
Eaux grises très peu saumâtres
N'GUI BOUL DU SUD
Zone de hauts fonds couverts d'herbes aquatiques impraticable à la navigation
Region de bahrs desséchés
Zone de parcours des Tebous soumis
Terrains désertiques
Dunes de 8 à 10m de relief
Désertique
BORNOU
KANEM
KOUKAOUA
Abadam
Arégué
Bir Alali
Mao
N'Gouri
Arabes et Kanembous
Kouri
Kanembous
Delta du Chari
Terres basses inondables
40' 11º 20' 40' 12º 20' 40' 13º
20' 14º 40' 13º

to study the lake. In particular, Captain Freydenberg had the opportunity of visiting the whole northern basin of the lake, in 1905, when the lowering of the lake level was considerable. He made very important observations about the flora, the fauna and the inhabitants of the whole lake and its islands and presented them in a thesis submitted to the Faculté des Sciences in Paris in 1908.

Lake Chad which had remained mysterious for a long time was rather well known when on August 26th, 1906, the second mission led by Tilho arrived with the aim of delimiting on land the frontier between French and English territories in Central Africa. This delimitation was made in consultation with a British mission led by Commander in Chief R.P.O. Shee. The scientific documents from Tilho's mission, which were gathered over two years were decisive elements in the knowledge of the lake and its entire basin. (Tilho 1910). The works included not only the survey of the lake and its eastern regions that were still poorly known but also studies on the variations in levels of the lake and neighbouring depressions, the hydrology of the main tributaries of the lake, the climatology and the meteorology of the region, the magnetism, the history and the ethnography of the populations. Numerous samples were gathered in all the scientific fields, especially malacology and ichthyology. The malacological fauna was then studied by L. Germain (Tilho 1910).

During this period of exploration, the explorers were generally puzzled by two problems: the role of Bahr el Ghazal in the hydrology of the lake and the low salinity of the water in an environment situated in the sub-arid zone.

Some, such as Barth, thought that the Bahr et Ghazal was an effluent of Lake Chad, while others, such as Nachtigal, thought that it was a tributary of the lake. During his second mission (1906–1909), Tilho confirmed that it was an effluent after making surveys in the region under consideration.

As far as the low salinity of waters is concerned, the following two phenomena are often quoted:

— a freshening of lake waters in outlying ponds containing natron (Huart *in* Destenave 1903).

— a seepage of water into the sands of Kanem and then an underground run-off in the old arm of Bahr el Ghazal (Truffert *in* Destenave 1903).

Lahache and Marne (*in* Tilho 1910) confirmed the low salinity of water which was revealed previously through the 'taste test'. But they were in favour of the second explanation. We shall see in Chapter 5 that these two phenomena play an important part in maintaining the low salinity of the water.

In fact, the main concern at the beginning of this century was elsewhere. Was the lake not disappearing? As a matter of fact, explorers such as Denham, Barth, Rolfs and Nachtigal had observed a 'great lake' with swampy zones situated on a coastal margin of 5 to 10 km since the discovery of the lake in 1823 and throughout the 19th century. In 1854, Vogel saw a considerable flood invading bordering towns such as Ngornou with 30 000 inhabitants. On the

contrary, from 1903 to 1915, the lake turned gradually into a marshland, unfit for navigation. In 1908, the water surface was reduced by a half as compared with that of 1903. For this reason those who forecast the drying up of the lake were then numerous.

It seemed that such changes could be accounted for only by a final or temporary modification in the climate and the water supplies. In order to evaluate the importance of the variations in the water level and to reveal their possible frequency, during his third journey to Chad, Tilho used the measurements from his previous journey to Bol, on the eastern coast. Apart from measurements of the water level, they included measurements of temperatures, pressures, winds and rainfalls taken from November 1912 to September 1919. During this period, with a rise in the water level, the idea of a lake drying up for a short time was replaced by that of periodicity with large variations in the water level. At the end of this study, Tilho (1928) defined three main hydrological situations which characterized the lake: a 'Greater Chad' of 25 000 km^2 (in the 19th century), a 'Chad normal' of 18 000 km^2 (1916–1919) and a 'Lesser Chad' (from 1904 to 1915). He also tried to compare the fluctuations of the lake with those of the glaciers of Bossons and Grindewald. He inferred that the fluctuations in lake levels would follow those of the alpine glaciers within one or two years and while referring to the periodicity of the Bossons floods, he thought that the next 'Greater Chad' would occur about 1952–57 and 1993–97, the next 'Lesser Chad' at about 1940–50 and 1975–85. He was not far from the mark as far as the levels are verifiable today. In any case, he showed that there was no fear of a future drying up of Lake Chad from the climatological point of view. On the contrary, he revealed another danger which could threaten the existence of the lake itself, as a result of modification in the regime of its main tributaries. Tilho thought that a geological danger would originate from the capture of the Logone and afterwards the Shari by the Benoué which is an affluent of the Niger (Tilho 1926). If the number of his publications on this subject since that time are considered, his fear at such a capture can be evaluated, and he felt it was urgent to consider arrangements suggested by him in order to avoid this (Tilho 1926, 1927, 1928, 1932, 1934, 1935, 1936 and 1937).

Tilho's mission ended a period of twenty years that provided valuable information about Lake Chad. Then nearly half a century elapsed before scientific works resumed. In fact, the scientific commission about the Logone and the Chad was created at Fort-Lamy (now N'Djamena) in 1954. A base including a meteorological station manned by scientists from ORSTOM. (Lefevre, Bouchardeau and Guichard) was set up at Bol in 1955. At the same time, hydrological studies were undertaken in the region of Bol where polders were created by scientists from INRA (Pirard and Schneider).

Finally, in 1964, a hydrobiological team was formed under the leadership of J. Daget and B. Dussart.

References

Destenave, L., 1903. Le lac Tchad. 1° partie: le lac, les affluents, les archipels. Rev. gén. Sci., Paris: 649–662.

Destenave, L., 1903. Le lac Tchad. 2° partie: les habitants, la faune, la flore. Rev. gén. Sci, Paris: 717–727.

Freydenberg, L., 1908. Le Tchad et le bassin du Chari. Thèse, Paris, 187 pp.

Lenfant, E. A., 1904. De l'Atlantique au lac Tchad par le Niger et la Bénoué. Géographie 9: 321.

Tilho, J., 1910. Documents scientifiques de la Mission Tilho (1906–1908). Imp. Nat., Paris, 3 vols., 1 atlas.

Tilho, J., 1926. Sur une aggravation du danger de capture par le Niger des principaux affluents du Tchad. C. r. Ac. Sci. Paris 182: 1063–1065.

Tilho, J., 1927. Devons-nous sauver le lac Tchad? Rev. sci. Paris 15: 454–463, 4 figs.

Tilho, J., 1928. Variations et disparition possible du Tchad. Ann. Géogr. Paris 37: 238–260, 5 figs.

Tilho, J., 1932. Le problème du déssèchement du Tchad. Dépêche col. Paris, 1er juill.

Tilho, J., 1934. Sur l'éventualité de la capture du Logone, affluent du lac Tchad, par le Niger, C. r. Ac. Sci. Paris 199: 752–755.

Tilho, J., 1935. Le Logone quittera-t-il le bassin du Tchad? Rev. gén. Sci., Paris 23: 652.

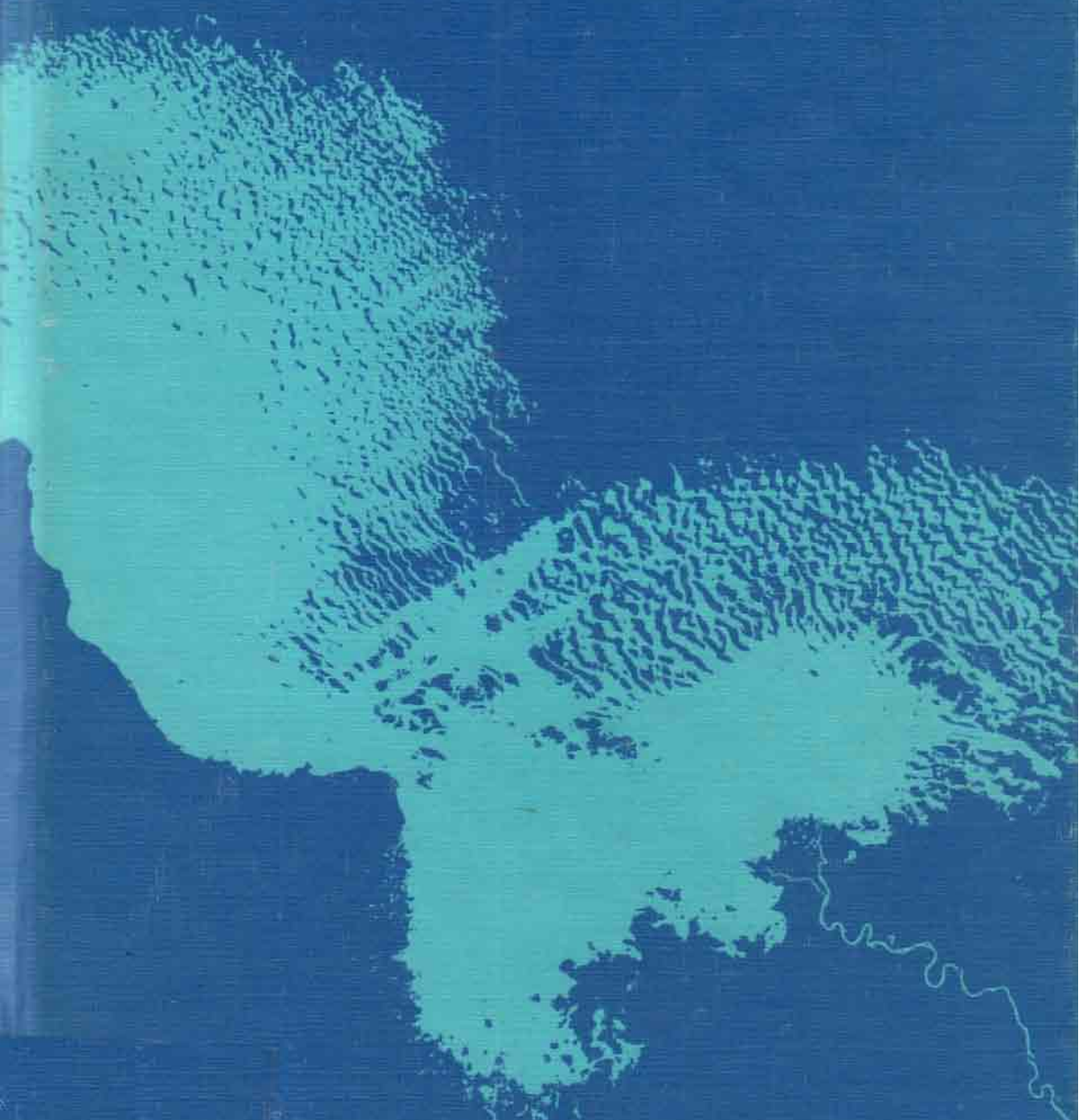
Tilho, J., 1936. Sur l'état actuel de la zone de capture du Logone par la Bénoué. C. Sci. Paris 202: 2109–2113.

Tilho, J., 1937. La capture du Logone par la Bénoué. Bull. Ass. Géogr. fr. Paris 000: 49–53.

LAKE CHAD

ecology and productivity
of a shallow tropical ecosystem

edited by J.-P. Carmouze J.-R. Durand C. Lévêque



W. Junk Publishers

LAKE CHAD

Ecology and Productivity of a Shallow Tropical Ecosystem

Edited by

J.-P. CARMOUZE, J.-R. DURAND and C. LÉVÊQUE

1983 **Dr W. JUNK PUBLISHERS**
a member of the KLUWER ACADEMIC PUBLISHERS GROUP
THE HAGUE / BOSTON / LANCASTER

Distributors

for the United States and Canada: Kluwer Boston, Inc., 190 Old Derby Street, Hingham, MA 02043, USA
for all other countries: Kluwer Academic Publishers Group, Distribution Center, P.O.Box 322, 3300 AH Dordrecht, The Netherlands

Library of Congress Cataloging in Publication Data

Main entry under title:

Lake Chad.

(Monographiae biologicae ; v. 53)
Includes bibliographies and index.
1. Lake ecology--Chad, Lake. 2. Biological productivity--Chad, Lake. 3. Chad, Lake. I. Carmouze, Jean-Pierre. II. Durand, Jean René. III. Lévêque, C. IV. Series.
QP1.P37 vol.53 574s [574.5'26322'096743] 83-4288
[QH195.C46]
ISBN 90-6193-106-1

ISBN 90-6193-106-1 (this volume)

Cover design: Max Velthuijs

PRINTED IN THE NETHERLANDS