

10

SÉLINGUÉ RESERVOIR



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10.1 Introduction

The construction of the Sélingué reservoir must have had a huge impact on the local people, just as everywhere else in the world where artificial lakes have been constructed. Due to the Sélingué dam, 13,500 people from 30 villages lost their houses, their traditional grazing grounds, orchards and land on which many generations have grown their millet or sorghum. Everything was covered by several metres of water, including the graves of their ancestors. Even if the government provides financial compensation, does that make up for these losses? On the other hand, a reservoir often creates new possibilities to make a living. The people from the Sankarani valley being affected directly by the Sélingué reservoir were compensated, for instance, by the construction of an irrigation system.

In this Chapter we will try to give a concise profile of the Sélingué reservoir, its environment and people. The area and its management is described in Section 10.2, fisheries and agriculture in Section 10.3 and ecological values in Section 10.4. The conclusion in Section 10.5 summarises the documentation.

10.2

The area

been constructed downstream at the place where the Wassoulou-Balé flows into the Sankarani River. The average water depth is 5.3 metres. However, the water level in the reservoir varies seasonally each year up to 3 m above and below this average (Fig. 2.10 in Chapter 2). Due to the seasonal fluctuation in water level, the surface area also varies. At the highest water level, the reservoir is 80 km long and 3 to 8 kms wide. Satellite images clearly show the continuous change in the shape of the lake (Fig. 10.1).

After its creation the Sélingué-reservoir, also known as Lac Sélinkegny, was managed by the Autorité du Barrage de Sélingué, and later by the Office d'Exploitation des Ressources Hydrauliques

du Haut Niger (OERHN). In 1989, the production of hydropower was transferred to the Direction Nationale de l'Energie du Mali (EDM), but for the rest OERHN remained responsible. In 1994 OERHN was changed into Office de Développement Rural de Sélingué (ODRS), a department of the Ministère du Développement Rural. The annual reports of ODRS contain a lot of detailed information about fisheries, agriculture, etc. This Chapter is largely based on this source of information and on Haidara (2003) and PAPIM/ODRS (2003).

People

The Sélingué zone is an agricultural and fisheries region since it is situated in the Guinean climate belt, with abundant rainfall (1100-1200 mm) and several water courses in the area. Since the construction of the Sélingué dam, creating Lac Sélingué, the resident Wassoulou population consisting of Peul people has increased considerably, with fishermen and new rice-farmers settling in the area. Even fishermen from the Inner Niger Delta region moved to the lake. However, the new reservoir affected the fruit cultivation, one of the main economic activities, by the inundation of mango, guava and orange orchards. The ODRS co-ordinates the agricultural activities of 15 villages in some 1600 parcels, and of fisheries executed by over 1000 families of fishermen (8900 persons) spread over 72 settlements.

The three National Censuses show that the population in the Cercle de Yanfolila has increased from 96,925 to 123,535 people between 1976 and 1987, thus by 2.5% per year. This increase was even larger in the following 11 years, since in 1998 there lived 163,798 people in this cercle, an annual increase of 2.96% since 1987. This rate of increase is slightly higher than the population increase of 2.43% for Mali as a whole. However, since the rural population of Bamako grows with 5% per year, the average increase of the rural population is less than 2.43%. The relatively high population increase in Yanfolila may be explained by immigration.



Landscape and habitats

The Sélingué dam became operational in 1980. The landscape had changed dramatically by then, from a wooded savanna to a large lake. Before the reservoir was filled with water, many trees were cut down. Altogether 268,800 m³ of wood was taken from the forests. The remaining trees were submerged and after 25 years still many dead trees can be seen emerging from the shallow parts of the lake.

The lake habitat is characterised by a falling water level in the period from January to June, and the shores of the lake become exposed. From July to September the lake is filled again. Various grassy habitats develop on the clayey, sandy, and even stony grounds between woodland and the waterline when the water in the lake falls. There are no marshy habitats. Downstream from the dam, some 1300 ha of mainly rice crop area - out of the 55,000 ha planned - have been reclaimed as compensation for the loss of arable land and dwelling grounds of 30 villages and hamlets. Together with the lake, and the Niger river itself, the irrigated rice fields constitute important wetland habitats in the region.

Situation and setting

The Sélingué reservoir is situated in the Sankarani valley, 150 km south of Bamako, within the cercle of Yanfolila, in the region of Sikasso (Fig. 10.1). The reservoir has the shape of a fork, since the dam has

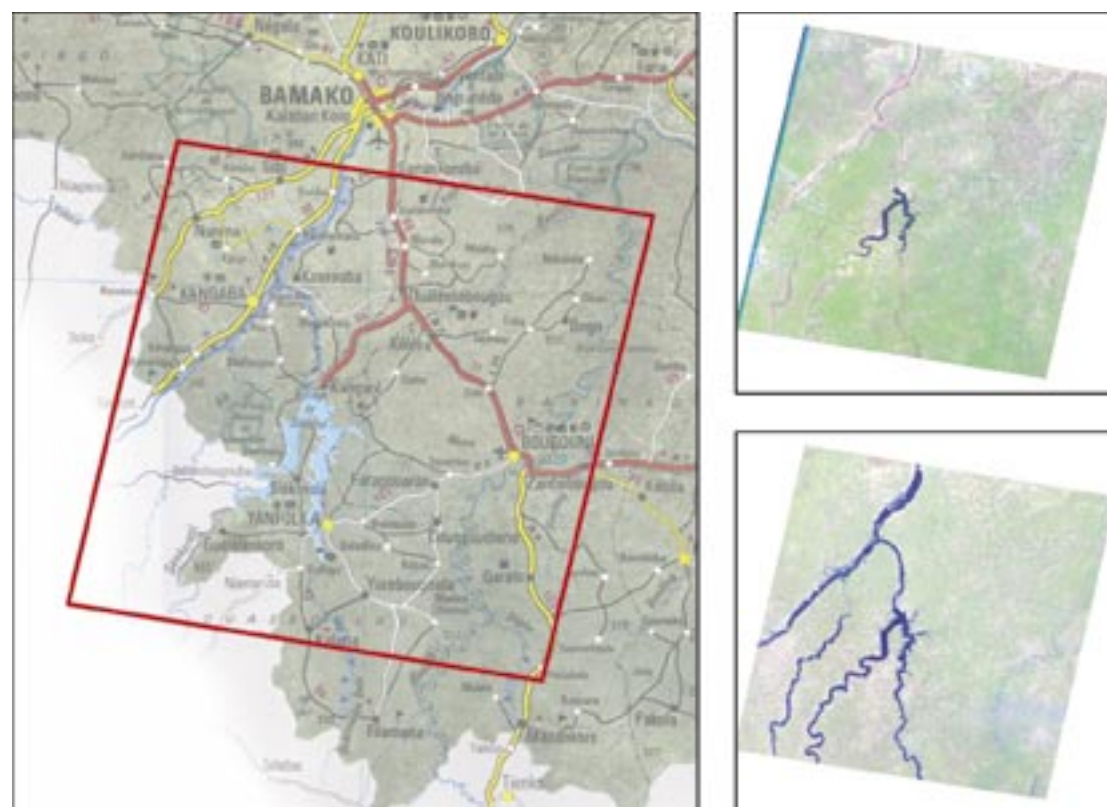


Fig. 10.1. The shape of Lac Sélinkegny at a water level of 343 m (above: the satellite image of 5 June 2000) and 349 m (below; image of 12 September 2001). The area covered by the image (180 x 180 km) is indicated on the map (left).

10.3 Production

Fish production

Everywhere in the world reservoir fisheries are an important source of income for local people, so much that in many reservoirs fisheries are pushed to a level of over-exploitation (Crul & Roest 1995). The annual fish catches in Lac Sélingué have also increased since its origin, from 1000 – 2000 tonnes to over 4000 tonnes in recent years (Fig. 10.2; Laë & Weigel 1995). We can put this figure into perspective as Laë & Lèveque (1999) compared the total fish production in different lakes and man-made reservoirs in Africa to their surface area and volume. They found, as expected, that the fish production increases with water surface area and water volume. The fish catches in the Sélingué reservoir (4000 tonnes in a lake of 400 km²) fits within the observed trend.

The fishermen themselves consume about 30% of

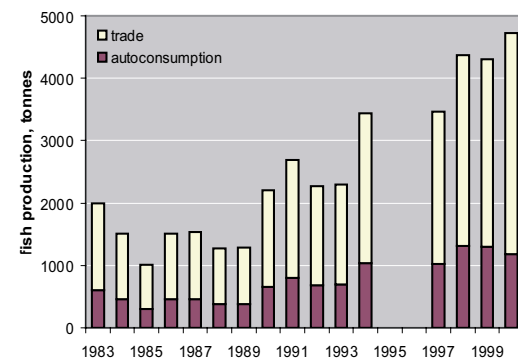


Fig. 10.2. Annual fish production in Lac Sélingué, split up for the amount consumed by the fishermen and the amount being traded. Source: Annual reports of ODRS.

the captured fish, 70% is traded. In contrast to the Inner Delta, not many fish are dried in the sun or smoked. Nearly all traded fish is transported daily along a perfect road to Bamako, where freshly caught fish can be sold on the market the same day. The fishermen in Lac Sélingué come originally from the Inner Delta. They took with them their skills but also their traditional fishing techniques. Most fish in Lac Sélingué is caught with nylon nets, hook lines and fish cages. The increase in the number of fishermen in Lac Sélingué leads to more problems about the use of the fishing grounds. A committee was formed some time ago by local fishermen and authorities, to solve these problems.

Altogether 86 fish species have been found in Lac Sélingué (Laë & Weigel 1995; annuals of ODRS). Most belong to the following families: Bagridae (*Bagrus bayad*, *Chrysichthys nigrodigitati*, *Auchenoglanis occidentalis*), Cichlidae (*Oreochromis niloticus*, *O. aureus*, *Tilapia zilli* and others), Ciprinidae (*Labeo senegalensis*), Shibeidae (*Eutropius niloticus*), Mochokidae (*Synodontis spec.*), Citharinidae (*Citharinus*), Characidae (*Brycinus leusiscus*, *Alestes dentex*), Centropomidae (*Gymnarchus niloticus*) and Osteoglossidae (*Heterotis niloticus*). *Micralestes acutidens*, locally known as Miri, is a small but a very abundant fish in the lake. The fishermen cap-

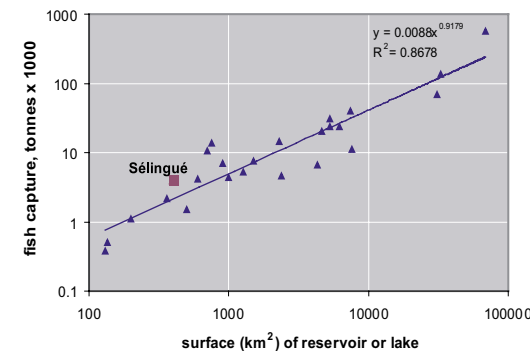


Fig. 10.3. Fish catch as a function of the surface area of the lakes and man-made reservoirs in Africa. Source: Laë & Lèveque (1999).

ture mainly Taka *Tilapia spec.* (30%) and Korokoto *Auchenoglanis occidentalis* (15%). Most species are found everywhere in the Niger River and also in the Inner Delta, although their relative occurrence differs.

Most striking difference between Lac Sélingué and the Inner Delta is the size of the fish being caught. Nearly all fish in the Inner Delta are nowadays less than 10-20 cm and fish of 30 cm or longer have become rare. In Lac Sélingué, most captured examples of *Lates niloticus* (in bambara: Saalé), *Gymnarchus niloticus* (So dyege), *Heterotis niloticus* (Fana) and *Citharinus citharus* (Tala) are still longer than 30 cm, just like in the Inner Delta more than 25 years ago. As described in Chapter 5, the increased fishing intensity in the Inner Delta reduces the survival time of fish, so that the majority of the fish caught are less than one year old.

There is a remarkably large seasonal variation in the catches, being low in November – February and high in May – July (Fig. 10.4). The most likely explanation is that the fish are easier to catch in May – July because the fish are more concentrated due to the lower water level. However, this is only true if (a part of the) fish are withheld by the dam and do not leave the reservoir together with the outflow. When the reservoir is completely filled at the end of the *crué*, its water volume is 2.1 km³, but some months later the surface area is reduced by 70% and the volume even by 90% (Table 2.4; Appendix 2). The water volume was extremely low in 1999. One might expect that in such a case, the fish could be very easily caught, but as shown in Fig. 10.4 this was not the case. On the contrary, the peak catches were lower than in other years. Possibly, the total amount of fish still present in the reservoir greatly decreased when the reservoir was emptied.

Cattle

According to the annual reports of ODRS 73,000 cattle and 54,000 sheep and goats are counted annually in the *cercle de Yanfolila*. During the Great Drought zebu cows came from the region of Ségou, Koulikoro and the *cercle de Bougouni* to the surroundings of Lac Sélingué. This caused overgrazing but also had

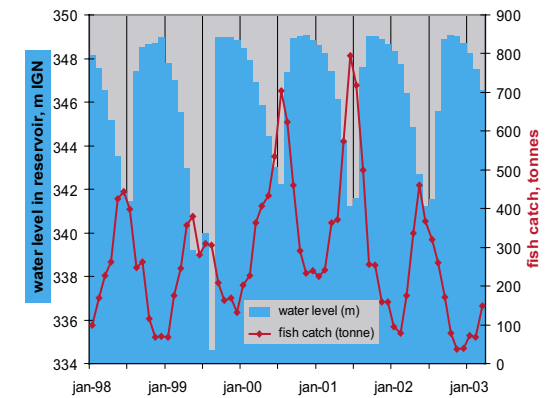


Fig. 10.4. Lac Sélingué. The monthly variation in fish catches between January 1998 and March 2003 compared to the variation in water level (m IGN). Source: annual reports of ODRS.

another long-term negative effect. The local cows are a breed which are tolerant against N'Dama, or trypanosomiasis (sleeping sickness), but the zebu are not. During the Great Drought a subspecies (*le méré*) came into existence being less resistant to the sleeping sickness.

Due to the construction of the reservoir, the cows lost a part of their grazing grounds. The newly created irrigated land downstream from the dam gives no solace, since the farmers there have two crops per year and do not allow cows on their land. The immersed area that re-appears at a low water level in the reservoir is grazed by livestock, but this probably does not compensate for the loss of grazing grounds since the creation of the reservoir. Hence, the Sélingué reservoir has brought no nett advantages to the cattle breeders.

Rice

It would be possible to irrigate 55,000 ha along the Sankarani river up and downstream from Sélingué dam. So far 1350 ha has been realised of which annually 900 ha is cultivated. The area is used for growing rice. The farmers have two crops a year, one



10.4 Ecological values

When Lac Sélingué came into existence, an estimated 1.8 million trees drowned. Large dead trees still rise above the surface of the water and now function as a perch for a large variety of bird species, such as Long-tailed Cormorant *Phalacrocorax africanus*, Cattle Egret *Bubulcus ibis*, White-faced Whistling Duck *Dendrocygna viduata*, African Fish Eagle and Osprey *Pandion haliaetus*. Whereas before the construction of the dam wetland habitat was confined to the river bed, now both the lake and the irrigated rice polder make up two important wetland habitats. Both have a distinct ecological function.

Breeding waterbirds

Breeding habitat for waterbirds are found to be very limited in the rice fields. Breeding colonies were not found during the field work in 2002-2004, but fishermen claimed breeding 'herons' further upstream on the lake. In June 2004, bush cover along the Sankarani just downstream from the dam hosted several white heron species (100-200 birds in total) and <10 Black-crowned Night Herons *Nycticorax nycticorax* were roosting, whereas Squacco Herons *Ardeola ralloides* in full summer plumage are assumed breeders in this area.

Staging waterbirds

Information on the lake is available for December and February (van der Kamp et al. 2005). Waterbird numbers on the lake were mainly made up by White-faced Whistling Duck: 80-95% of the total concerns this species. The numbers counted increased between December 2002 and February 2003 from 4500 to 15000 birds. Another frequent bird on the lake is the Osprey (Fig. 10.5). Their number doubled from

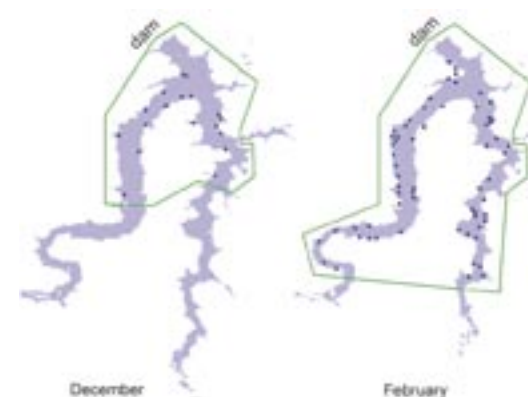


Fig. 10.5 Distribution of Osprey on Lac Sélingué at high water (December 2003) and low water (February 2004). The green line limits the counted area.

December to February, which may partly be triggered by receding water levels, or first pre-migratory movements of birds from elsewhere. Shore counts in June-July revealed very modest waterbird numbers, with Spur-winged Plover *Vanellus spinosus*, Egyptian Plover *Pluvianus aegyptius* and Kittlitz's Plover *Charadrius pecuarius* among the more common species. Locally rare and endangered species, although seen yearly, were White-headed Lapwing *Vanellus albiceps* and Grey Pratincole *Glareola cinerea*. Dead trees at the lakeside served as a night roost for Long-tailed Cormorant *Phalacrocorax africanus* (several hundred), Cattle Egret (1500-2000) and Black Kite *Milvus migrans* (>500).

Data on bird densities were obtained from the rice polder downstream from the dam (Table 10.1). Overall densities are somewhat higher than in the irrigation zone of Office du Niger (Chapter 11.4). In July, African Jacana *Actophilornis africana* was by far the most common species together with Spur-winged Plover. The second common wader species in July was the Afrotropical Greater Painted-snipe *Rostratula benghalensis*. The Sélingué irrigation zone serves as a staging area during the dry season for species such as Cattle Egret *Bubulcus ibis* and African Wattled Lapwing *Vanellus senegallus*. Wood Sandpiper *Tringa glareola*, Cattle



Egret and Yellow Wagtail *Motacilla flava* were the most numerous species in February and contribute most to the total density (Table 10.1).

With regard to its international importance the White-faced Whistling Duck and the African

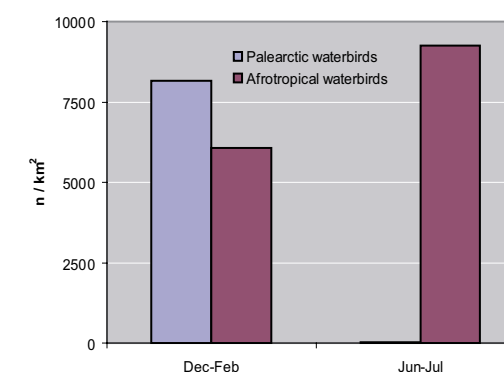


Fig. 10.6. Total density (n/km²) of Palearctic and Afrotropical waterbirds and wetland-related species in the irrigated rice fields near Sélingué (data 2002-2004). In total 431 plots are counted. Note the absence of Palearctic waterbirds in the rainy season (June-July). For details and methods see van der Kamp et al. (2005).

Wattled Lapwing at least meet the 1% criteria (see also Chapter 9) when the rice area and the lake are combined. The lake is also an important wintering area for Osprey *Pandion haliaetus* (estimation of 50-100 birds). Also the presence of the vulnerable Great snipe must be taken into account when considering the international value.

Other fauna groups

Information of other fauna groups than birds is almost completely lacking, but according to local people there is rich wildlife around, among which

are Crested Porcupine *Hystrix cristata*, monkeys and several antelope species. This qualification may be biased as the Wassoulou region, in which Sélingué is situated, has a hunting tradition. Many species of bats *Chiroptera* are found in the area (see Kingdon, 1997). In July 2003 the occurrence of Hippopotamus *Hippopotamus amphibius* was confirmed by traces on the west bank of the lake near the Sélingué dam, and local villagers confirmed the incidental occurrence of two hippos in this area. The status of West African Manatee *Trichechus senegalensis* in the lake is unclear: some people agree on its occurrence, others don't.

Table 10.1. Mean densities per 100 ha and estimated populations of waterbirds and wetland-related species in rice fields in the ODRS-irrigation zone in 2002-2004 (330 counts in December and February and 101 counts in June and July). For details and methods see van der Kamp *et al.* (2005) and Appendix 8 in this report. Common species with low densities are omitted. 1% crit = 1% criterion of Ramsar Convention (see Table 9.2), Exc.= exceeding 1% crit., n = no criteria available.

English name	Latin name	n per 100 ha		Estimated total		1% crit	Exc.
		Dec-Feb	Jun-Jul	Dec-Feb	Jun-Jul		
Long-tailed Cormorant	<i>Phalacrocorax africanus</i>	0	17.3	0	225	1000	
Purple Heron	<i>Ardea purpurea</i>	0	1.6	0	21	120	
Intermediate Egret	<i>Mesophyx intermedia</i>	28.2	2.8	367	36	1000	
Cattle Egret	<i>Bubulcus ibis</i>	295.0	0	3835	0	n	
Squacco Heron	<i>Ardeola ralloides</i>	16.5	69.2	215	900	3000	
Green-backed Heron	<i>Butorides striatus</i>	0	54.4	0	707	10000	
Hamerkop	<i>Scopus umbretta</i>	10.9	0	142	0	10000	
Lesser Moorhen	<i>Gallinula angulata</i>	0	12.7	0	165	n	
African Jacana	<i>Actophilornis africana</i>	30.2	615.6	393	8003	n	
Lesser Jacana	<i>Microparra capensis</i>	0.6	29.4	8	382	1000	
Collared Pratincole	<i>Glareola pratincola</i>	9.2	0	120	0	240	
Greater Painted Snipe	<i>Rostratula benghalensis</i>	0.7	69.7	9	906	n	
Spur-winged Plover	<i>Vanellus spinosus</i>	87.1	42.6	1132	554	4000	
African Wattled Lapwing	<i>Vanellus senegallus</i>	119.1	16.0	1548	208	450	3.4
White-headed Lapwing	<i>Vanellus albiceps</i>	0	4.0	0	52	500	
Little Ringed Plover	<i>Charadrius dubius</i>	15.2	0	198	0	1000	
Forbes's Plover	<i>Charadrius forbesi</i>	8.7	0	113	0	1000	
Wood Sandpiper	<i>Tringa glareola</i>	397.1	0	5162	0	10400	
Great Snipe	<i>Gallinago media</i>	14.2	0	185	0	350	
Ruff	<i>Philomachus pugnax</i>	29.9	0	389	0	10000	
Yellow Wagtail	<i>Motacilla flava ssp</i>	353.6	0	4597	0	n	
Northern Red Bishop	<i>Euplectes franciscanus</i>	0	1.7	0	22	n	
Yellow-crowned Bishop	<i>Euplectes afer</i>	0	3.9	0	51	n	
Overall total (incl. omitted species)		1477	962	19,297	12,512		