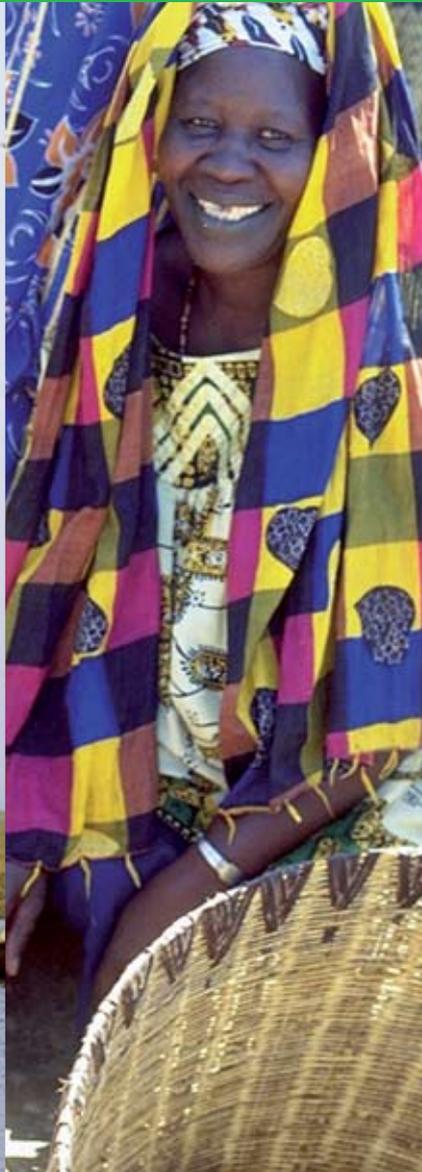
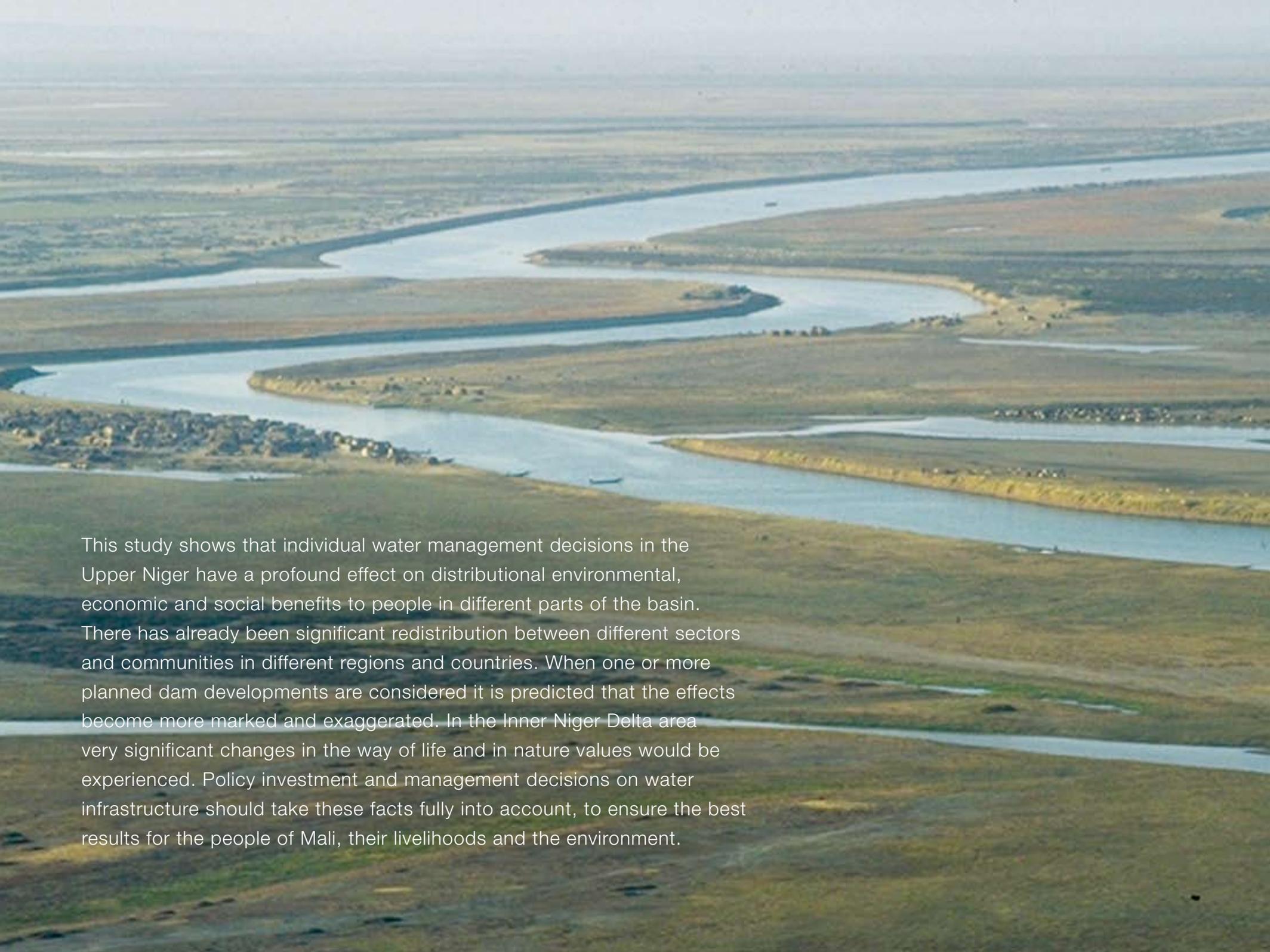


Impact of dams on the people of Mali





This study shows that individual water management decisions in the Upper Niger have a profound effect on distributional environmental, economic and social benefits to people in different parts of the basin. There has already been significant redistribution between different sectors and communities in different regions and countries. When one or more planned dam developments are considered it is predicted that the effects become more marked and exaggerated. In the Inner Niger Delta area very significant changes in the way of life and in nature values would be experienced. Policy investment and management decisions on water infrastructure should take these facts fully into account, to ensure the best results for the people of Mali, their livelihoods and the environment.

Impact of dams on the people of Mali

This brochure provides a basis for decisions regarding the use of water of the Upper Niger. This brochure does not prescribe what should or should not be done; it simply presents facts on the costs and benefits, winners and losers.

In the near future, several decisions have to be taken regarding the use of the river water in the Upper Niger Basin. The major ones concern the building of four proposed dams: the Tossaye, Talo, Djenné and Fomi dam (which is discussed in detail here). Other decisions relate to water management, such as the expansion of existing irrigation in Office du Niger (Markala dam).

1. Background information and facts can be found at www.wetlands.org/ind.

This brochure is based on research addressing water management options in the Upper Niger¹. It focuses in particular on the Sélingué and Markala dams in Mali and the proposed Fomi dam in eastern Guinea. With this brochure, we show the costs and benefits of the three dams and which sectors, regions in both countries and communities lose or win. We do not draw the conclusions regarding the best options for water management in the Upper Niger; that is left up to you as the reader. The information is provided to enable better informed decisions to be made with full awareness of the consequences.





The net-outcome of the dams

All the dams studied provide benefits to specific groups of people and bring costs for others. People downstream only lose as a result of these dams; even in cases where, on average, the country or region benefits. The proposed Fomi dam in Guinea causes however more net costs than benefits. But again, for some groups of people, this dam will just bring benefits.

A whole range of direct and indirect impacts of the dams were considered. We calculated the costs of building the dams, maintenance costs, electricity production and revenues from the irrigated areas. We also looked at the more indirect impacts upstream and downstream related to lower water levels.

We expressed all those gains and losses in terms of money expressed as gross revenues. This provides the following picture for the existing Markala (irrigation of Office du Niger) and Selingué dam and the planned Fomi dam. The table below shows the final net outcome when all costs and benefits are taken into account.

The table below provides the final outcomes; table 1 for the region as a whole; table 2 for individual people.

Table 1: Annual net-benefits or losses of the investigated dams (Mali and Guinea)

Selingué dam	€ 5 mln
Markala dam for Office du Niger	€ 22 mln
Fomi	- € 35 mln

Derived from: Zwarts et al (2005) The Niger - a lifeline. Riza, NL

Table 2: Annual river related benefits per person

Benefits from river without dams	€ 44
Selingué dam	€ 48
Selingué and Markala (OND) dam	€ 68
Selingué, Markala and Fomi dam	€ 52

Derived from: Zwarts et al (2005) The Niger - a lifeline. Riza, NL

Tables 1 and 2 show that the current two dams have a net benefit. This is not the case for the Fomi dam in Guinea. The financial costs are only partly compensated by benefits (mainly electricity). Moreover, the indirect losses for fisheries, livestock and biodiversity downstream dominate these revenues.

‘Winners and losers’

For centuries, people in West Africa have used the Niger River and the Inner Niger Delta for fisheries, transport, agriculture, and grazing lands. In the dry area of the Western Sahel, the water of this river system was and still is essential for life.

More recently, the river water is also used for hydropower and for irrigation of formerly dry land. Many people benefit from these infrastructures. Irrigated areas provide stable food production; electricity supply is guaranteed. However, others suffer when water levels drop and the area of annually inundated floodplain reduces in size as a result. For instance fisheries, navigation and the area of inundation supporting cattle grazing and agriculture in the Inner Niger Delta are impacted. Also the rich nature of these areas is affected when millions of waterbirds lose their important wintering areas.



Sectors: winners and losers

If we look at the different sectors, it is clear that some win and some lose as a result of the dams. The figure below shows the impact of the three dams separately for a sector, on a national level.

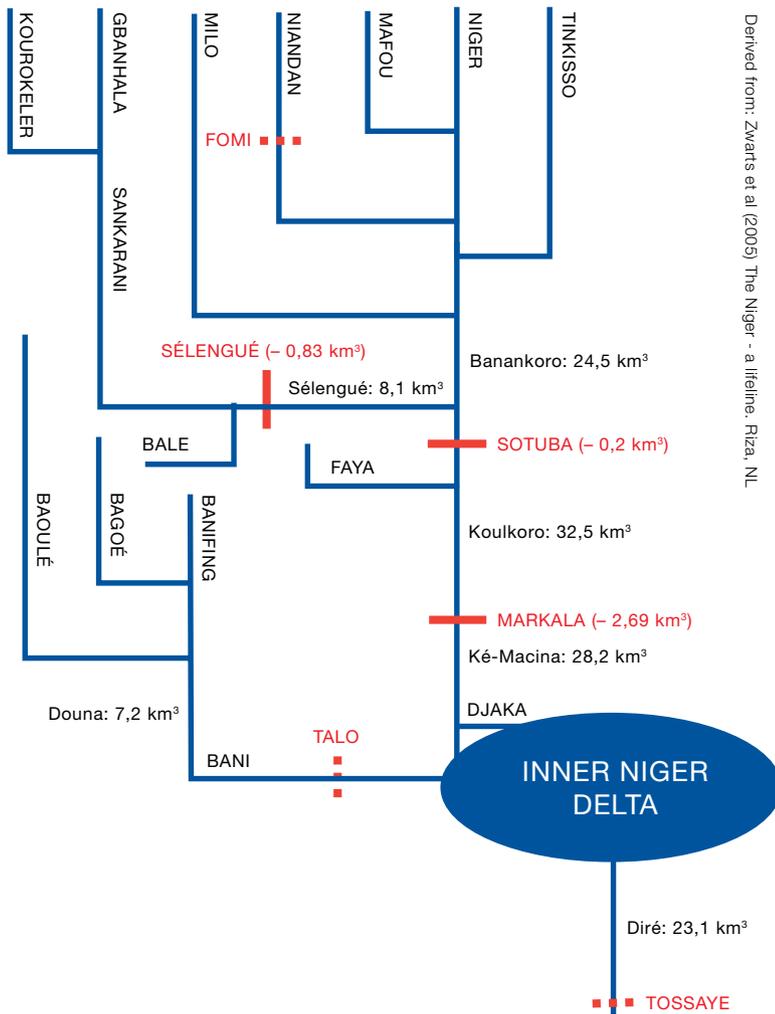
Different sectors in regions like the Inner Niger Delta also reflect different ethnic groups. The Bozo and Somono people are the fishermen; Fulani are the herdsmen and Marka, Bambara and Sonrai are the farmers. Therefore if one sector is badly affected, a whole community is in trouble. For these people, changing their profession means in fact abandoning their culture.

Table 3: Annual costs or benefits of the dams for several sectors within Mali and Guinea

	Sélingue dam	Office du Niger dam	Fomi dam	
Value for :				
Agriculture	€ 152,439.02	€ 36,280,487.80	€ 6,250,000.00	
Livestock	€ 152,439.02	€ 0.00	- € 1,981,707.32	
Fisheries	- € 4,268,292.68	- € 1,219,512.20	- € 9,146,341.46	
Biodiversity	- € 457,317.07	€ 0.00	- € 5,030,487.80	
Transport	€ 304,878.05	- € 152,439.02	- € 152,439.02	
Electricity	€ 10,670,731.71	€ 0.00	€ 17,987,804.88	
Total benefits	€ 6,707,317.07	€ 34,756,097.56	€ 7,621,951.22	
Total costs	€ 3,963,414.63	€ 22,256,097.56	€ 27,743,902.44	
Net value	€ 2,743,902.44	€ 12,500,000.00	- € 20,121,951.22	

Derived from: Zwarts et al (2005) The Niger - a lifeline. Riza, NL

Figure 1: Water flows of the Niger River system and the impact of dams. (Red lines are existing dams, dotted lines are planned dams)



Derived from: Zwarts et al (2005) The Niger - a lifeline. Riza, NL

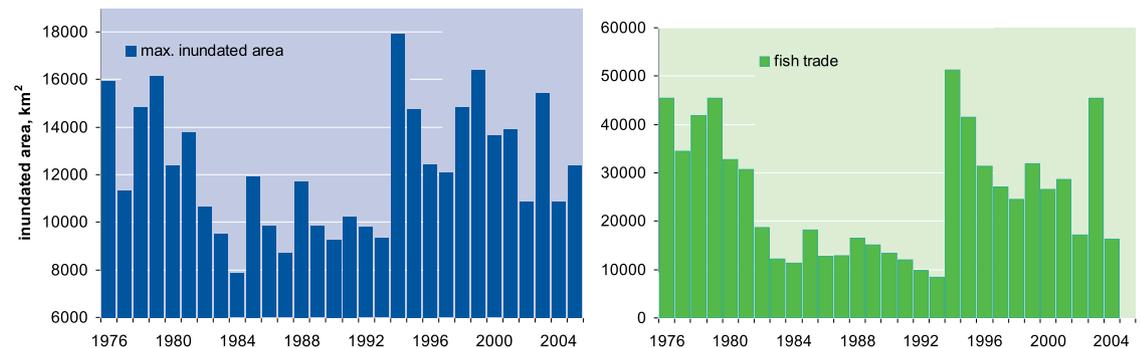
Regions: Winners and losers

All dams take a share of the precious water in this dry environment. This is especially the case for dams used for irrigation, like the Markala dam for Office du Niger. The graph below shows the water flows and the impact of current dams.

Considered on an annual basis, the loss of flow downstream caused by the existing and proposed dams is quite limited (11,6%). However, the impact of this fixed amount is much greater during the dry season when up to 70% of the total water flow is lost. Water currently taken by the Markala and Selingue dams at low and high discharges of the Niger River during the wet season is respectively 30% (weak flood) and only 6% (high flood). The impact of this fixed amount is of course much greater during the dry season. The reduction at these times is up to 70% of the total water flow.

Less water left for the downstream Inner Niger Delta means a smaller inundated area of the floodplain. In turn this has a direct impact on cattle raising, rice agriculture and fisheries that depend on this. The graphs below clearly illustrate this direct link for the fisheries as expressed by weight of fish traded. Other sectors in the Inner Niger Delta will show a similar picture.

Figure 1: Strong relation between water and fish trade



Derived from: Zwarts et al (2005) The Niger - a lifeline. Riza, NL



The table below shows the impact of the current dams on the various regions. Population change is a clear indicator for the regions that win or lose. While the overall Malinese population is rising steeply, the almost stagnant situation in the Inner Niger Delta can be seen.

Table 4: Impact of the current dams in Mali

Derived from: Zwarts et al (2005) The Niger - a lifeline. Riza, NL

Name of area	Size	People	Population change (annually, last decades)	Impact of dams
Mali (total)	1,240,000	8,810,911	2.43%	Additional and stable electricity supply Increased food production Loss of biodiversity, navigation, fish production
Inner Niger Delta	30,000 km ² (inundated)	1,107,791	0.7%	Drop in cattle, fish catch, agricultural production and navigation
Selingué area	13.5 km ² irrigated	123,535	2,96%	Loss of agricultural and grazing lands (result of the 50km ² lake); newly irrigated areas and fish production
Office due Niger	740 km ² irrigated	270,289	5-10%	Newly irrigated areas

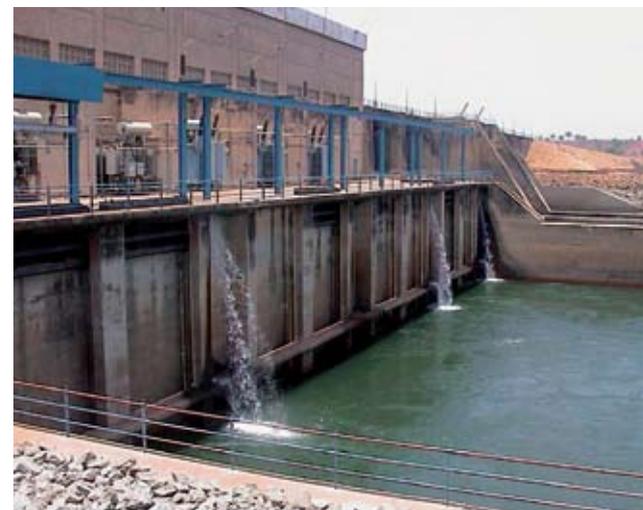


Impact of dams on different sectors in different regions

The overview of sectors gaining and losing is only telling a part of the story. The same applies for the regions that win and lose. The three tables below provide a breakdown of the impact on sectors in each region. This shows exactly who is winning and losing².

2. Numbers are for several dates in the last decade; dependent on the available data.

The Selingué dam (1980) has been built to produce electricity, mainly for Bamako (the capital of Mali). There are also some associated irrigation and fisheries activities. On the other hand, 13.500 people living in the valley of the Sankarani lost their houses, grazing lands, orchards and other agricultural lands.



Office du Niger

Office du Niger is an agricultural area. The Markala dam enables gravitational irrigation. At 74,000 ha, it is the largest irrigation scheme in West-Africa and crucial for Mali's rice production.



Expansion of the irrigated area of the Office du Niger is feasible and can be made possible with further improvement of the water efficiency of the system's. However further increasing the water intake from the Niger River would have a considerable negative impact on the Inner Niger Delta.



Due to the Sélingué reservoir and the irrigation by the Office du Niger, the water level in the Inner Niger Delta has been lowered by 20 to 25 cm. As a result of the lower water levels the inundated area of the Inner Niger Delta has been decreased by 900 km². Table 5 clearly demonstrates the impact. The lower water level is also expected to reduce the extent of floating “bourgou” fields by 62%. Besides its ecological value, bourgou areas are indispensable as a nursery habitat for juvenile fish and as grazing for cattle.

The impact of these dams in their own area is predominantly positive; especially for the Markala dam that had the sole purpose of creating new agricultural land. But also for the Sélingué dam that had energy supply as a main purpose. Even some populations of waterbirds are now dependent on associated newly created wetlands. However the Inner Niger Delta and its 1 million inhabitants lose out completely.

Table 5: Impact of the existing dams on the investigated areas

	IND without dams	Impact of dams on the Inner Niger Delta	Impact of dams on the Office du Niger	Impact of dams on the Sélingué area
Rice (tonnes)	99,200	- 13,200	+ 333,078	+ 6,000 / 7,500 t.
Fish production (tonnes)	54,000 - 133,000	- 4,100	0	+ 4,000 t.
Number of Cattle	1,260,000	- 60,000	+ 99,000	- (negative, unknown)
Number of wintering waterbirds	3,000,000 - 4,000,000	Negative impact (up to 4% less reproduction)	+ 595,155	+ 20,000

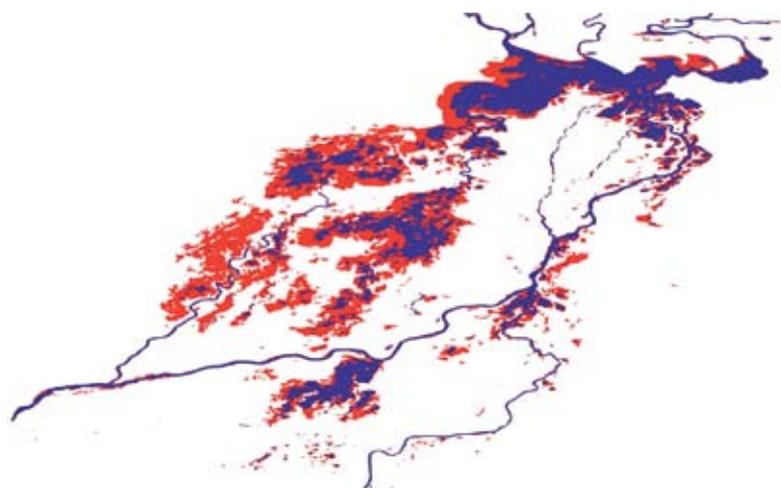
Derived from: Zwarts et al (2005) The Niger - a lifeline. Riza, NL



The Fomi dam

The Fomi dam in Guinea is primarily planned for electricity production. The dam lake will probably also create opportunities for some fish production. The areas around the lake may or may not be suitable for some cattle or other livestock and for agriculture and may provide some opportunities for waterbirds. The negative impact on downstream areas (mostly in Mali) is however considerable.

Figure 3: Impact of the Fomi dam on the inundated area of the Inner Niger Delta: (red areas will no longer be inundated)



Water levels in the Inner Niger Delta will drop by another 45 cm if the Fomi dam is built. The inundated area will be further reduced by 1400 km². With the Fomi dam, the operational season of the Niger River for larger boats would be reduced due to the shorter period with deep water. Table 6 shows the expected impact of the dam on sectors in different regions.

If the Fomi dam were built, the impact on people depending on fisheries, rice production or livestock in the Inner Niger Delta would be devastating. The Fomi dam might also lead to significantly lower population levels of both residents and migratory species waterbirds; the last large breeding colonies of cormorants, ibises, herons and egrets in West Africa would be pushed to the edge of existence.

Table 6: Additional impact of the Fomi dam on sectors in the investigated areas

	IND without any dams	Impact of Fomi dam on Inner Niger Delta	Impact of Fomi dam on Office du Niger	Impact of Fomi dam on Selingué area	Impact of Fomi dam on Fomi-area
Rice (tonnes)	99,200	- 34,000	0	0	-
Fish production (tonnes)	54,000 - 133,000	- 8,500	0	0	+ 4000 t.
Cattle	1,260,000	- 24,000/ 48,000	0	0	-
Biodiversity (waterbirds)	3,000,000 - 4,000,000	Negative impact: Loss of 60% of key habitats (Bourgou); extinction of populations.	0	0	?

Derived from: Zwartz et al (2005) The Niger - a lifeline. Riza, NL

Colophon

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To sustain and restore wetlands, their resources and biodiversity for future generations.

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