



INITIATIVES POUR L'AVENIR
DES GRANDS FLEUVES
INITIATIVES FOR THE FUTURE
OF GREAT RIVERS

Synoptic sheets

Rivers of the World

SENEGAL

Senegal

The Senegal River has its source in Guinea with the Bafing and Bakaye rivers, whose confluence is at Bafoulabé in Mali. After having crossed the western part of Mali, it joins the Falémé, its main tributary, and forms along the rest of its course the border between Senegal and Mauritania and then flows into the Atlantic Ocean at Saint Louis. The importance of this river in a region marked by episodes of drought, very early on strengthened the need for the four States of the basin to cooperate to develop the river, and has resulted in the creation of what is still a unique international system in terms of river governance.

An “international river”

The origins

Deriving greater value from the river was studied beginning in the first half of the 19th century at the start of the colonial period. The first comprehensive studies of the river were carried out in 1892. Several successive bodies brought the countries bordering the river together, but they only began to have real scope after their independence in 1958/1960. In 1963 and 1964, agreements relating to the status and development of the river were signed. The great drought that the region experienced between 1968 and 1973 strengthened the need for cooperation between the riparian States.

It is in this context that in 1972 the OMVS was created, in an agreement between Senegal, Mali and Mauritania. A unique model on a global scale, it assigns to the river the status of an “international” resource, thereby implying freedom of navigation and equality between the States of all forms of use of the water. The OMVS demonstrated its stability during the crisis of diplomatic relations between Senegal and Mauritania in 1989, as well as through its arbitration role during the crisis regarding the reflooding of the fossil valleys of the Ferlo, and it is still considered a benchmark in this respect.



Technical data

<u>Flow rate</u>	640 m ³ /s (from 3m ³ /s to 5,000 m ³ /s)
<u>Length</u>	1,700 km
<u>Watershed</u>	337,000 km ²
<u>Countries crossed</u>	Guinea, Mali, Senegal, Mauritania
<u>Main tributaries</u>	Kolombiné, Karakoro, Gorgol, Bafing, Bakoye, Falémé, Baoule

Segment

Type of flow

Flow regime: The flow regime of the Senegal River depends mainly on precipitation in the Haut-Bassin. It is characterised by a high water season (Jul-Oct) and a regular decrease low water season (Nov-May/June). By the end of the dry season in May or June, in general there remains only a very low water flow rate in the large rivers or in the more favoured of their small tributaries.

Haut-Bassin (Fouta-Djalou – Bakel)

Wet climate, annual rainfall of between 700 and 2,000mm. April to October rains in the mountainous parts in the extreme south of the basin, result in the annual flooding of the river (July/October)

Valley (Bakel-Dagana)

Alluvial plain enclosed by semi-desert regions. Flood area whose width varies between 10 and 20 km, but can reach 25 Km. Agricultural landscape fertilized every year by the river flood. The bottoms of the main bed interspersed by rocky or sandy sills hindering navigation in shallow waters.

Delta

Many branches, a single river mouth. Wide flat area invaded by the salt water of the ocean during the dry season. Width of the river: 400 to 500 m, relatively deep. Strong influence of the tide.

Many uses

Agriculture and irrigation

In the Senegal River basin the populations carry out three types of agriculture:

Rain-fed agriculture (in the Haut-Bassin, varieties of mainly food crops -finger millet, maize, sorghum, watermelons)

Flood-recession agriculture (very important type of traditional agriculture, wide variety of cultivated species: maize, aubergines, pumpkins, tomatoes, hibiscus (bissap), sorghum, rice, watermelons and other local vegetable products. This type of agriculture is tending to become less important due to the flood control policy.

Irrigated agriculture

The irrigation land potential is estimated at 375,000 ha, of which 240,000 ha in Senegal, 120,000 ha in Mauritania and 9,000 ha in Mali.

Of this irrigable potential, more than 137, 800 ha is managed and about 90,000 ha of it can be farmed.

There are two main crop types:

- grain production where rice is very widely in the majority except in Mali; maize and sorghum are increasing, in the mid-valley in particular.
- horticultural production is dominated by onions, tomato, melon and okra

Prospects: from 1.4 billion m3 in 2012, water needs for agricultural production are expected to reach 5.25 billion m3 by 2025.

Other water supply needs

Drinking water

The Diama dam has secured the water supply to large cities such as Dakar, Nouakchott, Saint Louis, etc. Since the end of 2011, the town of Nouakchott, located approximately 200 km away, in a desert climate, is supplied almost entirely from the Senegal River.

Prospects: Drinking water demand of 53 million m3, forecast to rise to 130 million m3 by 2025.

Livestock farming

Livestock farming is of essential economic and social importance in the Senegal River basin. The development of this sub-sector is included in the strategy laid down by the Member States of the OMVS, as part of the fight against poverty.

Livestock farming involves on average, 60% of the rural population in each of the riparian countries; its contribution to the national GDP of the various countries ranges from 4% to 12%.

Prospects: from 61million m3 in 2012, water needs for livestock farming are forecast to reach 84 million m3 by 2025.

Industrial and mining activities

The industrial fabric in the Senegal River basin is quite weak. The Senegal sugar company -Compagnie Sucrière Sénégalaise (CSS)) is the only large company which operates in the basin (sugar cane and some tomato processing units).

Artisanal gold ore mining, although marginal economically, is an important source of pollution because of the type of products used. The easing of constraints (navigability of the river, the building of port infrastructure, etc.), will among other things, facilitate mining of the deposits in each of the three countries of the basin.

Prospects: from 13 million m3 in 2012, water needs for industrial and mining activities are expected to reach 235 million m3 by 2025.

Many uses

Hydroelectric power generation

Although irrigation is the main consideration in managing the water of the river, the countries members of the OMVS are increasingly emphasising the importance of hydroelectric energy to reduce their energy deficit, diversify the sources of production, and promote their industrial development. An infrastructure programme has been decided to regulate the river flows and produce energy through the construction of hydroelectric dams, and studies have been used to identify potential sites for dams and to initiate their construction.

The OMVS currently has two hydroelectric structures in operation:

- The **Manantali** complex (the dam and its power plant, 2002) sited on the Bafing. With installed power of 200 MW, it produces on average of **800 GWh/year** which are supplied to the national electricity companies of Mali (52%), Mauritania (15%) and Senegal (33%)
- The **Férou** (2013) development, which produces an average of **60 MW** injected into the Manantali grid.

Energy production is carried to the States over the Manantali (RIMA) interconnected transmission grid, 1,700km long. Currently, the total installed power capacity of the RIMA is 260MW.

On completion of the so-called second generation projects, the OMVS energy system should reach an installed power of approximately 2,000 MW.

Moreover, 30 sites have been identified in Guinea for the construction of micro-power plants dedicated to rural electrification.

Fishing and sailing

Fishing is an important economic activity, undertaken both in the main river and in the tributaries and in flood-recession ponds. The production level ranges between 26,000 and 47,000 tonnes per year. The impoundment lakes of the Diama dam and especially that of Manantali (11.5 billion m³ for 500km²) open up significant prospects for the development of fish farming.

The Senegal River was a flourishing transport waterway at the beginning of the 20th century, but this activity has almost stopped since the 1970s, mainly due to the total absence of investment to support competition with other modes of transport (roads, railways, etc.).

The hydraulic regime of the Senegal river is characterised by some very significant variations which impact the navigability of the river. Without the proposed development work and despite the regulation of the flows by Manantali and Diama, the section of the river that historically has been navigable is broken up

- **into two sectors of permanent navigation** (12 months/12): from the mouth at Podor for the downstream sector, with a guaranteed water draught of 2.5 m, and up to Boghé for the upstream sector which only guarantees a water draught of 1 m at most.
- **into several sectors of seasonal navigation** beyond Boghé, characterised by times which are increasingly reduced the further they are from the mouth of the river.

The Diama dam has allowed navigation on the river to be improved by regulating the water level. A navigation lock of 175m by 13 allows boats to pass. Improving navigability has been defined as one of the major challenges for the future of the river.

Senegal



Governance and international cooperation

The creation of management per basin: the OMVS

History

1972: Creation of the **OMVS**

1992: Guinea becomes an observer

2003: "Nouakchott Declaration" adopted at the 13th Conference of Heads of State and Government: restates the missions of the organisation and sets out commitments for the High Commission

2006: Guinea becomes a member of the OMVS

2009: The OMVS creates a "Basin Committee", opening participation in the OMVS to civil society players

Original missions

- Achieve food self-sufficiency for the populations of the basin and the sub-region,
- Secure and improve the income of the populations,
- Preserve the equilibrium of the ecosystems in the basin.
- Reduce the vulnerability of the economies of the Member States of the Organisation to vagaries of the weather and external factors.
- Speed up the economic development of the Member States.

Organisation

Main bodies:

1- Conference of the Heads of State and Government:

It sets out the general policies of the OMVS. The Conference is chaired in turn, for a two-year term.

2- Council of Ministers:

Conception and Control Body, it develops the general management policy of the Senegal River basin for the development of its resources. The Council is chaired in turn by each of the States, for a two-year term.

3- High Commission

The Executive Body of the Organisation, it applies the decisions of the Council of Ministers, regularly reports on their implementation as well as any initiative taken within the context of the directives received and within the limits of the powers delegated to it. It is headed by a High Commissioner appointed for a four-year term, assisted and supported by a Secretary General also appointed for a term of the same duration. (*Kabiné Komara*)

Advisory bodies:

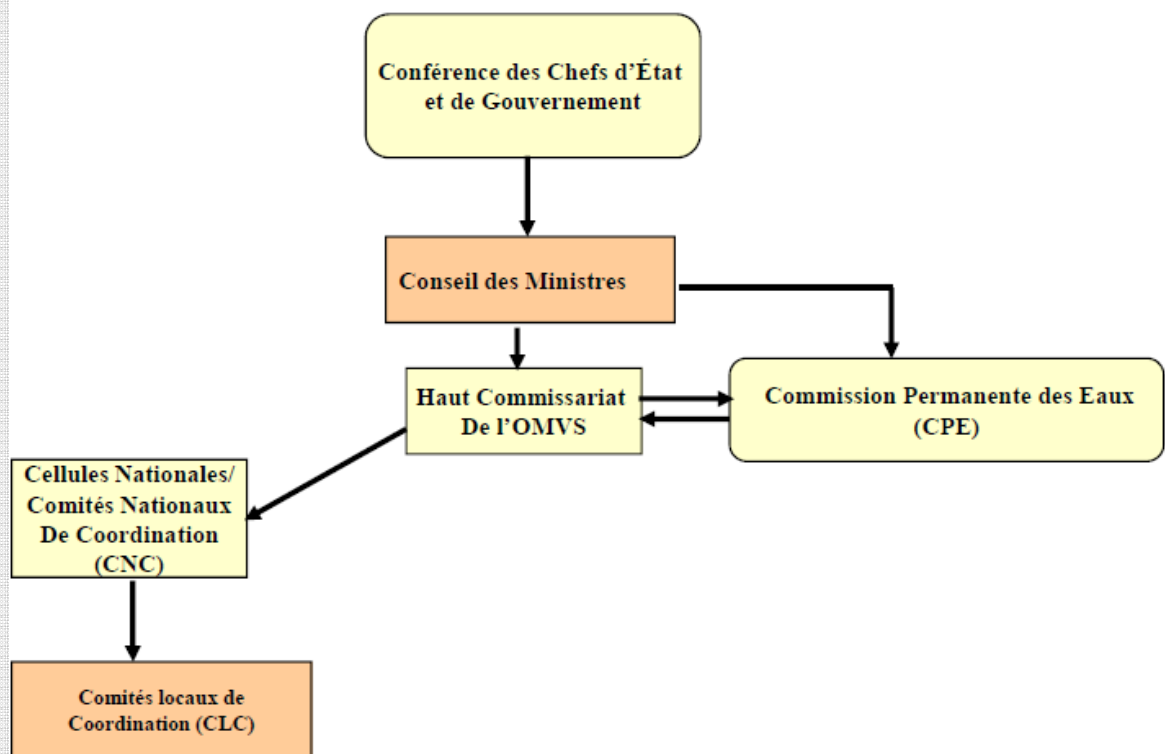
A "**Basin Committee**", made up of representatives of local authorities, companies, civil society and the scientific community, gathered in four "colleges" of approximately 60 people, within which each Member State has an equivalent number of representatives. Its mission is to put forward to the Council of Ministers, opinions relating to the development policy, management of the resource, protection of the environment and the SDAGE.

The Permanent Commission of the Water of the OMVS: supports the Council of Ministers.

The Regional Planning Committee (CRP).

Senegal

Governance and international cooperation



Governance and international cooperation

Reference texts

The OMVS relies on 4 fundamental texts:

1/ Agreement relating to the status of the Senegal River -11 March 1972

- Declares the river and its tributaries international watercourses on the territories of the three Member States which "assert their desire to develop close cooperation for the purpose of ensuring the rational use of the resources of the river and to guarantee freedom of navigation and equal treatment of users"
- Title II, Art 4: any State must ensure it has the prior agreement of its partners before undertaking any project that may change in a significant way, the characteristics of the river regime, its navigability conditions, the use of its resources, etc.

2/ Agreement on the establishment of the Organisation for the Development of the Senegal River - 11 March 1972

3/ Agreement on the Legal status of Common Structures - 21 December 1978 and that relating to the financing of Common Structures - 12 May 1982

- Any structure is the jointly-owned and indivisible property of the Member States
- Each co-owner State has an individual right, an indivisible share and a collective right of use, enjoyment and administration of the common structure
- The investment cost and operating expenses are divided between the co-owner States according to the benefits that each co-owner State obtains from use of the structure. This division may be adjusted according to the operating results
- The co-owner States guarantee the repayment of the loans accorded by the OMVS for the construction of the structures

4/ Charter of the Water of the Senegal River, adopted by Resolution No. 005/CGC of 28 May 2002 of the Conference of Heads of State and Government of the OMVS. It sets out the principles and provisions for the allocation of water between the various sectors of use, sets out the provisions for reviewing and approving new user projects for water resources and determines the rules relating to the preservation and protection of the environment.

Governance and international cooperation

Other bodies

Related to the OMVS:

- OMVS units

OMVS units were created in each of the 3 countries (Mali, Mauritania and Senegal) from 1985 to 1992. They belong to the Ministries responsible in each member State for relations with the OMVS, and coordinate and monitor the Organisation's activities. The OMVS units are directed by coordinators assisted by experts. At the level of each State, the unit organises a National Coordination Committee (CNC) made up of administrative structures but also representatives of civil society. At the local level, Local Coordination Committees (CLC) are created to take over from the CNC locally.

- Management companies

In the context of the completion of the construction work of the Diama and Manantali dams, the OMVS initiated an institutional reform in July 1988, which was continued with the establishment in early 1997, of the Company for the Management and Operation of Diama (SOGED) and of the Company for the Management and Operation of Manantali (SOGEM), to which management of the structures was transferred.

- The SOGED's mission is the operation, maintenance and renewal of the common structures comprised of: the Diama dam, the AFTOUT ES SAHEL intake structure and the embankments of the River.
- The SOGEM is responsible for the operation, maintenance and renewal of the common structures used for the production and transmission of electricity, namely: the Manantali dam, the Hydro-electric Plant, the command centre, the transmission lines, the sub-stations.

The SOGENAV, created later (2011), is responsible for managing and administering the activities of navigation on the Senegal River and maintaining and renewing the common structures relating to them.

These three structures are created in the form of a Public inter-State corporation. They are placed under the supervision of the OMVS and each have their own bodies: Board of Directors, General Directorate, General Shareholders Meetings.

Organisations independent of the OMVS

- The African Network for Basin Organisations

- The SAED

The National Company for the Development and Use of the land of the delta of the Senegal River, acts over the entire Senegal basin of the Senegal River and the Famélé. Created in 1965, its mission is to promote the development of irrigated agriculture on the left bank of the Senegal River and the Famélé. Since the late 1980s and the separation of the productive functions from those of development, the SAED has two main functions: State Project Management for public investment as regards hydro-agriculture development and infrastructure, and advice to the public and private players of irrigated agriculture.

Governance and international cooperation

Development programmes

Master Plan for the Development and Management of Water (SDAGE, 2011)

A planning and decision-making tool, the Master Plan for the Development and Management of Water (SDAGE) provides the OMVS with a long-term development vision. It directs how resources are used and assesses the impacts on the environment.

Objective: Establish for the next 25 years, an overview of the development of the Senegal River basin, including the various sectoral objectives of hydroelectricity, navigation the development of drinking water and sanitation, transport, rural development and mining and industry, based on a detailed analysis of the basin's water resources and the ecosystems that depend on it. More specifically, it entails:

- strengthening the regional planning capacities and tools
- standardising policies and laws
- strengthening the coordination of the various stakeholders, whether they are clients or funders.
- avoiding overuse of the environments and natural resources while allowing development of human activities
- reducing the risks of conflict related to the availability or accessibility to the water resource

Preparation: grouping of the engineering offices of Société du Canal de Provence (SCP) -Centre de Suivi Ecologique (CSE) -Compagnie d'Aménagement des Coteaux de Gascogne (CACG) -GINGER

SDAGE formulation process (2009-2011), 3 phases: assessment of existing situation; the formulation of sectoral diagrams; development of the action plan. It was validated and adopted in 2011 by the Council of Ministers of the OMVS.

The PGIRE

The Integrated Management of Water Resources and Development of Multiple Uses Programme (**PGIRE**) is a development programme formulated to strengthen the regional integration of the 4 riparian countries and improve the living conditions of the populations. It is spread over a decade (2007-2017) and split into two five-year phases. It emphasises five key activities:

- modernisation of the institutions involved in the management of the Senegal River basin,
- planning, management and development of resources at the regional level,
- the expansion of hydraulic structures,
- the mitigation of health effects induced by these structures,
- the promotion of economic growth through development activities related to the water sector while improving the social and environmental conditions of the basin.

Total cost: \$220 million

Support for the first phase (2007-2013): IDA, French Development Agency, African Development Bank

17 February 2015: a supervision mission of the World Bank began as part of the second phase of the PGIRE

Governance and international cooperation

GEF project

Funded by the Global Environment Facility and implemented by the OMVS between 2004 and 2008, the GEF /Senegal River basin project was formulated to take charge of urgent environmental issues. The implementing agencies were the World Bank and the UNDP.

At the end of this first phase, Dutch co-financing enabled certain activities included in the project to be continued. The emphasis has been placed on the fight against invasive aquatic plants (Typha), protection of the banks and the drinking water supply for the populations.

SITRAM

The aim of the Integrated Multimodal Transport System (SITRAM) is to create waterway and road infrastructure to ensure the shipment and the flow of traffic (freight and passenger) of the Senegal River basin. (see: "What river for tomorrow?")

HYCOS

The World Meteorological Organisation (WMO) and the Organisation for the Development of the Senegal River (OMVS) cooperate to establish a system for observation of the hydrological cycle in the river basin. The Senegal-HYCOS project should promote better knowledge of the water resources of the Senegal River basin and, more particularly in the high basin from where most of the river water comes.

With the support of the AFD, the preparatory phase has been entrusted to **the Compagnie Nationale du Rhône (CNR)** as part of the partnership between this structure and the OMVS. The project document (2012) is available on:

http://www.portail-omvs.org/sites/default/files/fichierspdf/senegal_hycos_document_de_projet.pdf

Other bodies and larger scale cooperation projects

The Project for Strengthening the Institutions for Transboundary Water Management in Africa (**SITWA**), works to strengthen regional cooperation for sustainable management of transboundary water resources in Africa, through an institutional strengthening of the African Network of Basin Organisations (**ANBO**).

The **Global Water Partnership (GWP)** also takes part in thinking regarding the PGIRE, Climate Change and the Development of Infrastructure in the Basin Organisations of Rivers and Lakes (OBF/L) of the continent.

Structures

Diama and Manantali dams

Designed to operate in a complementary way, the aim of the first two and main dams built on the Senegal is to:

- 1) regulate the Senegal River flow and provide flow rates required for the irrigation of 375,000 ha of developed land; permanent navigation on the Senegal river from Saint-Louis to Ambidédi ; the supply of drinking water to urban and rural centres;
- 2) produce approximately 800 million kilowatt hours hydroelectric energy per year;
- 3) prevent the inflow of marine water in the delta in low water periods;
- 4) provide annually, during a transitional period an artificial wintering flood to maintain conditions favourable for flood-recession crops;
- 5) mitigate natural floods and reduce the impacts of flooding in the event of strong or exceptional flows;
- 6) improve the conditions for filling the lakes, depressions and distributaries fed by the Senegal River.

Other built or projected dams

Dam	Characteristics
Férou	<p>Entry into service: 2013 Run of river structure Situation: on the Senegal River, 15 km upstream of Kayes. installed power: 70 MW. Average production: 320 to 350 GWh/year Cost: 100 million euros Management: SOGEM Funders: International Development Association (IDA), the European Investment Bank (EIB) and the governments of Senegal, Mali and Mauritania.</p>
Gouina	<p>Work begun in 2013 Situation: on the Senegal River, 80 km upstream of Kayes (Mali) Run of river structure Installed power: 140 MW; Average production: 570 to 620 GWh/year Funders: Eximbank (China)</p>
Boureya	<p>Situation: on the Bafing in Guinean territory approximately 30 km upstream of the border dividing Guinea from Mali. Installed power: 160.6 MW Average production: 717.4 GWh/year</p>
Gourbassi	<p>Situation: on the Falémé on the border between Mali and Senegal structure-reservoir comprising a central concrete part connected to two side dikes supplemented by a secondary riprap dike Normal retention elevation: 93.7 metres; crest length: 1,110 metres; fall height: approximately 17.6 to 28 metres; Installed power: 20 to 25 MW Average production: 104 GWh/year</p>

Senegal

Structures

"Second generation" dam objectives

- Make available 66.32% of the total hydroelectric power of the basin. The total installed power on completion of "second generation" hydroelectric dams would total 2,000 MW.
- Allow the storage of almost 23 billion m3 of water, and thus achieve almost complete control (more than 97%) of the flow of the Senegal River, by doubling the storage capacity of Manantali and Diama combined;
- Eventually allow an annual saving of approximately 240 billion CFA francs on the oil bills of the States.
- Enable the States to take advantage of the multiple benefits of the interconnection and exchanges of electrical energy.



The Diama dam

Location	delta, 26 km upstream from Saint-Louis
Construction	1981-1986
Composition	<ul style="list-style-type: none">- Flood spillway- Navigation lock- Closure gate dike- Closure dikes
Uses	Irrigation, navigation
Actors involved	fundes: (Saudi funds, Kuwaiti funds, Abu Dhabi funds, France, European Development Fund, the African Development Bank, the United Nations Development Programme).

Objectives

- Prevent, in a period of low water, the inflow of salt waters in the delta and the lower valley of the Senegal River,
- Enable 120,000 ha of land to be irrigated in its area of influence, in combination with the Manantali Dam;
- Satisfy the water needs of urban and rural centres;
- Improve the filling conditions of the lakes and depressions connected to the Senegal River (in particular the Guiers lake, the R'kiz lake, the Aftout-Es- Sahel depression), the Djoudj Park and the Diawling Park;
- Reduce the pumping heights in the area of influence of the impoundment lake

The SOGED

Created on 07 January 1997, the missions of the Company for the Management and Operation of Diama (SOGED) are:

- the operation, maintenance and renewal of existing structures: the Diama Dam, the embankments of the Senegal River, the water intake structures incorporated in the embankments, the access roads to the Diama dam and the ancillary and accessory structures.
- the design, financing, construction and operation of new structures, with the exception of those dedicated to producing hydroelectricity

Capital: 600 million CFA francs, divided into equal parts between the shareholder States (Mali, Mauritania and Senegal).

The SOGED's resources are made up of:

- mainly the fees for water abstraction;
- the advances of the Member States;
- the support of the fundes;
- various resources.

Governance of the SOGED: Council of Ministers of the OMVS, Governing Board (9 Administrators, 3 administrators per Member State), General Directorate. The term of office of the Director General and the Administrators is four years.

Headquarters: Nouakchott (Mauritania)

Impacts

Positives

By ensuring the permanent availability of freshwater over the course of the Senegal River, the entry into service of the Manantali and Diama dams has been a stimulating factor for the socio-economic development of the Senegal River valley.

- large-scale development of irrigated agriculture which increased from an area of 16,000 ha in 1996 to about 110,000 ha in 2002,
- securing of the drinking water supply for large urban centres: Dakar, Saint-Louis, Kayes, Rosso, Richard Toll and Nouakchott;
- securing of the satisfaction of the domestic and pastoral needs of rural populations;
- regeneration of plant cover and revitalisation of wetlands of global importance (Djoudj and Diawling Parks)
- prevention of the inflow of salt by the Diama dam

Negatives

The dams have however been the source of far-reaching changes to the natural environment , strongly influenced by the new hydraulic conditions and the ending of saline intrusion. They have accelerated the development of semi-aquatic harmful vegetation on the banks of the river and in the bed of the associated hydraulic systems. (presence of nuisance aquatic plants, in particular Typha and Phragmites in the delta area)

In addition, the impoundment lake of the Diama dam is currently the main source for water abstraction, particularly in Senegal and Mauritania, not only for agricultural activities, but also for the water supply to many urban and rural centres.

This function will become more significant with the development of economic activities and population growth.

At the same time, the risks of water pollution, resulting from natural factors (water stagnation, rotting of aquatic plants, etc.) and agricultural, domestic and industrial activities are increasing.

The Manantali dam

Location	Bafing, 90 km to the south-east of Balafoué (Mali)
Construction	1982-1988
Annual production	800 GWh
Installed power	200 MW
Number of turbines	5
Actors involved	funders: (Saudi funds, Kuwaiti funds, Abu Dhabi funds, France, European Development Fund, the African Development Bank, the United Nations Development Programme). Eskom

Objectives

By its design, Manantali is a regulating dam, producing annually 800 GWh of guaranteed electricity 9 years out of 10, the irrigation of 255,000 ha of land in the valley, the navigability of the Senegal River from St-Louis to Ambidédi throughout the year. Distribution of the electricity produced: 52% Mali, 13% Mauritania, 33% Senegal.

Actors

Management: SOGEM

Operation: the SOGEM created in July 2014 a subsidiary dedicated to utilisation of the energy of the dams which it manages: the SEMAF. The operation and distribution of the energy was until then carried out by a private operator, Eskom Energie Manantali (South African company). The SEMAF is taking over from Eskom pending the launch of an international call for tenders aimed at recruiting a new independent operator.

Impacts

The Manantali complex has enabled clean and cheap energy to be produced, although it is largely insufficient to cover the needs of the shareholding countries. Manantali is used to release 300m³ of water daily to raise the water level for navigation and for irrigation.

Other consequences:

- Development of fishing
- Reappearance of fauna and regeneration of plant cover
- Flood reduction contributing to avoiding or limiting flooding
- Opportunity for telecommunications (the overhead earth wire of these lines made of optical fibre)

What river for tomorrow?

West Africa is one of the areas most affected by climate change. Moreover, population growth (3% per year) and the growth of consumption, are accentuating the dependence on transboundary water courses for supply. Food self-sufficiency, a major challenge for the region, relies in large part on the Senegal River and on the development of irrigation.

Developing irrigation: the food self-sufficiency challenge

Agricultural production satisfies only a small part of the demand of the countries of the basin (30% Mauritania, 15% Senegal). The demand for rice is met mainly by imports from South-east Asia (80% of the rice of Senegal).

The OMVS is engaged in developing the potential of the irrigable land of the basin, initially through rehabilitating farming land (until 2015), and then creating new farming land (after 2015). This ambition will lead to a tripling of the water resource necessary for agricultural needs, which will require promoting **water-efficient irrigation techniques**.

The increase in agricultural yields and irrigation techniques must however go hand-in-hand with deep economic and institutional changes able to form a solid base for the development of efficient agriculture.

Currently, the sector is suffering from a lack of structuring, both in terms of infrastructure (inadequacy of the road network, hydro-agricultural developments and storage and processing infrastructure, etc.), and as regards the provisions of control and management of land and the weakness of financing and access to productive investment.

From an institutional point of view, the public system alone is insufficient to manage the agricultural development missions. The players, in particular the socio-economic organisations, are still weak, and the regulatory incentive and support frameworks for investments are still too under-developed.

Meeting the energy challenges

The Manantali dam, in 2008, only met 18% of energy demand of the member countries. To address the energy needs of 2025, estimated at 9,735 GWh (which is more than double the energy demand of 2012), the OMVS has launched a major rehabilitation and renewal programme of the existing installations and an extension of the hydroelectricity network. Called Manantali II, this programme funded by the SOGEM and various funders, will endeavour to rehabilitate the existing installations at Manantali and create a network for transmission of the electricity produced by the future Gouina dam; no line currently exists. However hydropower, and renewable energies as a whole, are struggling to keep up in the face of fossil fuel resources.

Drinking water supply

The quantitative needs for supply of the populations should be met until 2025. However continuation of the drinking water and sanitation network infrastructure, which has already improved the level of access to drinking water a lot, will be essential to meet the needs of a growing population.

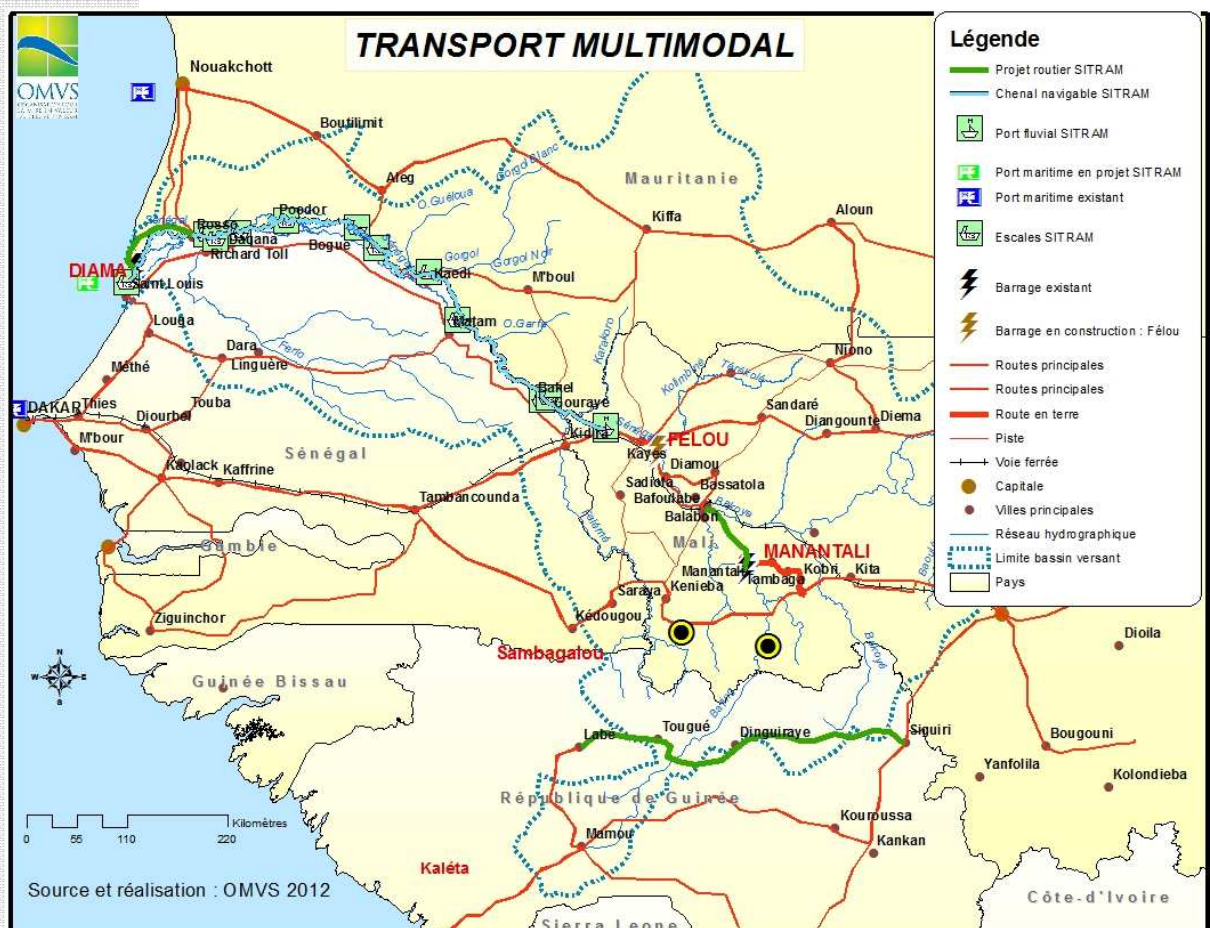
Senegal

What river for tomorrow?

Completing the navigability of the river

The 13th Conference of Heads of State and Government of the OMVS (2003) established a Strategic Direction Framework in which the development of transport based on the navigability of the river is a priority objective. The Integrated System Of Multimodal Transport (SITRAM), implemented by the SOGENAV, consists of:

- work intended to deepen the main bed of the river and create a navigable channel of 905 km, from the mouth of the river to the river port of Ambédi
- The development of ports, river ports of call and wharves along the river. (Sea-river port at Saint-Louis, inland port at Ambédi and ports of call along the waterway).



What river for tomorrow?

Environmental and health issues

The **upper basin**, in its Guinea part, appears to be the best preserved sector at an environmental level, but, paradoxically, the one on which most uncertainties weigh over the next decades. It suffers from being heavily landlocked and threats are increasing on its natural resources. Its future will depend heavily on how the climate develops over the next few years.

In the region of the **Manantali dam and up to Bakel**, the issue related to the development of water reservoirs and run of river power plants, both existing or future ones is serious. The extension of farming land, the construction of transport infrastructure, the destruction of forests, overgrazing, conflicts of land use and various sources of pollution are all potential threats to this area in which the three main branches of the Senegal River are located, the Falémé, the Bafing and the Bakoye. The OMVS plans to construct specific development schemas for these tributaries, tailored to the challenges affecting them.

The **valley** is totally dependent on upstream inputs, which are only in part regulated. It is in this territory that the consequences of the hydrological imbalance observed for forty years (reduction in the flow combined with an artificialisation the environment) are the most obvious. The reflection underway on "artificial" floods, able to satisfy the water needs of the distributaries of the river and groundwater, among other things, will be crucial for restoring environments and satisfying private, agricultural and industrial uses sustainably.

The **delta** is subject to particular attention but is suffering from the consequences of developments upstream:

- difficulty in supplying the distributaries and networks
- the impact of the protective dikes and the restriction of the main bed that they induce,
- the question of urban and agricultural land
- the development of typha

Prospects:

Despite the many efforts made in fighting malaria and bilharziosis, the question of water-related diseases is still present for the entire basin. Increasing coverage and access to health services is one of the major objectives that needs to be achieved.

With regard to ecosystems, the OMVS has established environmental monitoring systems to limit the consequences of developments:

- The Observatory of the Environment at the level of the High Commission
- The Limnology unit at the level of the Manantali dam