REPUBLIC OF SENEGAL
One People - One Goal - One Faith

MINISTRY OF THE ENVIRONMENT AND SUSTAINABLE DEVELOPPEMENT

CENTRE DE SUIVI ECOLOGIQUE (CSE)

REPORT ON THE STATE OF THE ENVIRONMENT IN SENEGAL

2020 EDITION

SYNTHESIS

CSE
Centre de Suivi Ecologique

CONCLUSION

The implementation, since February 2014, of the Plan Sénégal Émergent (PSE) considered as the matrix of public policies for development by 2035, will undoubtedly have a significant impact in determining the state of the environment over the next fifteen years in the sense that it relies heavily on the exploitation of natural potentialities (agricultural land, mines, oil and gas). However, the evolution of future environmental trends in Senegal will not be determined solely by natural resources extraction. It is important to add population dynamics, poverty and climate change as other driving forces of environmental change that will also determine the sensitivity of certain environmental components, including land and loss of productivity, water resources, biodiversity and ecosystems, the marine and coastal environment, the urban environment and human and animal health, etc.

Despite the political will expressed through the adoption of the "Green Payment for Ecosystem Services" as a pillar of sustainable development, the challenge lies in controlling the ecological footprint and increasing the biocapacity of ecosystems through environmentally friendly development policies. The population, which is the key variable in the increase of the ecological footprint, will have to be widely convinced that behavioural changes in production and consumption patterns are both necessary and reasonably priced. It is now essential to ensure that national and local sectoral policies include environmental objectives to prevent and control their ecological impacts. In this perspective, environmental issues should be placed in the context of other major development challenges such as the fight against poverty, food and energy security, education, employment, housing, transport and health.

Environmental policy requires a dynamic and efficient planning system with precise instruments and procedures for action within an adequate institutional and legal framework and sufficient budgetary resources to ensure optimal management of the environment and natural resources in order to contribute to poverty reduction in a sustainable development perspective. The implementation of an ecological policy requires access to environmental information, which is a source of commitment and mobilization of communities in favour of ecology. Therefore, the environmental knowledge-based needs to be consolidated and the contribution of the environment to socio-economic development demonstrated.

The report, structured around ten chapters developed in response to the need for diverse and detailed information on the state of the environment in Senegal, provided in-depth analyses of issues of concern, including the integration of environmental planning into public policy. In a context of economic growth and intensification of human activities, loss of biodiversity, depletion and contamination of water resources, coastal erosion, air pollution, soil degradation, waste management, impacts of mining, urban flooding, etc., are some of the environmental challenges that the chapters have addressed, and for which appropriate solutions must be implemented in order to ensure sustainable and integrated development. In this perspective, environmental planning should be a tool that all decision makers and project operators should integrate into their development policies, programs and projects through a set of environmental and social safeguards as provided for in legal, regulatory and institutional provisions. The report on the state of the environment in Senegal provides a set of updated and accurate information and indicators on the evolution of the country's natural and man-made ecosystems in the face of the dynamics of social, economic and cultural systems, with a view to better preservation of the environment and natural resources, but also enables policies, programs and projects to be based on reliable information and data in order to be effective and beneficial.

The COVID-19 pandemic outbreak has severely tested the Senegalese economy, whose growth forecasts have been drastically revised downwards from 7% to 0.7% for the year 2020. To cope with the socio-economic impacts of this pandemic, the Senegalese government launched an ambitious program to revive the national economy (Priority Action Plan 2 adjusted to the PES) structured around four orientations: sustainable and inclusive industrialisation; accelerating food, health and pharmaceutical sovereignty; strengthening social protection for greater resilience; and increasing the private sector's capacity to intervene in the economy. This process of reviving the Senegalese economy risks further increasing the pressure on the exploitation of natural resources with potentially disastrous consequences for the environment if carefully designed safeguard measures are not implemented.

The state of the environment report is a prospective and strategic document for planning the use of natural resources and the management of the country's environmental challenges. This new light on the state of the environment is all the more important as projections indicate that the Senegalese population will reach 22,326,369 inhabitants in 2030 and 38,987,234 inhabitants in 2050 (ANSD, 2019) with a great risk of pressure on natural resources and environmental management. This document should therefore constitute a referential for any strategic planning process of development policies in order to integrate the crucial issue of the environmental dimension.

Moreover, the regular publication of this report (every five years) is undoubtedly a major contribution of the environment sector to the achievement of the objectives of the Emerging Senegalese Plan (ESP) and the Sustainable Development Goals (SDGs), due to the cross-cutting nature of the issues addressed in the various chapters. Moreover, this document could also help to implement Senegal's commitments under the 2015 Paris Climate Agreement through the Nationally Determined Contribution (NDC) and the territorialization of climate policies.

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CHAPTER 1

PHYSICAL AND SOCIO-ECONOMIC CONTEXT

«Considering the economic, social and environmental dimension for an inclusive sustainable development»

Located at the utmost west of the African continent, Senegal is a Sahelian country with an area of 196,722 km2. The country is relatively flat with an average altitude of less than 50 m over nearly ¾ of the territory and rare steep altitudes. The highest point is 581 m, at the south-eastern end, in the foothills of Fouta-Djallon.

Senegal has relatively large surface and groundwater resources, but they are unevenly distributed throughout the country. The main feature of the Sudan-Sahelian climate is the great spatial variability of rainfall, which fluctuates, on average, between more than 1000 mm in the south and less than 300 mm in the north. In addition to this spatial variability, there is a great temporal variability (interannual) which is often accompanied by a persistent rainfall deficit. Vegetation is highly dependent on rainfall and land use. The reduction of vegetation cover, deforestation, water and wind erosion, salinization and acidification have led to soil degradation, reducing its suitability for cultivation.

In 2019, the population is estimated at 16.2 million compared to 13.5 million in 2013 (RGPHAE, 2013). While the growth rate is still high, it has remained almost stable in recent years. The Senegalese population is characterised by its high proportion of young people and a predominance of rural areas, with a pronounced trend of urbanisation in recent years. This urbanization, however, come with significant disparities between regions.

Faced with the rapid and uncontrolled urbanization of certain cities, the State of Senegal, through the Plan Sénégal Émergent (PSE), plans to improve the access of rural populations to basic social services and thus reduce the rural exodus.

Progress made in the primary sector (7.9%), the secondary sector (7.5%) and the tertiary sector (5.3%) in 2018, favoured economic growth despite the deceleration recorded during the same year (Figure 1). The tertiary sector stays as the main driver of economic growth given its dominant weight and vitality.

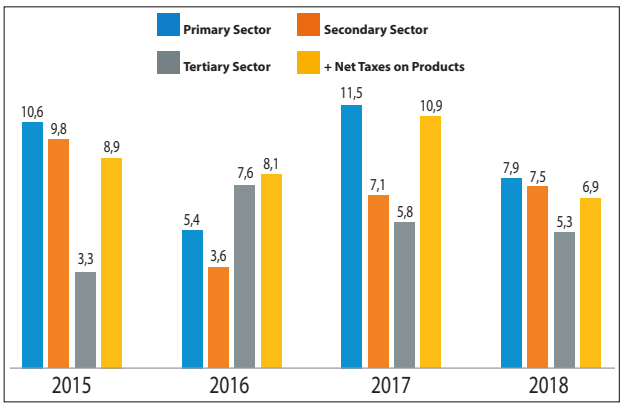


Figure 1: Changes in industry volume value added and net taxes

Source : ANSD, 2019

Since 2015, the country's social situation has been assessed from the perspective of the Sustainable Development Goals (SDGs), set for the 2015-2030-time horizon. The achievement of these goals has required the establishment of an organizational framework and reforms at the national and international levels, in order to promote the acceleration of growth, improve equity and equality of opportunity and determine environmental sustainability. To this end, several advances have been noted in the context of achieving the SDGs with the implementation of the PES. The analysis of social statistics highlights the situation regarding Senegal's performance (SDGs 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 and 16). Among other things, it should be noted that there has been a decline in poverty, significant progress in improving health and access to health care services for all, and investments to put an end to epidemics. Improvements have been noted in the total primary school enrolment rate, the provision of drinking water from an improved source, the use of improved toilets, access to electricity, the level of unemployment among people aged 15 or over, the penetration rate of the Internet and mobile phones, the acceleration of the provision of social housing, etc.

Within the framework of the study on the place of the environment in GDP, the contribution of the environment economic growth was evaluated at 1.9% in 2012, representing CFA-XOF 121.072 billion (products of the forestry and logging sector calculated within the framework of the preparation of national accounts). At the policy level, the important contribution of the environment to the economy recommends a consistent allocation of the budget to the sector while ensuring the preservation of forest and wildlife resources. More specifically, the State should reinforce actions undertaken on natural and environmental resource management.

he year in which the State of the Environment Report (2020) is published coincides in Senegal with the global pandemic of COVID 19 pandemic, which have significant consequences on the world economy. No sector of economic and social life was spared (employment, tourism, transport, industry, trade, culture, fisheries, livestock, crafts, private education, private transfers to households, etc.). The country's economic growth, which has been fairly sustained in recent years, is experiencing a significant decline. Faced with the need for an urgent reorientation of economic and social policy to deal with the effects of the COVID crisis on the Senegalese economy, the government has set up the Economic and Social Resilience Program (PRES), financed to the tune of CFAF 1,000 billion.

CHAPTER 2

VULNERABILITY TO CLIMATE CHANGE AND GOVERNANCE

«Better planning for national development taking into account the threats posed by climate change»

Climate change since the industrial revolution is the result of a change in the composition of the Earth's atmosphere due to greenhouse gas emissions caused by human activities (IPCC), although natural variations in climate may be superimposed. The consequences of climate change are generally coming with rising temperatures, variability in rainfall, rising sea levels and an increase in extreme events. The impacts of this climate variability vary from one region of the world to another, with particularly significant socio-economic consequences in developing countries (Sultan, 2015).

Overall, studies in Senegal show a decrease in rainfall by 2035 with a different percentage from one model to another (DEEC, 2017; USAID, 2014; Bacci and Diop, 2014; Gaye, 2010).

These disturbances lead to major challenge related to the consequences on the environment and on certain key sectors (agriculture, livestock, fisheries, tourism, human and animal health, biodiversity, etc.), and affect socio-economic development by inducing additional costs.

All these socio-economic constraints have led the authorities to put in place a number of instruments, mechanisms and actions to reduce the negative impacts and strengthen the resilience of the population.

The climate change governance is harnessed through consultation frameworks bringing together several actors: The National Platform on Fisheries and Climate Change (PNPCC), the National Framework on Climate Services (CNSC), the National Platform for Science-Policy Dialogue on Adaptation of Agriculture and Food Security to Climate Change (CCASA), and the AGORA 30 on Resilience to Climate Change.

Therefore, in accordance with its commitments, Senegal is developing national communications for the regular monitoring of emissions with mitigation options, while putting in place mechanisms for the mobilization of climate finance.

Moreover, experience in the field, as well as the increasing impacts of climate change, led actors on all sides to adopt new approaches to better deal with the issue at all levels.

Senegal developed various frameworks for engagement and action that allow for the involvement of several actors and the development of several innovative, concrete and adapted projects that are producing convincing results in the process of accelerating mitigation and adaptation to the consequences of climate change.

Among the projects developed under mitigation is the construction of the Bokhol Ten Mérina, Santhiou Mékhé, Kahone, Malicounda (Photo5) and Sakal solar power plants.

Photo 1: Bokhol photovoltaic power plant

Photo 2: Malicounda solar power plant

In this vein, the consideration of gender in the fight against climate change is becoming increasingly important in the strategies put in place. Senegal is also committed to the territorialization of climate change through territorial climate plans and other initiatives carried out by the cities of Pikine and Guédiawaye, as well as the communes of the Petite-Côte. Similarly, the cross-border nature of climate change makes it a good subject for cooperation between local authorities.

Finally, in 2015 Senegal developed its Nationally Determined Contribution, which is the country's roadmap under the Paris Agreement. The implementation of this document, which includes a mitigation component and an adaptation component, is estimated at US$12.8 billion, including US$8.5 billion for mitigation and US$4.3 billion for adaptation.

CHAPTER 3

WATER RESOURCE

«Important resources, improved mobilization capacity, but management strategies to be strengthened for their sustainability»

Water is a political, economic and social priority to address improved management of development challenges in the 21st century. This concern is clearly formulated in the *"Plan Senegal Emergeant"* and in Goal 6 of the Sustainable Development Goals (SDGs), namely: «Ensure access to water and sanitation for all and ensure sustainable management of water resources».

Senegal has significant stocks of surface **water resources** estimated at between 20.9 and 23.5 billion m 3/year (WB, 2020). The main watersheds are those of the Senegal and Gambia rivers, whose waters come, for the most part, from the Fouta Djallon mountains in Guinea. In addition to these two large catchment areas, there are the Casamance, Kayanga, Sine and Saloum rivers and small coastal rivers with intermittent flows. A certain number of lakes and ponds complete this network: The Lac de Guiers, the «bolongs» (marigots) of the estuarine zones and the lakes of the Niayes constitute the most important ones.

For **groundwater**, the four (4) major aquifer systems, corresponding to the main geological formations, are: the superficial aquifer system (between 50 and 75 billion m^3); the intermediate aquifer system (between 60 and 110 billion m^3); the deep aquifer system (between 300 and 400 billion m^3) and the basement aquifer system (approximately 3.6 million m^3).

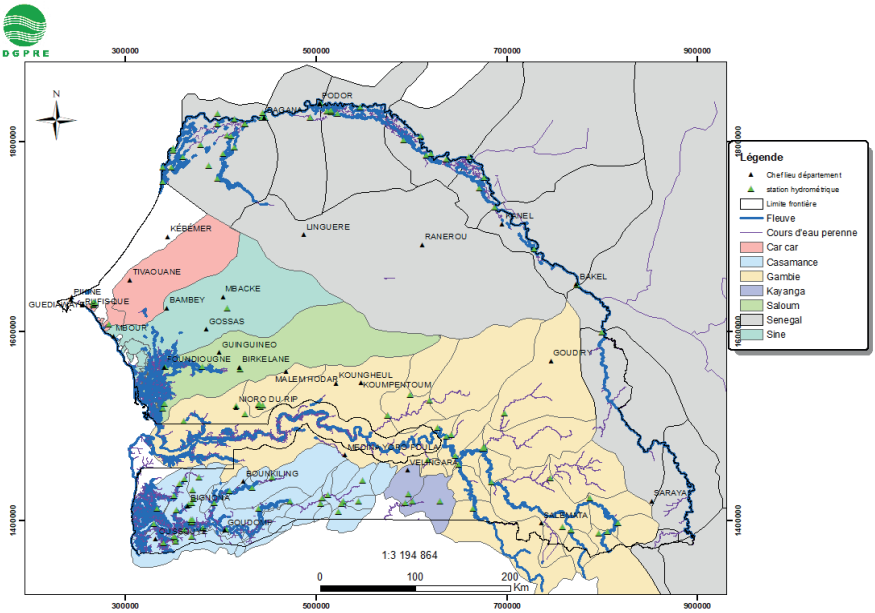


Figure 2: Major watersheds and the national river system

Generally speaking, water resources are highly dependent on rainfall. However, in Senegal, they are unevenly distributed throughout the country and are poorly controlled: either they are too far from the major consumption center's and development hubs, or they are difficult to mobilize to meet the population's demand for drinking water or for other uses (industry, agriculture, mining, etc.). In addition to these challenges, there is the conservation of natural ecosystems (forests, pastures and wetlands), the protection of populations against risks associated to floods and water-borne diseases.

Almost all of the population's water supply is provided by boreholes, although in Dakar, more than 40% of the water comes from Lac de Guiers. The water chemistry characteristics vary according to the water tables exploited, while the quality of surface water varies greatly according to its use and geographical location.

In general, for surface waters, there are three main sources of pollution: the high concentration of salts, mainly due to the intrusion salted water, invasive aquatic plants in certain water basins and lakes, and anthropogenic pollution due to the discharge of untreated polluted water from agriculture, industries and the access of populations to water bodies, without appropriate protection measures.

For groundwater, the quality problems noted concern chloride and fluoride levels in the Maastrichtian aquifer in the northeast; and the salty central band of the deep aquifer, in addition to iron, constitutes a constraint for the exploitation of the Maastrichtian aquifer in certain regions such as Matam, Tambacounda, Kolda, Ziguinchor, Thiès and Dakar.

The increased demand on freshwater resources varies greatly depending on the zones or regions of the country. This pressure is generally high on the western fringe of the country, particularly in the Dakar region, the Petite-Côte and the urban center of Thiès and its surroundings (1,000,000 to 2,916,800 m^3/year). However, it is low (low pressure areas of 55 to 10,000 m^3/year), or even minimal in the interior of the country, with the exception of a few areas where intensive agricultural, mining and tourist activities are concentrated and in religious center's.

At the end of the implementation of the 2008-2015 IWRM-PAP, the Government initiated the updating of the PAGIRE and the development of a new PAP 2018-2030 to consider the new issues and challenges related, in particular, to the implementation of the orientations of the Sectoral Development Policy Letter (SDPL) 2018-2030, the requirements related to the implementation of the Sustainable Development Goals (SDGs), participatory governance of water, gender and climate change. In addition, the updated PAGIRE is aligned with major reforms including those related to the results-based management approach and budget programming by objective, defined within the framework of the public finance management reform adopted by the member states of the West African Economic and Monetary Union (WAEMU).

CHAPTER 4

MARINE AND COASTAL ENVIRONMENT

«A rich and varied ecosystem, but highly threatened, hence the need for integrated management»

The marine and coastal zone of Senegal is characterized by an Exclusive Economic Zone (EEZ) of nearly 159,000 km^2 and a coastline of nearly 700 km consisting of beaches, rocky coasts and estuaries. Several economic activities (fishing, agriculture, industry, mining, tourism) and socio-cultural activities are carried out in the coastal zone.

Climate change, that incurred extreme climatic events, an increase in surface temperature and mean sea level and anthropisation (exploitation of marine sand and mangrove wood products, overexploitation of fishery resources, construction of infrastructures on the coast, bad fishing practices, etc.), led to the vulnerability and degradation of marine and coastal ecosystems.

Coastal erosion, the depletion of marine and coastal resources and industrial, domestic and agricultural pollution of the marine and coastal environments and the water table become a threat. In addition, the vulnerability of certain human settlements and coastal sites, already weakened by the occurrence of recurrent disasters, has increased, accentuating coastal erosion marked by a retreat of the coastline all along the coast (Photos 3). Moreover, the exploration and future exploitation of oil and gas in Senegal constitute a threat to aquatic ecosystems through marine pollution.

Photos 3: State of degradation of Diogué Island, April 04, 2018

However, the Senegal Government, through institutional, technical and financial actions, has initiated actions to mitigate their impacts on marine and coastal ecosystems. These actions include the construction of coastal protection measures (hard and soft) to safeguard hotel infrastructures, housing and various facilities, but also activities related to fishing and tourism. The coastal protection projects (example of the Saly seaside resort), the West African Coastal Resilience (WACA), and the integration of adaptation to climate change in sustainable development in Senegal (INTACC), were carried out with the support of technical and financial partners.

For the restoration of resources and the protection of their habitats, the Government established mechanisms and strategies for the protection and regeneration of marine and coastal ecosystems such as artificial reefs, Protected Fishing Zones (ZPP), and Community Marine Protected Areas (AMCP), the reduction of fishing effort (pressure on resources), the banning of certain fishing gear (monofilament), and the «ban on night fishing» initiated for the first time in the department of Mbour (a six-month biological recovery period for night fishing).

Despite these efforts, the problems of the coastline and the marine and coastal zone persist, hence the need to adopt and promulgate the Coastal Law as soon as possible and to ensure its strict application. The involvement of all stakeholders in the sector is also essential for sustainable development.

CHAPTER 5

LAND AND LAND GOVERNANCE

«Sustainable land management, the only alternative for a limited resource under increasing pressure»

In Senegal, land has great economic, political, social and cultural importance. Indeed, this resource is one of the main bases of agro-sylvopastoral production. It provides many ecosystem services to the population, offers employment in rural areas and is an important means of economic growth and poverty reduction.

Because of this importance and the multiple interests and issues involved, land resources are affected by several factors such as population growth, poor agro-sylvo-pastoral practices (clearing, deforestation, overgrazing, etc.), climate variability and inadequate governance. The pressures exerted by all these factors result in a multifaceted degradation (loss of plant cover, erosion, salinization, etc.) and its corollaries: lower yields and incomes, food insecurity, poverty, conflicts and rural exodus. However, disparities are noted in the estimation of the potential of productive land and the extent of its degradation.

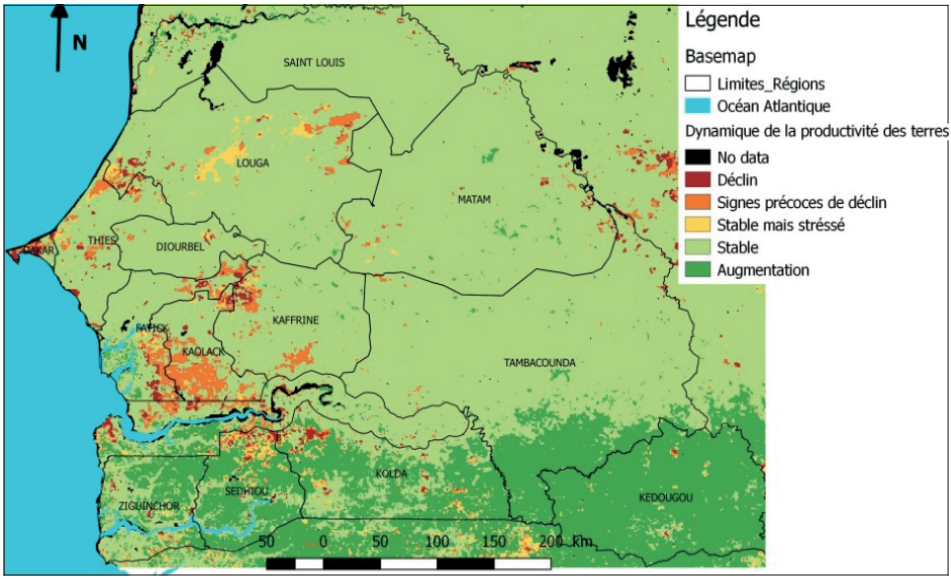


Figure 3: Dynamics of land productivity in Senegal from 2001 to 2015

Source: Trends. Earth 2019

In response to increasing land degradation, several political, legal, financial and technical initiatives have been taken by various actors, including the State and its partners, civil society and the population.

At the political level, the State of Senegal has developed several policies, plans and programs whose implementation contributes to addressing the many threats to land: The "Plan Senegal Emergent" (PSE), Act III of Decentralization, the Senegalese Agriculture Acceleration Program (PRACAS), the Sectoral Policy Letter on Agricultural Development (LPSDA) and the Policy Bill on the Environment and Sustainable Development (LPSEDD). To overcome the shortcomings related to legal issues the State of Senegal has undertaken, in the area of land and land governance, the establishment of a National Commission for Land Reform (CNRF) and the drafting of Constitutional Law No. 2016-10 of 05 April 2016. Regarding financial measures, efforts have been made in recent years in terms of financing Sustainable Land Management (SLM) through both internal and external resources. Important technical measures have also been contributed by state institutions, civil society (NGOs) and the populations.

Despite all the efforts made by these actors, there are still important challenges to be met to ensure a sustainable improvement of land productivity. These include: improving knowledge by harmonizing methods for monitoring and evaluating the state of the land, allocating sufficient resources to Sustainable Land Management (SLM), completing and effectively implementing land reform and revitalizing consultation frameworks to improve synergy in interventions.

However, opportunities exist to face these challenges both at the national level, through the political will show by the State in the gradual inclusion of SLM in public policies, and at the international level through various initiatives in the framework of the Sustainable Development Goals, the fight against desertification and the fight against climate change.

CHAPTER 6

BIODIVERSITY AND ECOSYSTEM SERVICES

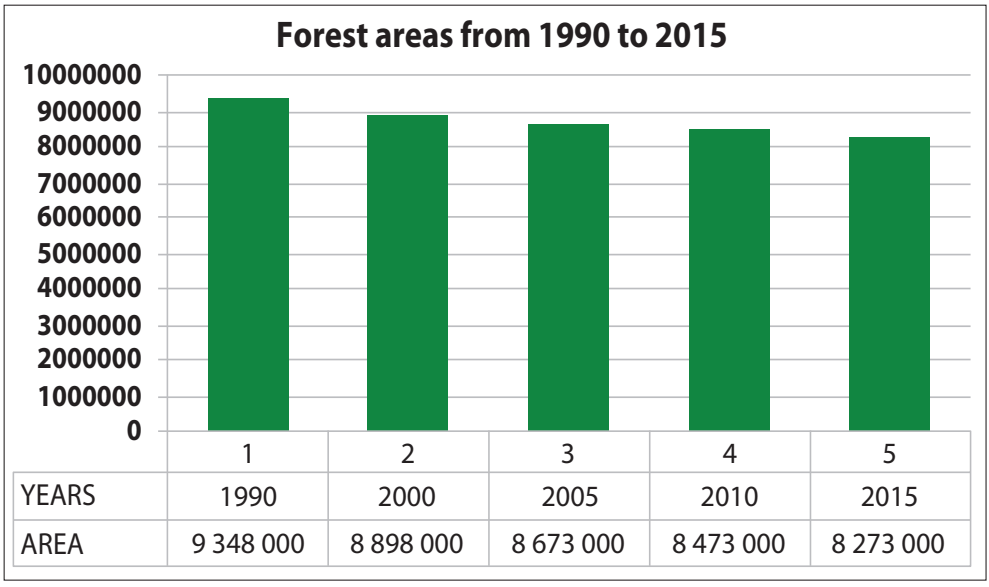
«Improved biodiversity management is also about ensuring good health for everyone»

Senegal has a important biological diversity. The 8225 species listed are divided between animals (4330), plants (3645) and fungi (250).

The main sites of high biodiversity are those of the protected ecosystems (national parks, reserves, classified forests and protected community marine areas) and those of the protected domain (gallery forests, sacred woods and forests, etc.).

Ecosystems provide goods and services on which socio-economic and cultural activities are based: provisioning, regulating, supporting or sustaining services and cultural, spiritual and social services.

However, the pressures noted on this biological diversity, with regard to the importance it provides in terms of goods and services, have led to its progressive erosion. Despite the absence of a global scientific evaluation of the dynamics of ecosystems and species, it is unanimously recognized that most ecosystems are characterized by a relatively high state of degradation, but variable according to their typology and the related pressures. It should be noted, for example, that the forest area decreased from 9 348 000 ha in 1990 to 8 273 000 ha in 2015 (Figure 4). The area continued to decline with 8,188,160 ha in 2017. The annual rate of change in forest area from 2016 to 2019 is -0.49 (MEDD, 2019). Senegal's forest area decreased by about 6.9% between 2001 and 2016 (Global Forest Watch (2018). Degradation continues and even affects sacred sites.



	1	2	3	4	5
YEARS	1990	2000	2005	2010	2015
AREA	9 348 000	8 898 000	8 673 000	8 473 000	8 273 000

Figure 4: Evolution of forest areas in Senegal (ha)

Source: CSE, Yearbook 2018

In Senegal, the main causes of biodiversity loss are linked to anthropogenic activities, in particular fraudulent and abusive exploitation of biological resources, agro-sylvo-pastoral activities, bush fires, demographic pressure, destruction and fragmentation of habitats (first cause of biodiversity loss worldwide), pollution of ground and surface water, etc. In addition to these anthropogenic causes, there are natural factors such as climate change and

its corollaries, and other constraints of a socio-economic, legal (texts relating to biodiversity that are not widely disseminated and little or insufficiently applied) and economic nature; insufficient harmonization, incoherence and failure to update biodiversity regulations; persistent legal loopholes, particularly in the areas of predation and depredation), institutional (lack of synergy and insufficient coordination due to the multitude and diversity of actors) and scientific.

The management of biological diversity benefits from the intervention of government institutions, non-governmental organizations (NGOs), local communities, grassroots community organizations (CBOs), private companies and international organizations, training and research institutions such as universities, etc. Therefore, different actions have been carried out: in-situ conservation (creation of new protected areas) and ex-situ conservation (botanical gardens, reforestation activities, recovery of saline lands, exploitation of protected areas, herbariums, etc.) to which are added the improvement and reinforcement of political, legal and institutional frameworks for the management and sustainable use of biological diversity.

CHAPTER 7

MINING AND ENERGY

1. MINES

«Mining in the context of Emergence and Sustainable Development»

Senegal's mining sector is one of the priority sectors of the "Plan Senegal Emergent" (PSE). As such, it is a pillar of the structural transformation of the Senegalese economy and of community development. During the first phase of the PSE, six (6) flagship projects concerned this sector: the development of the phosphate sector, the acceleration of gold mining, the acceleration of zircon mining, the relaunch of the integrated Falémé iron project, the national artisanal mining program and the mining hub. These targeted projects respond to the persistent needs for raw materials on the national and international markets and to new mining challenges.

The need for raw materials is felt in the construction sector where, at the national level, major infrastructure construction projects (toll motorways, regional express train (TER), road projects, Community Development Emergency Program (PUDC), etc.) led to an increase in the demand for construction materials (basalt, limestone, sand, clay) and, consequently, a proliferation of quarries for these materials. In addition to the building and public works (BTP) sector, the information technology (ICT) industry is a major consumer of metals.

The satisfaction of this demand for construction materials and metals requires the exploitation of mineral resources. Exploration campaigns have made it possible to discover several deposits in Senegal and construction materials, some of which are in the exploitation phase (phosphate, gold, zircon, basalt, limestone, clay). Since the opening of new gold and zircon mines and the increased number of quarries, the trend in mining production has been upward over the past five years, thus generating more economic benefits for the country. However, the opening of new mines and the use of methods such as dredging in artisanal exploitation also underlie new socio-environmental challenges to be faced (very extensive soil degradation with high risks of erosion; water pollution; very high air pollution, etc.).

In the case of large mining projects such as the Mako gold project, an Environmental and Social Impact Assessment (ESIA) revealed moderate and major impacts on water, air, and agricultural land with an estimated loss of 46.5 hectares of arable land, including 35 hectares that have been fallow for over 10 years. As the project is close to the Niokolo-Koba National Park, the vulnerability of wildlife is one of the consequences identified in the ESIA. Unformal mining also has impacts on the environment with water pollution by toxic products such as mercury, deforestation, non-rehabilitation of gold panning sites, etc (Photo 4).

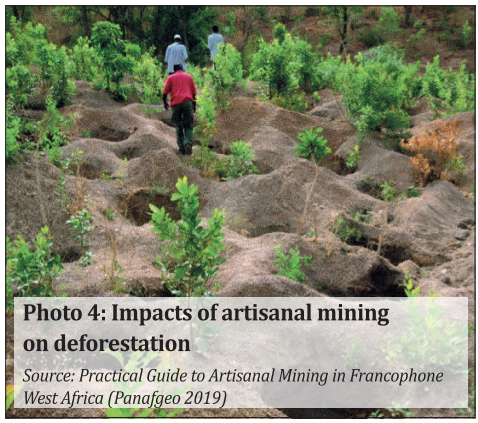


Photo 4: Impacts of artisanal mining on deforestation

Source: Practical Guide to Artisanal Mining in Francophone West Africa (Panafgeo 2019)

To mitigate, or even eliminate these socio-environmental impacts, the Senegal Government has adopted a new mining code (Law n°2016-32 of 08 November 2016). In this code, the innovations are: a better protection of the environment with the obligation to carry out the environmental assessment before any granting of research permit (Article 20 of the code), as well as the obligation to make the ESIA and suggest an environmental and social management plan (ESMP) before any granting of mining title of exploitation. This plan will be monitored and controlled throughout the project. However, it should be noted that the monitoring missions of these ESMPs are timidly carried out due to a lack of resources.

In addition to the laws and regulations established by the State for the strict respect of the environment, companies, within the framework of Corporate Social Responsibility (CSR), are taking voluntary initiatives for a better balance between profit, social and environmental considerations. Good initiatives are being taken, both at the state and private levels, in the face of a vigilant civil society, to move towards sustainable mining. However, certain challenges such as the identification and continuous monitoring of environmental indicators need to be improved for a better assessment of the state of the environment. Also, the strengthening of existing mechanisms, with the effective application of the law and strategies on local content, the implementation of a strategy for the elimination of mercury in artisanal mining, the development of research and innovation in close collaboration with universities and research centers, could contribute to making the mining sector more sustainable.

2. ENERGY

«Affordable energy, accessible to all and environmentally friendly!»

Access to quality energy services is one of the foundations of economic and social growth. The Emerging Senegal Plan (PSE) made it one of the pillars of development for Senegal. The country's energy policy, embodied in the *"Lettre de Politique de Development du secteur de l'énergie à l'horizon 2023"*, is in line with this logic of providing quality, affordable and environmentally friendly energy. Over the years, electricity production has increased significantly to meet current needs and growing demand.

In the area of electricity, efforts have been made in the area of rural electrification, a pillar in the fight against social inequalities, with a rate of over 40% in rural areas thanks to various projects and programs (Table 1). In this context, Senegal has set itself the objective of achieving universal access to electricity by 2025. Thus, nearly 250 MW of additional power have been injected into the network and the construction and installation of new power plants, which will eventually be convertible to gas, will contribute significantly to restructuring the production of and access to electricity in Senegal.

Table 1: Evolution of the rural electrification situation

	Status in 2012	Status in 2018	Évolution (6 years)
Number of villages electrified	1 648	4 583	+ 2 935
Electrification rate	27%	42,3%	+15,3 %

Source: MEP, 2019

Renewable energies have developed significantly over the years with a penetration rate (including hydroelectricity) of 21%. In line with the commitment to climate protection, the development of renewable energies through the energy mix contributes to minimizing environmental impacts while helping to meet national energy needs.

This improvement of the energy mix will involve the production of electricity from gas. Thus, the development of gas infrastructures and the conversion of heavy fuel oil (HFO) production units to run on gas are timely with the recent gas discoveries.

From a fuel-importing country, Senegal is preparing to become an oil and natural gas producing and exporting country in the coming years. With total gas resources estimated at about 910 billion m 3 and oil resources with a total estimated volume of 1030 million barrels (excluding Dôme Flore) [PETROSEN, 2019], Senegal's ambition is to ensure secure energy supplies in quantity and quality, and at lower cost for industries, households and commerce.

However, the sector's activities have significant environmental impacts. In Senegal, energy contributes to 40% of greenhouse gas emissions and is an important lever on which to act to combat climate change.

In the medium and long term, the energy sector is expected to experience a reduction in costs through the development of domestic energy resources. The share of solar energy is growing; wind energy will provide 158.7 megawatts of clean, reliable power to the grid. Senegal plans to convert its existing oil-fired power plants into dual-mode (oil and gas) plants, which would allow the use of part of the local gas production for energy access in order to reduce poverty and promote economic growth. Finally, the Millennium Challenge Corporation (MCC) Compact 2 will eventually enable a restructuring of the energy sector governance framework.

The environmental dimension in the energy sector deserves greater attention. Although the Environmental Code requires all energy projects to undergo an environmental and social impact assessment (ESIA), monitoring and evaluation of the impacts caused by projects in particular must be more rigorous.

In order to properly manage and supervise natural resources (fisheries and the environment), particularly extractive resources (oil and gas), the State has taken appropriate measures and has anticipated the launch of procedures for recruiting firms to promote preventive policies with regard to the offshore oil and gas exploitation project. In the same vein, the recruitment of firms to consider environmental and social concerns has already been launched for the Clean Energy Mix Support Project.

CHAPTER 8

HUMAN SETTLEMENTS AND LIVING ENVIRONMENT

«Population dynamics, access to basic social services and urban risks»

The demographic situation in Senegal reveals a continuous increase in the population, marked by a relatively high growth rate and an unequal distribution according to place of residence. The growth rate of the urban population is much higher than that of the rural population, mainly because of in-migration from rural to urban areas. Analysis of the state of human settlements reveals a high concentration of the population and the bulk of basic social services in urban centres in the western part of the country, mainly along the coastline around Dakar.

This growth of the urban population (effect of the rural exodus) leads to an extension of informal settlements and the ruralization of the urban space characterized by the widespread practice of small-scale agriculture in the cities, particularly in Dakar. The rural environment is characyerised by the evolution of agricultural areas with negative consequences on the environment because of the pollution of water, soil and air due to the use of chemical fertilizers and phytosanitary products, the destruction of vegetation and on health with the transmission of pathologies and zoonoses.

The quality of the living environment and human activities are closely linked to population changes, demographic trends and development parameters (education, health, energy and pressure on natural resources). However, human settlements face environmental challenges, the main ones being: the management of natural risks (floods, coastal erosion, drought, marine intrusion), the management of industrial and technological risks (industrial accidents, accidents involving the transport of chemical products and hydrocarbons, dilapidated industrial equipment, etc.), the management of urban risks (air pollution, inadequate development of green spaces) and the management of waste (household, industrial, biomedical, etc.).

Poor waste management has consequences on health with the development of certain pathologies (malaria, dermatitis, diarrhea, parasitic infections, eye irritations etc.). In terms of urban air management, Dakar is the only city in sub-Saharan Africa to be equipped with an air quality monitoring network with the creation of the "Centre de Gestion de la Qualité de l'Air (CGQA)". Air pollution measurements taken at the stations give the monthly evolution of the Air Quality Index [Box 1].

Box 1: Monthly evolution of the Air Quality Index from 2010 to 2016 in Dakar

The Air Quality Index (AQI) calculated daily indicates the state of air quality in Dakar represented by color codes: green for good, yellow for average, orange for bad and red for very bad. The air pollution measurements made at the stations give the monthly evolution of the Air Quality Index from 2010 to 2016, illustrated by Figure 5

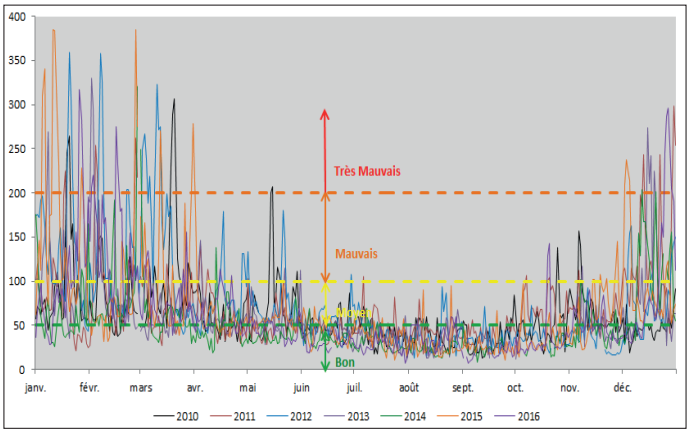


Figure 5: Evolution of the Air Quality Index from 2010 to 2016

Source: Air Quality Management Centre (AQMC) / Excerpt from the thesis of Awa Niang (2019)

The responses of the Senegalese State and grassroots actors to the problem of human settlements include the implementation of Act III of decentralization, the Town Modernisation Programme (PROMOVILLES), the Emergency Community Development program (PUDC), the Diamniadio urban development project, the national «zero waste» program me, the Ten-Year Flood Management Program, etc. However, in order to guarantee the results of all the strategies for the development of human settlements and the improvement of the living environment, the local authorities must ensure the monitoring of achievements in the economic, social and environmental sectors.

Given the multidimensional nature of the problems expressed by local authorities, it is necessary to strengthen inter-communality for the management of natural resources, territorial inconsistencies and access to basic social services. Furthermore, risk and disaster management should involve the mapping of risk areas and the implementation of spatial planning tools to better address the negative impacts of climate change (floods, drought, coastal erosion, etc.).

CHAPTER 9

ENVIRONMENTAL PLANNING

«The basis for sustainable development in the face of new environmental issues and challenges»

Environmental planning moved from centralized management to decentralized management, and then to participatory management. It is implemented by the Ministry of the Environment and Sustainable Development (MEDD) through its various structures, in collaboration with various actors such as local communities, civil society, the private sector, development partners and the population.

The legal framework for environmental planning is governed by national, regional and international texts. Thus, several laws and codes have been defined for the protection of the environment and natural resources. These include the Environmental Code, the Petroleum Code, the Mining Code, the Forestry Code, the Plastic Law, and regional and multilateral agreements.

The planning system is articulated with the national economic orientations, in a sustainable development perspective. It is based on the Policy Letter of the Environment and Sustainable Development Sector, the Multiannual Expenditure Programming Document (DPPD), the Annual Performance Project (PAP) as well as the planning instruments at the regional, communal and local levels. All this shows the participatory and iterative nature of the environmental planning process, which is steered by the Directorate of Environmental Planning and Monitoring (DPVE), in collaboration with all MEDD structures and all other stakeholders.

Other planning tools are used for good environmental planning. These are mainly: The National Strategy for Sustainable Development, revised in 2015, which guides Senegal's action on sustainable development; the Nationally Determined Contribution, technically validated in December 2019 and which constitutes Senegal's commitment under the Paris Climate Agreement; the National Strategy for Green Growth aiming at accelerating access to climate finance; etc.

In addition to leading environmental planning, the DPVE, in conjunction with the various structures, directorates and services attached to the MEDD, is responsible for monitoring and evaluating the implementation of MEDD projects and programmes through the annual performance report (RAP). The RAP thus shows the technical and financial progress of the projects and programmes, through the analysis of the gaps between the targets and the levels of achievement in terms of inputs, activities and outputs.

The monitoring-evaluation system also allows us to note a certain number of achievements, constraints and challenges to be met. The constraints identified are of an institutional, legal and financial nature: insufficient synergy between the focal points of the international conventions on the environment; lack of communication and information sharing between actors; lack of harmonization, updating and application of legal texts; failure to consider inter-municipality in environmental management; absence of a functional centralized national system for data feedback; poor financing of the sector, etc.

The financing of environmental planning remains one of the major challenges for the effective implementation of environmental policy. This funding is provided by state resources and those of development partners. However, these resources have experienced a general downward trend since 2011, hindering the achievement of the set objectives.

Since 2015, more than 70% of the finance of environmental policy has been provided by the State. This is, on the one hand, commendable; but, on the other hand, one may wonder about the capacity to mobilize external resources such as those of the Green Climate Fund or green bonds which represent new opportunities for the financing of environmental policy.

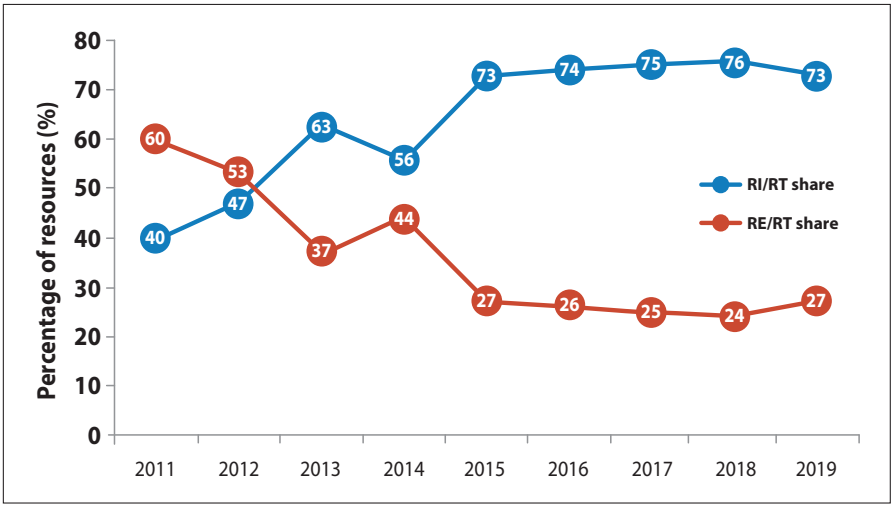


Figure 6: Comparison of internal and external resources from 2011 to 2019

Source : DPVE

Because of the cross-cutting nature of the environment and the need to have reliable and up-to-date data for the various sectors, a national environmental information system (SNIE) is being set up. For the time being, difficulties have been encountered and, in order to overcome them, recommendations have been formulated and translated into an action plan to make it operational.

CHAPTER 10

ENVIRONMENTAL OUTLOOK

Senegal's commitments to sustainable development focus on priority areas whose implementation will have a considerable impact on the sustainability of natural resources and the quality of ecosystems. In general, environmental changes are induced by socio-economic development policies and inappropriate human actions in a context of persistent climate change. Terefore, environmental priorities identified in the Nationally Determined Contribution (NDC) and the requirements of environmental and social management plans provide a framework for harmonization and coherence between development strategies and environmental policies. However, the current pace of population growth is such that the country is going through critical moments for maintaining a balance in the ratio of «environmental (or ecological) footprint» and bio capacity. A World Bank study (2015) points out that half of Senegal's population will live in urban areas by 2030. The consequence will be a strong concentration of socio-economic activities in cities and a significant production of waste accompanied by greenhouse gas emissions.

The diligent implementation of key reforms and projects of the PES Priority Action Plan has made it possible to reduce the budget deficit by 1.5% in 5 years. Senegal's development option is currently based on production systems that emit a lot of greenhouse gases and have a large environmental footprint on ecosystems and natural resources. The findings of the 2019 Exploratory Report on the Green Economy (REEV) in Senegal resulted in encouraging prospects for promoting a green economy and fighting poverty, by reducing the gaps between rural and urban areas.

The dynamics of climate change in a context of strong demographic growth leads to a modification of environmental conditions that generates various environmental, social and health risks. Thus, recurrent increases in temperature are expected by 2050. These increases will be stronger in the agro-sylvopastoral zone. We could therefore expect, in the future, climatic hazards such as drought, floods, heat waves, an increase in coastal erosion, among others.

Global warming due to climate change could lead to a sea level rise of 20 cm by 2030 and 80 cm by 2080 (DEEC, 2011; World Bank, 2013). The impacts on the Senegalese coastline will be greatly exacerbated by the combination of sea level rise with the predicted decrease in rainfall, increasing urbanization and the current risks of river flooding, coastal erosion, marine intrusion, poor runoff management and evacuation capacity in low-lying areas and urban areas, as well as increased salinity. In addition, there is the natural dynamic of the closure of the Saint-Louis breach, i.e. the current mouth of the Senegal River. Only 550 m wide separates the distal part of the northern segment of the Langue de Barbarie spit from the base of the sandy spit at Pilote Barre (Figure 7).

The closure of the breach will prevent communication between the Senegal River and the Atlantic Ocean and will have as a direct consequence, a reappearance of the risk of flooding of fluviatile origin at the level of the districts of the commune of Saint-Louis. The closure of the mouth of the Pilote Barre lagoon will lead to a total isolation of the water body which will inevitably evolve into an evaporite basin, with multiple economic consequences. In addition, the populations of the villages of Pilote Barre, Tassinère, Ndiébene Gandiole, Ndiol, etc. will no longer have direct access to the sea for their economic activities.

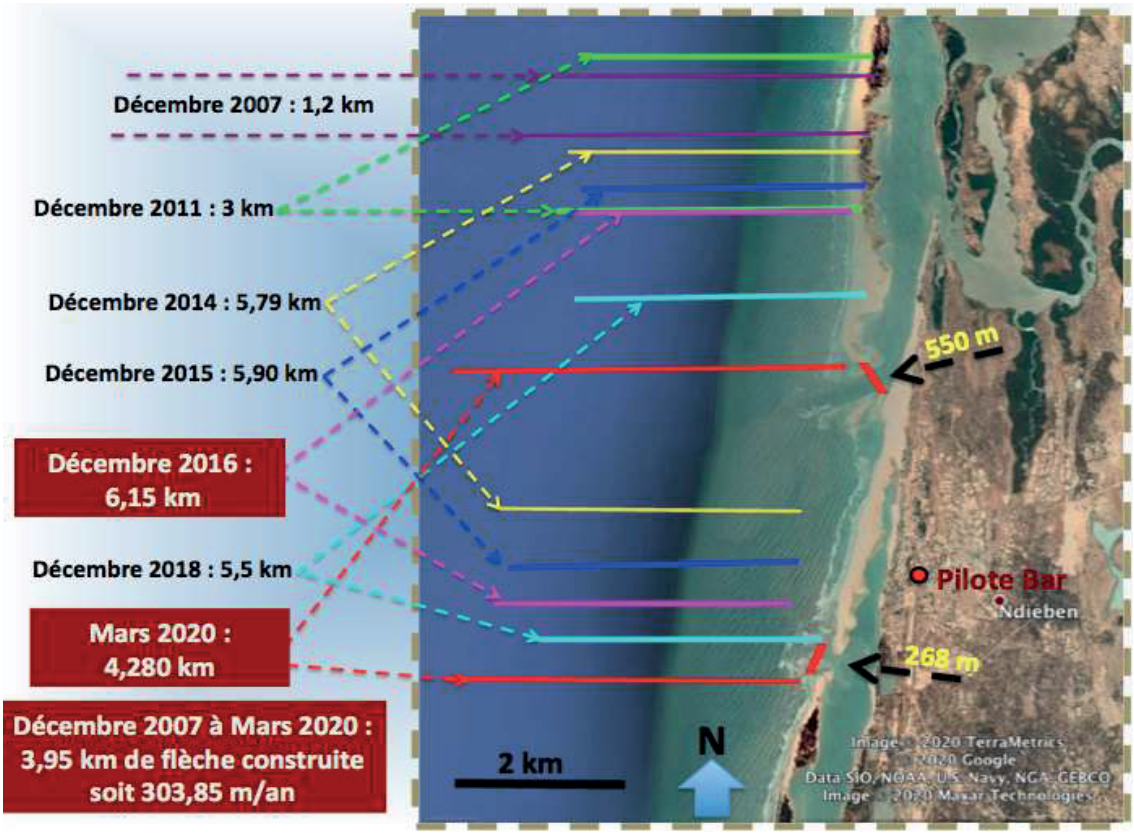


Figure 7: Evolution of the Langue de Barbarie breach since 2003

Source: CSE, 2020

Senegal's environmental outlook will depend largely on socio-economic development scenarios, population growth and climate risk impacts. However, this prediction can be qualified especially by the occurrence of unexpected disruptive events such as the COVID-19 pandemic. The combination of demographic pressure, urbanization, poverty, food security policies and cultural practices may lead to a conversion of agricultural land to buildings, particularly in the groundnut basin; hence the urgent need to develop a sustainable land management strategy.

The decrease in rainfall and the rise in temperature, as a result of climate change, have led to increased pressure on water resources and pressures and threats to biodiversity from several factors. The disruption of the balance of terrestrial ecosystems is manifested, among other things, in several ways: changes in functioning, vulnerability, salinization and acidification of waters, and drying out of valleys. The current trend in forest ecosystems is characterized by a continuous degradation that is reflected in a change in floristic composition and a decrease in surface area. The risk of extinction of certain species of biodiversity is increasing and even accelerating through the lenses of current environmental pressures.

INTRODUCTION

The Senegalese State of the Environment Report (REE) is a reference document that provides information on the state and trends of natural ecosystems and human well-being in Senegal, as well as an assessment of the progress made in implementing the national environmental policies. Its regular update and dissemination respond to the need to provide a knowledge-base and effective management tools, likely to guide decision-making in order to integrate the environmental dimension in the national, sectoral and territorial planning process.

In this fourth edition, whose main theme is **"Improving environmental awareness for a sustainable management of natural resources in Senegal"**, a special focus was on climate governance, particularly with regard to the modalities of the PES contribution in its improvement, as well as the implementation of the Nationally Determined Contributions (NDCs) and the 2030 Agenda of the Sustainable Development Goals (SDGs).

The framework used to assess the state of the environment in Senegal is called **"DPSIR"** (drivers, pressures, state, impact and response). It is an approach that makes it possible to analyze the current state of the environment by considering the driving forces and direct causes of environmental change, the consequences on human and ecological systems, as well as the potential for economic and social development, without forgetting the multi-scale strategies intended to mitigate the causes and effects of environmental change.

In the continuity of the previous reports (**2000; 2010 and 2015**), the **fourth edition** of the EAR covers areas of concern for the priority sectors of Senegal's economic recovery plan: **Water Resources, Marine and Coastal Environment, Land and Land Governance, Biodiversity and Ecosystem Services, Mining and Energy, Human Settlements and Living Environment, Environmental Planning**. It provides important data and information on natural resources, the optimal exploitation of which is the driving force behind the march towards emergence in 2035.

Ten chapters structure the PTR:

- "Biophysical and Socio-Economic Context" (Chapter 1)
- "Vulnerability to Climate Change and Governance" (Chapter 2)
- "Water Resources" (Chapter 3)
- "Marine and Coastal Environment" (Chapter 4)
- "Land and Land Governance" (Chapter 5)
- "Biodiversity and Ecosystem Services" (Chapter 6)
- "Mining and Energy" (Chapter 7)
- "Human Settlements and the Living Environment" (Chapter 8)
- "Environmental Planning" (Chapter 9)
- "Environmental Perspectives" (Chapter 10).

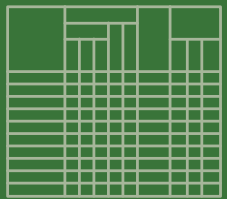
The ten chapters of the report, with interconnected themes, provide an overview of the environmental issue addressed, an inventory of the institutional and regulatory arrangements in place, a background analysis of the sectoral policies, programs and projects implemented and an assessment of the potential and actual environmental impacts, including strategies and solutions for mitigating the adverse effects on communities.

The 2020 EAR includes:

280 pages

100 figures

55 tables



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